CURRICULUM

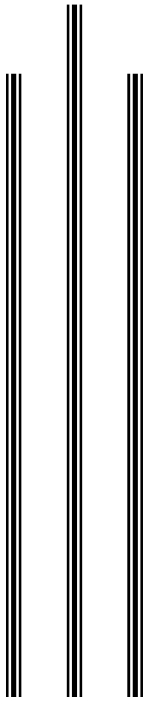
for

DIPLOMA

in

PHARMACY

(Second and Third Year)



COUNCIL FOR TECHNICAL EDUCATION AND VOCATIONAL TRAINING

Curriculum Development Division

2005

Revised on: June 2014

Table of Contents

Introduction

The Government of Nepal (GoN) is committed to bringing about tangible changes in access and utilization of Essential Health Care Services (EHCS), thereby improving the health status of the Nepalese population through health sector development process. Access to health care facilities continues to be a problem in rural areas as well as urban areas, especially for the most disadvantaged. Nepal's health policy and strategy documents over the past several decades repeatedly identify issues regarding the deployment and retention of health sector human resource as a major problem that our country is facing. The Council for Technical Education and Vocational Training (CTEVT) has been contributing towards the development of different middle level of health human resource. In this connection, CTEVT is producing Diploma in Pharmacy professional - as middle level pharmaceutical service providers. The CTEVT will award certificate of **"Diploma in Pharmacy"** to the candidates who successfully complete the requirements as prescribed by the council. The **Diploma in Pharmacy** professional will be able to work as **Pharmacy Assistant in the** Community Pharmacy, Hospitals and other Pharmaceutical services providing sites.

Mission of the Curriculum

To provide the document which direct CTEVT schools and faculty in the process of educating quality middle level pharmacy human resource to meet the requirements of pharmaceutical services in Nepal and abroad.

Strategy

The strategies to achieve our mission of professional excellence will be attained by maintaining expert faculty, implementing the curriculum, and enrollment of quality students.

Philosophy

The philosophy of the **Diploma in Pharmacy** curriculum should be based on the development of pharmacy, as a profession for fulfilling the healthcare needs of the people with its socio-cultural impact on health. It should be based on code of conduct of Nepal Pharmacy Council. The approach should focus on pharmaceutical services for better health of the people.

Program Description

This course is based on the job required to perform by a pharmacy assistants at different levels of public and private health institutions in Nepal. The **Diploma in Pharmacy** program extends over three years. The first year focuses on basic science subjects; the second year focuses on basic medical science and pharmaceutical sciences. Similarly, the third year focuses on the professional practice focus courses and application of acquired knowledge and skills through comprehensive field practices in hospital, community pharmacies, drug manufacturing, regulation and quality assurance. The professionals are eligible for registration as pharmacy assistants in the Nepal Pharmacy Council. The contents of individual subjects prescribed in the curriculum are incorporated in the light of skills required for professional practice.

Aims and Objectives

The course aims to produce middle level pharmacy human resource with perfect technical skills that can face real life situation at the level they are aimed at.
The course enables students:

- To prepare technically competent middle level pharmacy human resource who will demonstrate excellent service attitude and respect for the profession and socio-cultural values.
- To develop middle level pharmacy human resource for good pharmacy practice in the hospitals as well as in the community settings.
- To demonstrate leadership in managing quality supply of pharmaceuticals and to promote rational use of medicine within the healthcare facilities and at the community pharmacies.
- To develop middle level pharmacy human resource in order to assist in production and quality assurance of pharmaceuticals.

Conceptual Framework

The course should reflect:

- The need of pharmaceutical service for the proper care of a patient.
- The roles and responsibilities of pharmacy assistant to improve the pharmaceutical supply system and to promote rational use of medicine.
- The development of professionalism in pharmaceutical sector by addressing simple to complex ideas those are associated with epistemology, ontology and methodology in pharmacy.

Target Group

SLC pass candidates and/or equivalent.

Group Size

40 (Forty) students in a batch

Entry Criteria

The entry criteria are:

- SLC or equivalent with English, Science and Mathematics as compulsory subjects.
- Passed entrance examination organized by CTEVT.
- Applicant should submit along with the following documents at the time of application:
    - SLC pass certificate or equivalent certificate
    - Character certificate
    - Citizenship certificate (for the name, parents name, age, date of birth and address verification purpose only).
    - Medical fitness certificate (at the time of admission)
- Student quota for different category of students as per the policy of Nepal Pharmacy Council and CTEVT.

Medium of Instruction

English and/or Nepali

Course Duration

The diploma in Pharmacy program extends over three academic years. One academic year consists of maximum of 39 academic weeks and one academic week consists of maximum of 40 hrs.

Pattern of Attendance

Minimum of 80% attendance is required to appear in final examination.

Teacher and Student Ratio

The teacher student ratio is:

- Overall ratio of teacher and student must be 1:10 (at the institution level).
- Teacher and student ratio for practical demonstration 1:20
- Student ratio for bench work 1:4
- Each professional subject should have one full time teacher. (For example to run the 2nd and 3rd year course five full time faculties are necessary)

Program Coordinator, Teacher and Demonstrator

The qualifications of the program coordinator, teacher and demonstration are:

- The program coordinator must be a master degree holder in related field or a bachelor degree holder in related field with minimum 3 years experience in teaching activities.
- The teacher must be a bachelor degree holder with minimum 3 years experience in related field.
- The demonstrator must have an intermediate level degree in related field with 2 years experience in teaching activities.
- For basic science and general subjects the teacher must have a master's degree in related field.

Instructional Media and Materials

The following instructional media and materials are suggested for the effective instruction and demonstration.

- ***Printed Media Materials*** (Assignment sheets, Case studies, Handouts, Information sheets, Individual training packets, Procedure sheets, Performance Check lists, Books.). Student Textbook ratio 1:2, reference book 10:1
- ***Non-projected Media Materials*** (Display, Models, Flip chart, Poster, Writing board etc.).
- ***Projected Media Materials*** (Opaque projections, Overhead transparencies, Slides etc.).
- ***Audio-Visual Materials*** (Audiotapes, Films, Slide-tape programs, Videodiscs, Videotapes etc.).
- ***Computer-Based Instructional Materials*** (Computer-based training, Interactive video etc.).

Comprehensive Professional Field Practice

The details of professional practice and field visit within the course are as follows:

- Consists of 8½ weeks.
- Comprehensive professional practice should be conducted in hospitals, PHC, Health Post, community pharmacies that are listed (accredited after regulation regarding accreditation is approved) in Nepal Pharmacy Council (NPC).
- Field visit to Pharmaceutical Industry (approved by DDA), Regulatory (DDA) and QA/QC Lab total 3 days.
- During field practice there should be at least one teacher (either from health facility or training institution).
- Student Field Log book according to NPC is compulsory.

Teaching Learning Methodologies

The methods of teachings for Diploma in Pharmacy program will be a combination of several approaches. Such as Illustrated Lecture, Group Discussion, Demonstration, Simulation, Guided practice, Practical experiences, Fieldwork, Laboratory observation, Hospital and community visit, Term paper presentation, Case analysis, Tutoring, Role-playing, Heuristic and Other Independent learning.

- Theory: Lecture, Discussion, Assignment, Group work.
- Practical: Demonstration, observation and Self-practice.
- Extracurricular activities

Disciplinary and Ethical Requirements

1. Intoxication, insubordination or rudeness to peers will result in immediate suspension followed by review by the disciplinary review committee of the college.
2. Dishonesty in academic or practice activities will result in immediate suspension followed by administrative review, with possible expulsion.
3. Illicit drug use, bearing arms on campus, threats or assaults to peers, faculty or staff will result in immediate suspension, followed by administrative review with possible expulsion.

Methods of Evaluation

a. Internal assessment

- There shall be a transparent evaluation system for each subject both in theory and practical exposure.
- Each subject will have internal evaluation at regular intervals of 4 months and students must get the feedback about it.
- Weightage of theory and practical marks will be according to the course structure.
- Clinical/field assessment format must be developed and applied by the evaluators for evaluating student's performance in each subject related to the clinical experience.
- NPC regulations and guidelines have to be followed where ever instructed.

b. Final examination

- Weightage of theory and practical marks will be according to the course structure.
- Students must pass in all subjects both in theory and practical to qualify for certification. If a student becomes unable to succeed in any subject s/he shall appear in the re-examination organized by CTEVT.
- Students shall be allowed to appear in final examination only after completing the internal assessment requirements.

c. Requirement for final practical examination

- Pharmacist faculties involved in the teaching learning must evaluate final practical examinations.
- One examiner in one setting can evaluate not more than 20 students in a day.
- Practical examination should be administered in actual situation on relevant subject with the provision of at least one internal examiner from the concerned or affiliating institute led external examiner (subject expert) nominated by CTEVT. Provision of re-examination as per CTEVT's rules and regulations.

Pass Marks

The pass marks for theory and practical examinations are: 40% in theory examination and 60% in practical examination.

Grading System

The following grading system will be adopted

- **Pass division:** Pass aggregate to below 60%.
- **Second division:** 60% to below 65%.
- **First division:** 65% to below 80%
- **Distinction:** 80% or above.

Certificate Award

The council for technical education and vocational training will award the certificate of **"Diploma in Pharmacy"** to the candidate who successfully completes the requirements as prescribed by the CTEVT.

Career path

The professionals will be eligible for the position as Pharmacy Assistants or as prescribed by the Public Service Commission in the public health facilities. They are also eligible to provide the quality pharmaceutical service in the Hospital and community pharmacies according to Nepal Pharmacy Council Act and Regulation. The professional is eligible for registration with the Nepal Pharmacy Council in the grade as mentioned in the Nepal Pharmacy Council Act 2057 (2000).

Course Structure

First Year, Diploma in Pharmacy											
S.N.	Subject	Mode		Weekly Hours	Distribution of Marks						Total Marks
					Theory			Practical			
		T	P		Internal	Final	Time (Hrs)	Internal	Final	Time (Hrs)	
1	English	3	-	3	20	80	3	-	-	-	100
2	Nepali	3	-	3	20	80	3	-	-	-	100
3	Social Studies	3	-	3	10	40	3	-	-	-	50
4	Anatomy & Physiology	3	2	5	16	64	3	8	12	3	100
5	Physics	3	1	4	16	64	3	8	12	3	100
6	Chemistry	3	2	5	16	64	3	8	12	3	100
7	Zoology	3	2	5	16	64	3	8	12	3	100
8	Botany	3	2	5	16	64	3	8	12	3	100
9	Mathematics, Statistics & Computer Application	3	2	5	16	64	3	8	12	3	100
	Total	27	11	38	146	584		48	72		850

Second Year, Diploma in Pharmacy									
S.N	Subject	Mode		Wks/ Hrs	Distribution of Marks				Total Marks
		T	P	T	Theory		Practical		
					Internal	Final	Internal	Final	
1	Pharmaceutics- I	3	2	5	20	80	20	30	150
2	Pharmacology and therapeutics I	3	2	5	20	80	20	30	150
3	General Chemistry II	4	2	6	20	80	20	30	150
4	Pharmacognosy	3	2	5	20	80	20	30	150
5	Biochemistry & Microbiology	2	1	3	16	64	8	12	100
6	Pathophysiology	2	0	2	10	40	0	0	50
7	Pharmaceutical Management	2	1	3	16	64	8	12	100
8	Health Education, Health Care System	3	1	4	16	64	8	12	100
		22	11	33					950

Third Year, Diploma in Pharmacy									
S.N	Subject	Mode		Wks / Hrs	Distribution of Marks				Total Marks
		T	P	T	Theory		Practical		
					Internal	Final	Internal	Final	
1	Pharmaceutics- II	3	2	5	20	80	20	30	150
2	Pharmacology & therapeutics II	3	2	5	20	80	20	30	150
3	Pharmaceutical Chemistry	3	2	5	20	80	20	30	150
4	Hospital & Clinical Pharmacy	3	2	5	20	80	20	30	150
5	Social Pharmacy & Pharmaceutical Jurisprudence	3	2	5	20	80	20	30	150
6.	Community Pharmacy and First aid	2	2	4	10	40	20	30	100
7.	Comprehensive Professional Field Practice						100	100	200*
		17	12	29					1050

*Details on the distribution of marks for field practice evaluation are mentioned in the field practice section of the curriculum.

Second Year

Subject Title: Pharmaceutics I

Theory total: 117 hrs (3 hrs/week) **Full marks: 150 (Th.100+Pr. 50)**
Practical total: 78 hrs (2 hrs/week) **Pass marks: 70 (Th. 40+Pr. 30)**

Course description

This course is designed to equip the students with knowledge and skills on pharmaceutical calculations, pharmaceutical process, and principles of pharmaceutics and basics of biopharmaceutics. It also deals with comminution principal, pharmaceutical application of size separation and mixing, extraction processes method of heat transfer and factors affecting bioavailability.

Course objective

After completion of course the student will be able to:

1. Classify different pharmaceutical dosage forms and orient with new drug delivery systems.
2. Describe the contents of different pharmacopoeias.
3. Define metrology, do conversion from one system to another and solve the problems related to percentage and ratio strength and dilution and concentration.
4. Define comminution and describe comminution principles with example of each.
5. Describe different grades of powder.
6. Describe the pharmaceutical application of size separation and mixing and working of their respective equipments.
7. Select filters and describe the different filtration equipment.
8. Define extraction and describe various extraction processes and its principles
9. Explain the pharmaceutical application of drying and explain different dryers.
10. Describe the physicochemical principles of pharmaceutics and their applications.
11. Prepare simple Pharmaceutical preparations.

Theory

Unit 1 Introduction to pharmaceutical preparation and dosage form 13 hrs

1.1 Different pharmaceutical preparations and dosage forms (10 hrs):

Define and classify Tablet, Capsules, Aromatic Water, Cachets, colloids, Creams, Draughts, Dusting Powders, Dentifrices, Ear Drops, Elixir, Emulsions, Enemas, Eye Drops, Eye Lotions, Gargles, Gels, Glycerines, Granules, Effervescent Granules, Implants, Infusions, Inhalations, Injections, Insufflations, Irrigations, Jellies, Linctuses, Liniments, Lotions, Lozenges, Mixtures, Mouthwashes, Nasal Drops, Ointments, Ophthalmic Ointments, Paints, Paste, Pessaries, Powders, Solutions, Dispersible Tablets, Chewable tablets, Spirits, Sprays, Suppositories, Suspensions, Syrups, Tinctures. Introduction to veterinary dosage forms.

1.2 New drug delivery system (3 hour):

Discuss briefly about Nasal, Transdermal, Pulmonary, Occular, Buccal, Post-oral, Vaginal and Intramuscular drug delivery systems.

Unit 2. Pharmacopeias and formularies used in Nepal 3 hrs

2.1 Brief introduction about pharmacopoeias and their uses. Introduce British Pharmacopoeia, United States Pharmacopoeia, Indian Pharmacopoeia, British Pharmaceutical Codex, Japanese pharmacopoeia, International Pharmacopoeia, European Pharmacopoeia etc.

Unit 3. Weight and measures **7 hrs**

3.1 Classify weight and measure and convert from one system to another and one unit to another.

3.2 Solve problems related to percentage and ratio strength, allegation method and isotonic solutions.

Unit 4. Comminution **6 hrs**

4.1 Define comminution and describe objectives of size reduction.

4.2 Describe factors affecting size reduction.

4.3 Describe principles of size reduction with description of hammer mill, ball mill, fluid energy mill and colloid mill.

Unit 5. Size Separation **6 hrs**

5.1 Introduce size separation and describe pharmaceutical applications of size separations.

5.2 Classify powders as per official standards.

5.3 Describe size separation by sifting and sedimentation methods.

Unit 6. Mixing and Homogenization **7 hrs**

6.1 Define mixing and mention its pharmaceutical applications.

6.2 Describe liquid-liquid mixing, semisolid – liquid mixing, Semisolid – solid mixing, Solid - liquid mixing and solid - solid mixing.

6.3 Describe the function of the following mixing equipment: Planetary Mixer, Triple Roller Mill, Colloid mill and Double cone mixer.

Unit 7. Filtration and clarification **7 hrs**

7.1 Define filtration and explain theory and pharmaceutical applications of filtration.

7.2 Discuss filter media and filtration aids in brief.

7.3 Describe factors affecting the selection of filters and describe the application of the following:

- Sintered filters.
- Filters candles.
- Filter press.

Unit 8. Extraction **5 hrs**

8.1 Define extraction and provide concept of solid-liquid and liquid-liquid extractions.

8.2 Study of percolation and maceration and their modification, continuous hot extraction-Application in the preparation of tinctures and extracts.

8.3 Describe factors affecting the selection of extraction process.

Unit 9. Heat Process **6 hrs**

9.1 Define heat, temperature and heat transfer and describe method of heat transfer.

9.2 Mention the name of different heat processes.

9.3 Define evaporation and explain its pharmaceutical application.

9.4 Describe evaporation still and evaporation pan.

9.5 Explain factors affecting evaporation.

Unit 10. Distillation **7 hrs**

10.1 Define and differentiate between distillation and evaporation.

10.2 Mention different types of distillation and explain simple distillation, fractional distillation, steam distillation and vacuum distillation.

10.3 Explain the preparation of purified water and water for injection.

Unit 11. Drying process **6 hrs**

11.1 Define drying and mention its pharmaceutical applications.

11.2 Mention different types of dryers and explain tray dryer and fluidized bed dryers.

Unit 12. Physicochemical Principles of Pharmaceutics **21 hrs**

12.1 Rheology and flow of fluids: **5 hrs**

• Define viscosity and rheology and classify fluids based on its flow properties.

Newtonian fluids

• Provide concept of laminar, transitional and turbulent flows and explain capillary and falling sphere viscometers.

Non-Newtonian fluids

- Provide concept of types of Non-Newtonian flow. Describe briefly plastic, psuedoplastic and dilatants flow.
- Describe pharmaceutical applications of rheology.

12.2 Surface and Interfacial Phenomena: **6 hrs**

- Define surface and interfacial tension and mention the different methods of measurement.
- Describe contact angle and its pharmaceutical applications.
- Describe surface-active agents, their physical properties and their pharmaceutical applications.

12.3 Disperse Systems: (4 hrs)

• Define colloids and describe their properties.

• Describe application of colloids in pharmacy.

12.4 Kinetics and stability testing: (6 hrs)

• Define different orders of reaction.

• Describe the factors that affect the stability of pharmaceutical products.

- Mention different methods of determination of orders of reaction and describe graphical method of interpretation.
- Describe the method of accelerated stability testing and prediction of shelf life of the product.
- Briefly describe Guidelines for stability testing of pharmaceuticals.

Unit 13. Monophasic liquid dosage forms **8 hrs**

13.1 Define monophasic liquid dosage form and mention its advantages and disadvantages.

13.2 Describe factors affecting solubility.

13.3 Mention the components of formulation with examples.

13.4 Describe the preparation of mixtures, Syrup, Elixirs, Linctuses, Drops, Draughts, Gargles, Mouth Washes, Throat paints, Sprays, Enemas, Douches, Ear drops, Nasal drops and sprays, Liniments and Lotions.

Unit 14. Introduction to Biopharmaceutics **15 hrs**

14.1 Provide the concept of bioavailability and biopharmaceutics.

14.2 Describe the basic concept of mechanism of drug transport across gastrointestinal barrier.

14.3 Mention different factors influencing bioavailability

14.4 Explain plasma concentration – time curves of oral, i. v. bolus and i. v. infusion and Cumulative urinary drug excretion curve.

14.5 Define absolute and relative bioavailability and bioequivalence.
14.6 Describe factors influencing steady state plasma drug concentration in the body.

Practical

Unit 1. Different pharmaceutical preparations and dosage forms 54 hrs

- Prepare and supply chloroform water. (4 hrs)
- Prepare and supply aqueous iodine solution. (4 hrs)
- Prepare and supply chloroform spirit. (4 hrs)
- Prepare and supply camphor spirit. (4 hrs)
- Prepare and supply strong ginger tincture. (4 hrs)
- Prepare and supply orange/iodine tincture. (4 hrs)
- Prepare and supply root extract of *Rheum emodi* (Padamchal). (6 hrs)
- Prepare and supply extract of *Mentha species* (Pudina). (6 hrs)
- Prepare and supply thymol / chlorhexidine gargle. (4 hrs)
- Prepare and supply calamine lotion. (4 hrs)
- Prepare and supply compound sodium chloride mouthwash. (4 hrs)
- Prepare simple syrup. (4 hours)

Unit 2. Physicochemical principles of pharmaceutics 24 hrs

- Determine surface tension using drop count method. (2 hour)
- Determine bulk density and void porosity of given powder. (6 hrs)
- Measure the viscosity of simple syrup using Ostwald viscometer. (6 hrs)
- Perform the mixing of different colored powders and examine their particle size microscopically. (6hrs)
- Carry out simple filtration experiment. (2 hours)
- Carry out simple experiment to measure moisture content in given powder material. (2 hours)

References

1. Gaud. Pharmaceutics, 2003, India.
2. Gaud and Gupta. Practical Pharmaceutics, 2004, India.
3. Gaud and Gupta. Practical Physical Pharmacy, 2004, India.
4. Gaud. Textbook of pharmaceutics, 2004, India.
5. Gupta, A. K. Pharmaceutics: Practical manual (Part I & II), 2004, India.
6. Gupta, A. K. Introduction to pharmaceutics-I. , 2004, CBS publisher and distributors, India.
7. THAPA, P, THAPA, B. B. and BUDHATHOKI, U. (2006), Introductory Pharmaceutics volume
8. The extra pharmacopoeia (Martindale).
9. Physical Pharmacy by Alfred Martin.
10. Bentley's Text Book of Pharmaceutics by E. A. Rawlins.
11. Remington: The Science and Practice of Pharmacy, 20th Edition, Vol I & II.
12. The Theory and Practice of Industrial Pharmacy, Leon Lackman, H. A. Lieberman, J. L. Kanig, Third Edition, Varghese Publishing House, Hind Rajasthan Building, Dadar, Bombay – 400 014.
13. Pharmaceutical Dosage Forms and Drug Delivery Systems. H. C. Ansel, L. V. Allen and N. G. Popovich, Seventh Edition, Lippincott Williams and Wilkins.
14. Pharmaceutics: The Science of Dosage Forms, M. E. Aulton, Churchill Livingstone.
15. Cooper and Gunn's Tuitorial Pharmacy, Sixth Edition.

Subject Titles: Pharmacology & Pharmacotherapeutics – I

Theory total: 117 hrs (3 hrs/week) **Full marks: 150 (Th. 100+Pr. 50)**
Practical total: 78 hrs (2 hrs/week) **Pass marks: 70 (Th. 40+Pr. 30)**

Course Description
This course is designed to help students to acquire the knowledge and skills on drug action, handling by body and therapeutics concerned with the application of pharmacology in prevention and treatment of diseases. This course deals with pharmacotherapeutic agents and their role in different pathophysiological conditions. Additionally, this course focuses on the mode of action, the uses and adverse effects, drug interaction, and precautions to be taken for drugs to be used.

Course objective
After completion of the course the student will be able to:
1 Understand the specific action and use of drugs on different body systems.
2 Explain the principles of phamacotherapeutics and drug safety
3 Know the action, use, mechanism of action, interaction, adverse reactions, and market availability mainly with reference to counseling to patients & care taker on rational use of following drugs:

- Gastro intestinal drugs.
- NSAIDs
- Autonomic Nervous System drugs.
- Respiratory System drugs.
- Antimicrobial Drugs

THEORY

1. General pharmacological principles **20hrs**
1.1 Terminologies used in pharmacology
1.2 Drug nomenclature
1.3 Routes of drug administration
1.4. Pharmacokinetics: Definition; process of absorption, distribution, biotransformation, elimination; factors affecting on these processes
1.4 Pharmacodynamics
1.4.1 Mechanism and principle of drug action
1.4.2 Receptor theory of Drug Action
1.4.3 Half life, plasma concentration of drug and bioavailability
1.5 Types of adverse drug reactions

Unit 2: GASTRAOINTESTINAL DRUGS **20 hrs**
2.1 Management of Peptic ulcer, vomiting, diarrhea, and constipation
2.2 General mechanism of action, use, side effect, contraindication, precaution and dose of commonly used

- antacids, ulcer healing drugs , ulcer protective an anti H.pylori drugs
- antiemetic drugs: Metoclopramide, Domperidone, Ondensetron, promethazine
- antidiarrheal: Diphenoxylate, ORS
- drug used in constipation: Bulk forming laxatives, irritant Laxative, Stool softeners, Lactulose

Unit 3 NSAIDS AND ANTIPYRETIC ANALGESICS 8hrs

3.1 Define pain, pyrexia and inflammation

3.2 General mechanism of action, use, side effect, contraindication, precaution and dose of commonly used

- Analgesic, antipyretic and anti-inflammatory drugs: Ibuprofen, Indomethacin, Diclofenac, Nimesulide, paracetamol, Aspirin
- drugs used in rheumatoid arthritis: NSAIDS, Disease modifying agents: Steroids, Methotrexate, Azothioprine
- drug used in gout: Colchicine, Allopurinol, Febuxostat

UNIT 4: DRUGS ACTING ON AUTONOMIC NERVOUS SYSTEM 17 hrs

4.1 Physiology of ANS

4.2 General mechanism of action, use, side effect, contraindication, precaution and dose of commonly used

- Cholinergic drugs: Pilocarpine, Neostigmine, Pyridostigmine
- Anticholinergic drugs: Atropine, Dicyclomine, Trihexyphenidol
- Adrenergic drugs: Adrenaline, Noradrenaline, Dopamine
- Antiadrenergic drugs: Prazosin, Terazosin, Tamsulosin, Propranolol, Atenolol, Timolol

UNIT 5: RESPIRATORY SYSTEM DRUGS 8hrs

5.1 Define cough, asthma, COPD

5.2 General mechanism of action, use, side effect, contraindication, precaution and dose of commonly used

- Drugs used in cough: Anti-tussives (Codeine, Dextromethorphan) Expectorant: (Ammonium Chloride, Bromohexine, Guafensin)
- Drugs used in asthma and COPD: Bronchodilators: Salbutamol, salmeterol, Theophyllin-Aminophylline

UNIT 6: ANTIMICROBIAL DRUGS 44 hrs

6.1 Classification of antimicrobials according to their mechanism of action, spectrum of activity, type of action, type of organism against which the antibiotics are active

6.2 General principles of antimicrobial therapy

6.3 microbial resistance, mechanism and types

6.4 General mechanism of action, use, side effect, contraindication, precaution and dose of commonly used

- Sulphonamides: Co-trimoxazole, Sulphasalazine, Sulphacetamide, Silver sulfadiazine
- Penicillin (including new generation penicillin e.g., meropenems ,carbapenems and monobactams): Benzylpencillin, Phenoxymethylpencillin, Ampicillin, Cloxacillin,Amoxycillin
- Cephalosporin: Cephalexin, Cefaclor, Cefotaxime, Cefuroxime
- Beta lactam inhibitors and their combination: clavulanic acid, sulbactam
- Tetracycline: Tetracycline, Doxycycline
- Aminoglycosides: Streptomycin, Gentamycin, Kanamycin,Amikacin
- Macrolides: Erythromycin, Azithromycin, Clarithromycin
- Quinolones and fluoroquinolones: Norfloxacin, Ciprofloxacin, Ofloxacin, Nitrofurantoin, Levofloxacin
- Antitubercular drugs: First line: INH, Rifampicin, Pyrazinamide, Ethambutol
  2^{nd} line: PAS, Cycloserine, Ciprofloxacin
- Antileprotic drugs:Dapsone,clofazimine
- Antifungal : Nystatin, Griseofulvin, Clotrimazole, Ketoconazole, Fluconazole

- Antiviral : Amantadine, Antiretroviral drugs
- Antimalarial : chloroquine, primaquine, mefloquine, quinine, artemisin
- Antiprotozoal : Metronidazole, Diloxanide Furoate, Tinidazole
- Antihelmentics: Albendazole, Mebendazole, Pyrantal pamoate, Niclosamide, Praziquintel, Diethylcarbamazine citrate

PRACTICAL

Unit- 1. Pharmacology laboratory set up **6 hrs**

1.1 familiarize with the different instruments /equipment of pharmacology laboratory in specimen /slide show/ pictures and diagrams

Unit 2 Clinical measurement **10hrs**

2.1 measure the temperature /pulse rate/ respiration rate/blood pressure of human volunteers

Unit - 3 Interpretation of pharmacological data **25 hrs**

3.1 Simulated data interpretation from existing data base.

Unit 4 Case studies **30 hrs**

4.1 Drugs use in clinical setting (at least 10 case studies)

Unit 5 To prepare drug profile of commonly used drugs **7 hrs**

Subject Title: General Chemistry II

Theory total: 156 hrs (4 hrs/week) **Full marks: 150 (Th. 100+Pr. 50)**
Practical total: 78 hrs (2 hrs/week) **Pass marks: 70 (Th. 40+Pr. 30)**

Course description
This course is designed to acquaint students with the knowledge and skills of basic chemistry that is the foundation for medicinal chemistry.

Course objective
After completion of this course the student will able to:

1. Describe the properties Alkali and alkaline earth metal and their chemical compounds.
2. Describe the properties of group - 10 elements and their chemical compounds
3. Describe the Chemical Kinetics that is basis for stability of chemical compounds.
4. Learn the equilibrium process in chemical reactions.
5. Interpret the pharmaceutical ingredients containing ions according to official monographs and articles.
6. Learn the QC of Pharmaceutical compounds and excipients according to official monographs and articles.
7. Describe the physico-chemical properties, method(s) of quality control, storage, stability, incompatibilities and medicinal and pharmaceutical use of various ingredients.
8. Understands the groups of chemicals serving mankind
9. Understand the inorganic and instrumental method of analysis.

Unit – 1: S-Block Elements (Alkali and Alkaline earth metals):

Group 1 and Group 2 elements: **(20 hrs)**

General introduction, electronic configuration, occurrence, anomalous properties of the first element of each group, diagonal relationship, trends in the variation of properties (such as ionization enthalpy, atomic and ionic radii), trends in chemical reactivity with oxygen, water, hydrogen and halogens; uses. Preparation and properties of some important compounds: Sodium carbonate, sodium chloride, sodium hydroxide and sodium hydrogen carbonate, biological importance of sodium and potassium. CaO, $CaCO_3$ and industrial use of lime and limestone, biological importance of Mg and Ca.

Group 10: elements: **(15 hrs)**

General introduction, electronic configuration, occurrence. Variation of properties, oxidation states, trends in chemical reactivity, anomalous properties of first element of the group; Boron-physical and chemical properties, some important compounds: borax, boric acids, boron hydrides. Aluminium: uses, reactions with acids and alkalis.

Unit – 2: Equilibrium (6 hrs)

Equilibrium in physical and chemical processes, dynamic nature of equilibrium, law of mass action, equilibrium constant, factors affecting equilibrium - Le Chatelier's principle; ionic equilibrium - ionization of acids and bases, strong and weak electrolytes with examples, degree of ionization, concept of pH. Hydrolysis of salts (elementary idea). Buffer solutions, solubility product, and common ion effect (with illustrative examples).

Unit – 3: Chemical Kinetics (15 hrs)

Rate of reaction (average and instantaneous), factors affecting rate of reaction; concentration, temperature, catalyst; order and molecularity of a reaction; rate law and specific rate constant, integrated rate equations and half life (only for zero and first order reactions); concept of collision theory (elementary idea, no mathematical treatment).Activation energy, Arrhenius equation. (Solving related numerical)

Unit – 4: Chemistry serving mankind (40 hrs)

Polymers: Classification – Natural and synthetic, methods of polymerization (addition and condensation), copolymerization. Some important polymers: natural and synthetic like polythene, nylon, polyesters, Bakelite, and rubber. Biodegradable and non-biodegradable polymers. Chemicals in medicines – analgesics (introduce Paracetamol), Anxiolytics, Anti-cancers (introduce Cisplatin), antiseptics (introduce Alcohol), disinfectants (introduce sodium hypochlorite), antimicrobials (introduce Sulphamethoxazole), antifertility drugs, antibiotics (introduce Penicillin), antacids (introduce Al $(OH)_3$ and Magnesium Trisilicate), antihistamines (introduce Promethazine).

Chemicals in food – preservatives (introduce sodium benzoate), artificial sweetening agents (introduce Sodium saccharine), elementary idea of antioxidants. Cleansing agents – soaps and detergents, cleansing action.

Dyes: Natural and synthetic coloring agents of Textile, foods and pharmaceuticals (common five examples). Uses and risks.

Pesticides: Insecticides, Herbicides, Weedicides and Fungicides. Uses and their risk.

Fertilizers: Chemical and organic, containing Nitrogen and Phosphate. Uses and their risk

Unit –5: Introduction to qualitative Inorganic and instrumental Analysis 10 hrs

Introduce dry and wet reactions. Introduce Potentiometric and Amperometric Titrations with examples. Introduce Colorimetric determination with example.

Unit –6: The basis of Titrimetric Analysis 40 hrs

Complexation Titration (Property of EDTA, Types of EDTA Titration, Masking and demasking agents, Metal ion indicators, Standard EDTA solution.

Introduce the determination of individual cations (Minimum 10 from S- block and group 10 elements), introduce the analysis of mixtures of Calcium + Magnesium and Magnesium + Zinc. Introduce the determination of commonly used 10 anions.

Precipitation titration: Introduce Argentometric titration Method, Describe the Preparation and standardization of 0.1 M silver nitrate solution. Introduce Volhard’s Method. Introduce the Gravimetric analysis with example.

Practical 78 hrs

1. Chemical Kinetics (Any two of the following):

1.1. Effect of concentration and temperature on the rate of reaction between sodium thiosulphate and hydrochloric acid.

1.2. Study of reaction rate of any one of the following:

(i) Reaction of iodide ion with hydrogen peroxide at room temperature using different concentration of iodide ions.

(ii) Reaction between potassium iodate, KIO3 and sodium sulphite (Na2SO3) using starch solution as indicator (clock reaction).

(c) Acid hydrolysis of ethyl acetate.

B. Thermochemistry

Any two of the following experiments:

i] Enthalpy of dissolution of copper sulphate or potassium nitrate.
ii] Enthalpy of neutralization of strong acid (HCI) and strong base (NaOH).
iii] Determination of enthalpy change during interaction (hydrogen bond formation) between acetone and chloroform.
iv] Heat of displacement of Cu from $CuSO_4$ by Zn.

1.3. Electrochemistry

Variation of cell potential in $Zn|Zn^{2+}||Cu^{2+}|Cu$ with change in concentration of electrolytes ($CuSO_4$ or $ZnSO_4$) at room temperature (demonstration).

2. Tests for the functional groups present in organic compounds covers in theory.

3. Determination of concentration/morality of cations using standard EDTA solution. (Students will be required to prepare standard solutions by weighing themselves).

4. Qualitative analysis: 10 each cations and anions covered in theory.

5. Study of the effect of potassium bisulphate as food and/or Aloe slurry preservative under various conditions (temperature, concentration, time etc).

Text Books: (Latest editions).

1. Holderness A and Lambert J- A New Certificate Chemistry, Heimann.
2. Graham C. Hall and John S Hallman- Chemistry in Context, ELBS.
3. Mitra Ladimohan- A text Book of Inorganic Chemistry.
4. Sthapit MK and Pradhanaga RR - Foundation of Chemistry Volume I, II and III, Talaju Prakashan Kathmandu.
5. Sienko and Plane- Chemistry, Mc-Graw- Hill.
6. Mathews Philip – Advanced Chemistry CUP.

Reference Books:

1. Mathews Philip – Advanced Chemistry (UP 1992).
2. Morrison, R.T. Boyd, D. J. and Hammond. G.S., Organic Chemistry, Prentice Hall of India Pvt. Ltd., New Delhi – 110001.
3. .A.H. Beckett and J.B. Stenlake, Practical Pharmaceutical Chemistry, Vol I & II.The Athlone Press of the University of London.
4. Vogel's Textbook of Macro and Semi micro Qualitative Inorganic Analysis. Longman. Latest Edition.
5. Vogel's Textbook of Quantitative Chemical Analysis. Longman. Latest Edition.

Subject Title: Pharmacognosy

Theory total: 117 hrs (3 hrs/week) **Full marks: 150 (Th. 100+Pr. 50)**
Practical total: 78 hrs (2 hrs/week) **Pass marks: 70 (Th. 40+Pr. 30)**

Course Description
This course is designed to provide students the skill and knowledge about pharmacognosy. It deals with the basic concepts of medicinal plants used in complementary and traditional system of medicine. Especially, this course focuses on phytochemistry, analytical process and microscopy of medicinal plants and their uses.

Course Objectives
After completion of the course the students will be able to:
1. Explain the history and scope of pharmacognosy.
2. Classify the drugs of natural origin.
3. Explain method of cultivation, collection, standardization, drying and storage of medicinal plants.
4. Explain Glycoside, Alkaloids, Phenolic compounds, Tannins, Volatile oils and derivatives of Isoprenes / Terpenes.
5. Explain the source, characteristics and uses of pharmaceutical aids of natural origin.
6. Describe source, geographical distribution, microscopic and macroscopic features, active constituents and uses of the plant drugs.
7. Explain and carry out microscopical and thin layer chromatography method of analysis.
8. Explain surgical cotton and gauze.
9. Explain various medicinal plants of Nepal having economic importance.

Theory

Unit 1: Introduction **14hrs**
1.1 Introduction to Pharmacognosy
1.2 History, scope and importance of Pharmacognosy
1.3 Classification of crude drugs
1.4 Complementary and alternative system of medicine and its different dosage forms (focusing on Ayurveda and Homeopathic system of medicine).

2 Unit 2: Plants to crude drugs **5hrs**
2.1 Method of cultivation
2.2 Collection, drying and storage of crude drugs

3. Introduction to parts of plants **10hrs**
3.1 Cell and its organelles
3.2 Cell inclusion (ergastric cell contents)
3.3 Plant tissues
3.4 Microscopy and morphology of plants (leaves, root, stem, flower, fruits, seed, bark and rhizome.

4. Quality control and evaluation of crude drugs **15 hrs**
4.1 Drug adulteration
4.2 World Health Organization (WHO) guidelines for the quality assessment of crude drugs
4.3 Evaluation methods (macroscopical, microscopic, physical, chemical and biological)

4.4 Principles and types of chromatographic techniques (Thin layer chromatography and paper chromatography)
4.5 Microscopical Techniques of analysis

5 Phytochemistry 26 hrs

5.1 Plant analysis
5.2 General properties, method of extraction, classification, chemical tests and uses of the following phytoconstituents.

- ❖ Alkaloids
- ❖ Glycosides
- ❖ Volatile oil
- ❖ Tannin
- ❖ Fixed oil
- ❖ Resin

6. Pharmacognostic study of crude drugs (Microscopical features of only highlighted drugs should be covered) 30 hrs

Different phytochemical constituents containing plants with reference to biological source, geographical distribution, macroscopical characters, microscopical characters, chemical constituents and uses:

Alkaloids: **stramonium,** Belladonna, Rauwolfia, Vinca, Ergot, Ipecacuanhua, **Ephedra,** Vasaka, Berberis

Glycosides: **Digitalis**, **senna**, Rhubarb, Glycyrrhiza, Dioscorea, Podophyllum, sapindus, **Chiraita**, Neem

Volatile oil: **Fenne**l, Lemon grass, **Clove**, Cinnamon, Eucalyptus, Ajwain, **Mentha**, Cardamom, Nardostachys, Gaultheria, **Ginger**, Acorus, Valeriana

Tannin: Harro, Barro and Amala

Fixed oil: Olive Oil, Mustard oil, Castor oil

Resin: Cannabis, picrorhiza

Unit 7: pharmaceuticals Aids (focusing on source, properties, and uses) 10 hrs

7.1 Starch, Gum Acacia, Tragacanth, Agar
7.2 Cod liver oil, Gelatin, Beeswax, Honey
7.3 Liquid paraffin

Unit 8: Status of medicinal plants of Nepal 7 hrs

State vernacular name, English name, botanical name, family, distribution, habitat, parts used and morphological characteristics of following ten medicinal plants of economic important found in Nepal.

- ✓ Panchaunle (*Dactylorhiza hatagirea*)
- ✓ Sugandhakokila (*Cinnamomum glaucescens*)
- ✓ Yarshagumba (*Cordycep sinensis*)
- ✓ Harro (*Terminalia chebula*)
- ✓ Pipla (*Piper longum*)
- ✓ Barro (*Terminalia balerica*)
- ✓ Satawari(*Asparagus racemosus*)
- ✓ Timur (*Zantoxylum armatum)*
- ✓ Gurjo (*Tinospora sinensis)*
- ✓ Amala (*Emblica officinalis*)
- ✓ Taxus (*Taxus wallichina*)

Practical

Unit I. Pharmacognostical studies 22 hrs

Perform the organoleptic test, physical and chemical test and microscopical examination of medicinally useful parts of the following drugs:
Digitalis, Chiraita, Ephedra, Mentha, Rhubarb, Stramonium, Vinca, Fennel, Berberis, Clove, Cinnamon, Ginger, Vasaka and Acorus

Unit II. Extraction procedures 14 hrs

1. Carry out the extraction of the following medicinal and aromatic plants applying hydrodistillation technique: Vasaka, Rauwolfia, Fennel and Clove

Unit III: Thin Layer Chromatography 8 hrs

1. Carry out thin layer chromatographic method of analysis of plant extracts.

Unit IV: Chemical test for active ingredients 10 hrs

1. Carry out chemical tests for alkaloids, glycosides, tannins and flavonoids

Unit V: Field trip Two Day

1. Perform field trip of minimum three days visiting Herbarium and herbal farm and collect specimens of locally available medicinal plants and write report on it.

Text Books

1. W. C. Evans : Trease & Evans Pharmacognosy 15 Edition. W. B. Saunders. Edinburg 2002.
2. Wallis T. E. – Practical Pharmacognosy.
3. Shah C. S. & Quadry – A text Book of Pharmacognosy.

Reference Books

1. Medicinal plants of Nepal – Bulletin of Department of Medicinal plants. No. 3. His majesty's Government of Nepal, Ministry of Forest and Soil conservation. Department of Plant Resources, Kathmandu, 1997.
2. Standards of Medicinal Plants for Ayurvedic Drugs : A publication of Department of Medicinal Plants.
3. Gokhale. Pharmacognosy (Diploma), 2004, India.
4. Gokhale and Kokate. Practical Pharmacognosy, 2002, India.
5. Kokate. Pharmacognosy, 2004, India.
6. Quality control of Medicinal plants: A publication of WHO, 1998.
7. Identification Manual for some Non Timber Forestry Products of Nepal: Dr. SB Malla et al.- Forest Resource information system project HMGN/FINIDA.

Subject Title: Biochemistry and Microbiology

Theory total: 78 hrs (2 hrs/week) **Full marks: 100 (Th.80+Pr.20)**
Practical total: 40 hrs (2 hrs/week) **Pass marks: 40(Th. 32+Pr.8)**

Course Description
This course is designed to equip students with the knowledge and skills of Biochemistry and Microbiology. The course is also focused on the basic metabolism and qualitative and quantitative tests biomolecules. The course equip the students with the basic knowledge of microbiology.

Course Objectives
After completing the course the student will be able to:
1. Develop general concept of basic metabolism and tests of Carbohydrate, amino-acids and fats.
2. Understand the role of minerals and water for biochemical process.
3. Understand the immunity and role of T-cell, B-cell and antibody .
4. Understand the basic concepts of nucleic acid and recombinant DNA technology
5. Understand the properties of Microorganisms (Bacteria, Fungus and Virus).
6. Understand the culture media and aseptic techniques.

Theory

Unit 1: Introduction **4 hrs**
1.1 Introduction to biochemistry and its importance for health science students.
1.2 Explain structure, composition, classification and multiplication of cell.

Unit 2: Basic metabolism, qualitative and quantitative tests of the followings: 10 hrs
2.1 Carbohydrates.
2.2 Amino acids, Peptides and Proteins.
2.3 Lipids and fatty acids.
2.4 Interpret the relation of Carbohydrate, Fat and protein metabolism.
2.5 Vitamins and enzymes.
2.6 Role of Minerals, ions and water in life processes

Unit 3: Fundamental of Immunology **4 hrs**
3.1 Explain Immune system and type of Immunity.
3.2 Describe Sources and properties of antigens, vaccines and sera
3.3 Describe Anti-bodies, T and B-lymphocytes, T-cell

Unit 4: Basic concepts of nucleic acid and recombinant DNA technology 4 hrs
4.1 Describe about DNA, RNA.
4.2 Introduce DNA replication.
4.3 Introduction to pharmaceutical recombinant products

Unit 5: Microbiology **25 hrs**
5.1 Introduction to Pharmaceutical Microbiology.
- Define Microbiology.
- Describe the historical development of microbiology
- Application of microbiology with special reference to pharmaceutical sciences.

5.2 Microorganisms
BACTERIA: General morphology, Classification of Bacteria. Growth curve, growth factors, Nutrition, Requirements and Nutrition factors affecting growth. Culture Media, Bacterial cultures and staining methods, Bacterial resistance to antibacterial therapy, aseptic technique
VIRUSES: General introduction and Classification

FUNGI/YEAST/MOLDS: Types, morphology, pharmaceutical importance of fungi and yeasts
5.3 NORMAL FLORA: Normal flora of skin, Intestinal tract, ear, nose.
5.4 Control of Microbes:

- Different method of sterilization and disinfections-
- Aseptic techniques
- Sterility Testing,
- Sterilization of pharmaceutical ingredients and dosage forms.
- Environmental monitoring

5.5 Explain microbial assay of antibiotics and vitamins-method.

Unit 6: Staining and microscopic examination (6 hrs)

6.1 Perform staining and microscopic examination of Sputum and Faces

Unit 7: Practice in injecting drugs by IM/SC/IV/withdrawal of blood samples. 4 hrs

7.1 Practice in injecting drug by IM/SC/IV/ withdrawal of blood samples.

Unit 8: Identification of microorganism by gram stain and acid-fast stain. 6 hrs

8.1 Identify microorganism by gram stain and acid-fast stain.

Unit 9: Preparation and aseptic transfer of at least one culture media and subculture of one microorganism 4 hrs

9.1 Perform the identification and count of bacterial colonies practically.

Unit 10: Demonstration of sterilization and disinfections of the following: 3 hrs

10.1 Sterilize Powder/glass ware and vials by dry heat.
10.2 Sterilize Rubber gloves/Surgical cotton/ligature and suture.
10.3 Sterilize thermo labile substances by filtration.

Unit 11: Phenol coefficient test and related experiment 2 hrs

11.1 Carry out Phenol coefficient test and related experiment

Unit 12: Sterility testing 3 hrs

12.1: Carry out sterility test.

Unit 13: Demonstration of microbial assay of antibiotics 3 hrs

13.1: Demonstrate microbial assay of antibiotics

Practical

Unit 1: Identification and detection of the following: 19 hrs

1.1 Perform the test of Carbohydrate: Molisch Test/ Barcode's test and iodine test for amylase.
1.2 Perform the test for Proteins:

- 1.3 Total protein/Albumin in blood.
- In urine: Heat + Acetic acid, Sulphasalicylic acid, Strip method.

1.3 Perform the test for Amino acids: Ninhydrin Test/ Xanthoproteic test
1.4 Perform the test of Lipid: Cholesterol (Lieberman Burchatd test).

Unit 2: Analysis of normal and abnormal constituents of blood and urine with relevant experiments 20 hrs

2.1 Perform the test of dextrose as blood sugar (o. Toluidine + Enzymatic test).

2.2 Perform the test of urine (Benedict's Method and strip method)

2.3 Perform the test for:

- Urea (DAM method) and Creatinine (Jafrie reaction method).
- Alkaline phosphate (KA Method) and Bilirubin (Vandenberg reaction)
- SGPT & SGOP (Enzymatic reaction) and Calcium (OCP Method).

2.4 Perform the test for:

- Diastase and Lipase (Enzymatic reaction)

References:

1. Furest R - Micorbiology in Health and Disease, W.B Saunder& Co,
2. Bialley and Scott - Digonostic Microbiology.
3. Rawling's EA-Benty's text book of Pharmaceutics. All India Traveller Book Sellers

Subject Title: Pathophysiology

Theory total: 78 hrs (2 hrs/week) Full marks: 50
Pass marks: 20

Course Description
This course is designed to equip students with the knowledge and skills of Pathophysiology

Course Objectives
After completing the course the student will be able to:
1. Know about the human body system.
2. Understand the Pathophysiolology of blood and urine.
3. Understand the basic concepts of hormones.

Unit-1: Introduction to pathophysiology 40 hrs
General explanation of Common pathological conditions with emphasis on the following diseases of different systems:

1.1 Describe gastric/peptic ulcer, hepatitis, diarrhea, vomiting, constipation and Typhoid fever.
1.2 Explain Hypertension, Angina Pectoris, Congestive heart failure and rheumatic heart disease.
1.3 Describe UTI, Nephritis and Renal failure.
1.4 Describe Epilepsy, Depression, Psychosis, conjunctivitis and otitis media.
1.5 Explain Pneumonia, Asthma and COPD.
1.6 Describe Meningitis, Myasthenia gravis, Spondilytis.
1.7 Explain Syphilis, Gonorrhea and HIV-AIDS.
1.8 Describe Goiter and Thyrotoxicosis, Diabetes.

Unit 2: Pathophysiolology of blood and urine 20 hrs
2.1 Explain blood cells- function, composition and their characteristics.
2.2 Introduce pathology related to blood cells. Blood counts.
2.3 Explain normal and abnormal constituents of urine.
2.4 Describe qualitative and quantitative tests of urinary constituents.

Unit 3: Basic concepts of hormones 18 hrs
3.1 Explain General considerations and mode of action.
3.2 Describe the release and related pathophysiology of hormones.
3.3. Introduction to Hypothyroidism and Hyperthyroidism.
3.4. Introduction to Insulin, Glucagon, Hypoglycemia and Hyperglycemia.
3. 5. Adrenocorticoides and Mineralocorticoides
3. 6. Parathyroid Hormone
3.7. Introduction to Male and Female sex hormones.

References:

1. Kulkani MV et.al- Biochemistry, Nirali Prakashan.
2. Essentials of pathophysiology for pharmacy, Martin M. Zdanowicz, CRC Press.
3. Hugo & Russell's Pharmaceutical Microbiology, Stephen P Denyer, Norman Hodges, Sean P. Gorman Brendan F. Gilmore
4. Chaudari MA and Gokhale S B- Biochemistry and Clinical Pathology, Nirali Prakashan.

5. Mc Murry J and Castellion E Mary- Fundamentals of Organic and Biological Chemistry, Prentic Hall
6. Kale-Practical Biochemistry and Clinical Pathology, Book Syndicate Mumbai
7. Robins et.al. Pathological basis of Disease, Churchil Levingtion
8. Lenniger AC- Principles of Biochemistry, CBS Publication
9. Chessebrough M - Medical laboratory Manual for Tropical Countries Vol I and II ELBS
10. Mukarjee K.C- Handbook of medical Laboratory Technology
11. Handbook of Medical Laboratory Technology CMC Vellore
12. HeroldVarley - Practical Clinical Biochemistry
13. I D P Watton Microanalysis in Medicinal Chemistry.
14. Manual methods In Clinical Chemistry - WHO publication.

Subject Title: Pharmaceutical Management

Theory hours: 78 hours (2 hours/week) **Full marks: 100** **Pass marks: 40**
Practical hours: 39 hours (1 hours/week) **Full marks: 50** **Pass marks: 30**

Course Description
This course is designed to equip students with the knowledge and skills on business organization and management, economic theory and financial management. The course is also focused on management of a community pharmacy, management of Public Medicine supply and pharmaceutical marketing.

Course Objectives
After completing the course the student will be able to:
1. Develop general concept of business organization and management.
2. Conceptualize economic theory applicable to pharmaceuticals.
3. Develop basic managerial skills and financial management skills applicable in pharmaceutical sectors.
4. Develop concept of marketing skills and apply them in the pharmaceutical sector.
5. Manage community pharmacy.

Theory

Unit 1: General concept of Pharmaceutical organization & management **15 hrs**
1.1 Describe the concept of management: process, discipline and characteristics.
1.2 Explain in brief about management and administration.
1.3 Illustrate in brief about major management functions.
1.4 Describe management skills and abilities.
1.5 Explain in brief about general principles of management, Taylor's scientific management theory, planning and organizing.
1.6 Describe nature and process of controlling.
1.7 Explain decision-making.
1.8 Describe direction and motivation.
1.9 Explain leadership and supervision.
1.10 Describe entrepreneurship.
1.11 Explain business organization in pharmaceutical enterprises (industry, trade, hospital and Community).

Unit 2: General concept on economic theory with focus to pharmaceuticals **10 hrs**
2.1 Explain market economy.
2.2 Describe theory of demand.
2.3 Illustrate consumer behavior.
2.4 Describe revenue and cost curves.
2.5 Describe theory of price and output determination.
2.6 Explain public finance and taxation.

Unit 3: Pharmaceutical Financial and Accounting management **15 hrs**
3.1 Describe general concept of cost and cost accounting.
3.2 General concept of Journal Voucher, Ledger, Trail Balance and Balance Sheet.
3.3 Describe concept of capital and capital management.
3.4 Explain calculation of turnover, working capital, Income statement, cost volume profit analysis and investment return ratios**.**

Unit 4: Drug Supply Management in Public Sector **8 hrs**

4.1 Describe selection and indenting of drugs, importance of EDL and STS in selection/ Indenting and quantification techniques.
4.2 Describe purchasing including tender procedures.
4.3 Explain storage of medicines including vaccines.
4.4 Depict the distribution system.
4.5 Describe monitoring mechanism.
4.6 Elaborate on importance of training and the concept of rational drug use.
4.7 Drug Management cycle

Unit 5: Pharmaceutical marketing **18 hrs**

5.1 Basic concept of Marketing and marketing management (traditional and modern concept) i.e. production, product, sales marketing and societal marketing.
5.2 Marketing segmentation of pharmaceuticals: marketing segmentation, target marketing, product positioning, tools of product differentiation.
5.3 Product and Pricing Decision of pharmaceutical: New product development, Decisions relating to product: product mix and product line decisions, branding and packing decision, product pricing.
5.4 Product promotion and Modern marketing of pharmaceuticals: a) Definition and promotional decision including personal selling advertising and sale promotion, public relation, personal selling. b) Introduction to export marketing globalization, web marketing, green marketing, network marketing , event marketing.

Unit 6: Human Resource Management in Pharmaceuticals **12 hrs**

6.1Human resource management and Environment: concept (nature, characteristics, objective) of HRM, HRM system model/area, role and responsibility of HRM/HR manager, strategic of HR manager, changing role of HRM in Nepalese organization.
6.2 HRM Environment: concept, internal and external environment.
6.3 Recruitment and selection: a) concept, process, source b) process of selection, validity in selection test, selection interview. c) Placement: orientation, socialization
6.4 Motivation and maintaining HR: concept, nature, importance

Practical

Unit 1: Pharmaceutical marketing **10 hrs.**

1.1 Prepare a marketing plan for the given product of pharmaceutical products.

Unit 2: Financial management in pharmaceutical sectors **10 hrs.**

2.1 Discuss and give presentation on the given problem on the followings.

- Calculate the profit and loss account.
- Calculate the working capital requirement.
- Calculate the rate of return.
- Propose alternate marketing plan.

Unit 3: Management of Different Pharmaceutical product **19 hrs.**

3.1 Prepare a survey report on the market of the given pharmaceutical product in different location.

References:

1. Managing Drug Supply, Published by HMG, DHS/MoH.

Subject Title: Health Education & Health Care System

Theory total: 117 hrs (3 hrs/week)	Full marks: 100	Pass marks: 40
Practical total: 38 hrs (1 hr/week)	Full marks: 50	Pass marks: 30

Course Description
This course is designed to acquaint students with knowledge and skills on health education and healthcare delivery system of Nepal.

Course objectives
After completion of course the student will be able to:
1. Find out health education needs related to pharmacy and deliberate both planned and incidental health education to individual, family and the community level.
2. Apply different health education methods and media to increase adherence to drug therapy.
3. Change the pharmaceuticals behavior of individual, family and the community.
4. Understand health care delivery system in Nepal.
5. Provide contribution in PHC activities as a pharmacy assistant.

Theory

Unit 1: Health education **40 hrs**

1.1 Concept of health: Define health.
- Differentiate promotive, preventive, curative and rehabilitative.
- Describe concept, causation and prevention of disease.
- Describe level of prevention.
- List factors that influence health.

1.2 Principles and scope of health education: Describe scope of health education.
- Explain principles of health education.
- State importance of health education in pharmacy.
- List person responsible for health education.
- Identify health education needs related to pharmacy conducting educational diagnosis survey.
- Define pharmaceuticals behavior of health workers, individual, family and community and explain how health education process helps change unfavorable behavior related to pharmacy.

1.3 Health education methods:
- Explain role of different methods for providing health education.
- Classify different methods.
    - Individual method: Interview and Counseling.
    - Group method: Group discussion, Role-play, Brain storming, Work-shop etc.
    - Mass Method: Lecture, exhibition etc.
- List advantages and disadvantages of each method.

1.4 Health education media:
- Define audio-visual aids.
- Classify different health education media.
- List advantages and disadvantages of each media.

- Describe criteria for the selection of media.

1.5 Planning of health education:

- · Describe concept and importance of planning.
- · Describe steps of planning.
- · Describe health education program planning process.
- · Explain health education program implementation.
- · Define health education program evaluation and differentiate formative and summative evaluation.
- · Describe health education program evaluation process.

1.6 Factors affecting health education:

- Explain factor-affecting learning.
- Biological factors such as condition of sensory organs.
- Physical factors.
- Socio-culture factors.
- Physiological factors.

1.7 Learning:

- Define learning.
- Describe different way of learning such as; by hearing, by seeing, by doing, by repetition, and by imitation.
- Describe different learning theories.

1.8. Change process: concept, need for change, hindrance of change

Unit 2: Health care system **25 hrs**

2.1 History of health care delivery system in Nepal:

· Describe the health care delivery system in Nepal.

- Traditional health care -
  _ Without system: Dhami, Jhankri, Lama, Guvaju etc.
  _ With system: Ayurvedic, Homeopathy, Unani. – Accupuncture / naturopathy
- Modern health care -
  _ National Health Sector Support Program II/III.
  _ Millennium development goal.
- Describe recent organogram of Ministry of Health (MoH).
- Explain healthcare management models.

2.2 Primary Health Care:

- . Define Alma-ata Declaration
- · Describe concept of Primary Health Care.
- · Define Primary Health Care.
- · Explain principles of Primary Health Care.
- · List and explain elements of Primary Health Care.
- · Describe implementation of PHC (in terms of WHO and government of Nepal).
- · Describe role of pharmacist in PHC.

Unit 3: Community Health diagnosis **20 hrs**

3.1 Educational diagnosis survey (in hospital or health post or community):

- Select topic of interest.
- Prepare Knowledge, Attitude and Practice (KAP) questionnaire.
- Collect data from patients (1 day field).
- Analyze and interpret data.
- Find out problem.
- Prioritize problems.

3.2 Preparation of a plan:

Prepare a plan for the development of a health education action project based on results of the health education survey.

3.3 Organization and assessment:

Organize and conduct a health education action project and assess the effectiveness of it (1 day field).

3.4 Demonstration of different methods of presentation:

- Prepare subject or text.
- Present those texts by using different health education methods.

3.5 Demonstration of operating process of Overhead Projector (OHP):

- Prepare appropriate text in transparencies.
- Operate Health Education Materials
- Deliver that text using mini-lecture method.

Unit 4: Health care system **5 hrs**

4.1 Visit of health facility (PHCC/HP/SHP):

- Make an organogram of health facility.

Unit 5: Vector Borne Disease **10 hrs**

5.1 Define vector

5.2 Preventive measurement of vector borne disease

5.3 Source of vector / vector carrying diseases

Malaria/Filiarisis/Kala-azar/Influenza 1 & 2/Dengue Fever/Japanese Encephalitis/

Unit 6: Nutrition **10 hrs**

6.1 Define & function Nutrition
6.2 Classification of food
6.2.1 Carbohydrate
6.2.2 Fat
6.2.3 Protein
6.2.4 Minerals
6.2.5 Vitamins
6.3 Sources and disease included due to deficiency of nutrition food

Unit 7: Family Planning **7 hrs**

7.1 Define family planning
7.2 Method of family planning
7.3 Contraceptive

Practical **38 hrs**

1. Prepare and demonstrate different tools for health education.
2. Data collection and presentation
3. Demonstrate the different foods with their function.
4. Students (in group) display a seminar about oral contraceptives.

Third Year

Subject Title: Pharmaceutics II

Theory total: 117 hrs (3 hrs/week) **Full marks: 150 (Th. 100+Pr. 50)**
Practical total: 78 hrs (2 hrs/week) **Pass marks: 70 (Th. 40+Pr. 30)**

Course description
This course is designed to provide students the knowledge and skills about pharmaceutics. This course deals with different dosage forms, biphasic pharmaceutical products, aerosol, parental preparation biological products, powders, suppositories, cosmetics and ophthalmic products. Additionally, it deals with packaging materials, quality control, method of dispensing, surgical devices and medical appliances and brief introduction about cosmetics and toiletries.

Course objective
After completion of course the student will be able to:
1. Explain manufacturing process of different dosage forms.
2. Describe the packaging materials and merits and demerits of each.
3. Explain different types of biological products and their production.
4. Explain and understand prescription components.
5. Explain and understand different types of cosmetics and personal care products.
6. Prepare simple solid dosage forms and biphasic preparations including intravenous solutions.

Theory

Unit 1: Oral administration of solid dosage **14 hours**

1.1 Tablets: **10 hours**

- Define tablet and describe its merits and demerits.
- Mention different types of compressed tablets and their uses.
- Briefly introduce controlled release tablet, sustained release tablet and their examples.
- Mention formulation of tablets with examples.
- Mention processes involved in the production of tablets (Direct compression, dry granulation and wet granulation).
- Evaluation of Tablets: Pharmacopoeial and non pharmacopoeial tests.
- Describe the defects in tablets.
- Describe the reasons for tablets coating and types of tablet coating (film coating, sugar coating and enteric coating) and their merits and demerits.
- Describe the packaging and storage of Tablets.

1.2 Capsule: **4 hours**

- Define capsule and mention its types and advantages and disadvantages.
- Mention different sizes of Hard and soft gelatin capsule, filling materials in hard and soft gelatin capsule, and describe method for calculation of filling weight.
- Describe different parts and filling procedure of hard gelatin capsule using manual filling machine.
- Mention the difference between hard and soft gelatin capsules.
- Describe the Packaging and storage of capsule.

Unit 2: Biphasic pharmaceutical products **26 hrs**
2.1 Emulsion: (7 hrs)

- Define emulsion and mention its types.

- Identification for emulsions.
- Define and classify emulsifying agents.
- Mention the components of formulation with examples and describe the method of preparation in brief.
- Instabilities in emulsions
- Describe the storage condition for emulsion.

2.2 Suspension: (7 hrs)

- Define suspension and mention the characteristics of an ideal suspension.
- Mention the formulation components with examples.
- Describe preparation in brief.
- Mention the difference between flocculated and deflocculated system.
- Describe the packaging and storage condition.

2.3 Semi solid dosage form

Ointment: (7 hrs)

- Define ointment and mention the characteristics of an ideal ointment.
- Classify ointments.
- Classify ointment bases.
- Describe preparation of ointment (trituration, fusion and chemical reaction) and its stability aspects in brief.
- Describe packaging and storage condition.

Cream, Paste and Jellies: (5 hrs)

- Define cream, paste and jellies.
- Mention formulation components with examples.
- Describe preparation, packaging and storage of each in brief.

Unit 3: Packing of pharmaceutical dosage form **5 hrs**

- Define packaging, primary packaging, secondary packaging, container and closure.
- Mention the ideal characteristics of containers and closures.
- Classify containers on the basis of (a) method of closure and use (b) shapes.
- Mention types and merits and demerits of glass, plastics, metals and papers.
- Describe the packaging guidelines for pharmaceuticals implemented in Nepal.

Unit 4: Aerosol **4 hrs**

- Define aerosol and mention its merits and demerits.
- Describe aerosol principle.
- Illustrate components of aerosol.
- Describe aerosol system operation.
- Describe metered dose inhalers (MDI) and Dry power inhaler (DPI).
- Mention the advantages of Aerosol over other dosage forms.

Unit 5: Parental preparation **10 hrs**

- Introduce parenteral preparations, types of products and mention its different routes of administration with examples.
- Mention its advantages and disadvantages.
- Briefly introduce small volume and large volume parenteral.
- Mention types and formulation components with examples.
- Describe aseptic condition and its need in manufacturing of parenteral preparation.
- Describe the steps involved in manufacturing of parenteral preparation in brief.

- Describe the quality control test for parenteral products. (Sterility, Pyrogen, Particulate matter and leak test of ampoules.)
- Briefly describe Total Parenteral Nutrition (TPN) and dialysis fluid.

Unit 6: Biological products **6 hrs**

- Define immunity and describe its types.
- Define immunological terminologies.
- Classifications of immunological preparations.
- Describe the preparation of vaccines, sera and toxoids in brief.
- Describe cold chain equipment and maintenance of cold chain for different vaccines.
- Introduction to the storage practice and cold chain maintenance.

Unit 7: Dispensing pharmacy **9 hrs**

7.1 Prescriptions:

- Describe the parts of prescription and its handling steps, orient with Latin terms commonly used, describe modern methods of prescribing and solve numerical involved in dispensing.

7.2 Pharmaceutical Incompatibilities in prescriptions:

- Describe physical, chemical and therapeutic incompatibilities.

7.3 Posology:

- Define dose and dosage form, describe the factors influencing dose, and calculate doses on the basis of age, sex and surface area.

Unit 8: Powders **3 hrs**

- Define and classify powders, mention its advantages and disadvantages.
- Describe preparation of different types of powders encountered in prescriptions.
- Describe its packaging and storage.

Unit 9: Suppositories **6 hrs**

- Define suppositories and mention its types.
- Mention the formulation components and describe the preparation in brief.
- Describe the packaging and storage.

Unit 10: Ophthalmic products **6 hrs**

- Introduce and classify ophthalmic products.
- Describe the pharmaceutical requirements of ophthalmic products.
- Describe the preparation in brief.
- Describe packaging and storage conditions.

Unit 11: Quality assurance **6 hrs**

- Define quality control and quality assurance.
- Describe the meaning of quality of drugs.
- Orient with GMP and GLP.
- Provide concept of total quality management.
- Describe documentation in quality assurance.

Unit 12: Surgical devices and medical appliances **7 hrs**

- Define surgical products and explain suture and ligature.
- Classify suture and ligature with examples.
- Orient with other medical appliances such as contact lens, urinary catheters, medical and

Surgical gloves, cottons, syringes, nebulizers surgical gauzes, bandages, adhesive tape, protective cellulosic homeostasis etc.

Unit 13: Introduction to Cosmetics and toiletries **15 hrs**

Introduction to the following cosmetic preparations

- Skin Preparations: creams and lotions, classification of skin creams, cold, vanishing, all purpose and emollient creams, cleansing creams, foundation creams, hand creams, protective and barrier creams.
- Hair preparations: Shampoos, hair setting lotions, conditioners, hair tonics, hair bleaches, hair coloring dyes, permanent waving, hair straightners, antidandruff preparations.
- Face powders and makeup : Face powders, compact powder, cake makeup, make- up cream, Liquid make up, stick make up and liquids, powder, beauty masks.
- Colored make up : Lipsticks, rouges and eye make up.
- Manicure preparations: Cuticle remover, nail bleach, nail whites, nail creams, nail lacquer and enamel remover.
- Dental Products: Dentifrices and mouth washes.
- Astringents and skin tonics.
- Body cosmetics : Antiperspirants and deodorants, sun screen, suntan and
- Antiburn preparations, skin lighteners and bleaches.
- Bath preparations: Foam baths, bath salts, bath oil and after bath products.
- Shaving preparations: Shaving creams lather and brushless, aerosol shaving foams, dry shaving preparations and after shave preparations.
- Baby cosmetics: Baby powders, oils, lotions, shampoos and soaps.

Practical

Unit 1: Oral administration of solid dosage **24 hrs**

1.1 Tablets:

· Prepare any type of tablet using direct, dry or wet granulation technique and evaluate it. 8 hours

· Determine physical parameter of any marketed product (paracetamol tablet). (4 hrs)

. Comparative study of disintegration test of different products (uncoated tablet, film coated tablet, dispersible tablet, enteric coated tablet, sugar coated tablet etc.) (6 hours)

1.2 Capsule:

· Prepare hard gelatin capsule of aspirin/ any other relevant product. (4 hrs)

· Determine physical parameter of formulated hard gelatin capsule or any marketed product. [2 hrs]

Unit 2: Biphasic pharmaceutical products **20 hrs**

2.1 Emulsion:

· Prepare and supply liquid paraffin emulsion. [2 hrs]

· Prepare white liniment (o/w emulsion). [2 hrs]

2.2 Suspension:

· Prepare and supply antacid suspension. [4 hrs]

· Prepare and supply calamine/kaolin suspension. [4 hrs]

2.3 Semi solid dosage form Ointment:

- Prepare and supply sulphur ointment. (4 hrs)
- Prepare and supply methyl salicylate ointment. (4 hrs)

Unit 3: Parenteral preparation **8 hrs**

3.1 Prepare and supply 5% (v/v) dextrose solution. (4 hrs)

3.2 Prepare and supply 0.9% sodium chloride solution. (4 hrs)

Unit 4: Dispensing pharmacy **4 hrs**

4.1 Chemical incompatibility:

· Prepare and supply strychnine hydrochloride mixture in aromatic spirit of ammonia. (2 hrs)

4.2 Physical incompatibility:

· Prepare and supply menthol insufflations containing camphor, Ammonium chloride and Light magnesium carbonate. (2 hrs)

Unit 5: Powders **4 hrs**

5.1 Prepare and supply compound magnesium trisilicate oral powder. (2 hrs)

5.2 Prepare and supply compound calcium carbonate powder. (2 hrs)

Unit 6: Suppositories **4 hrs**

6.1 Prepare glycero-gelatin suppository. (2 hrs)

6.2 Prepare boric acid suppository. (2 hrs)

Unit 7: Ophthalmic products **6 hrs**

7.1 Prepare and supply sulphacetamide eye drops. (2 hrs)

7.2 Prepare and supply sodium bicarbonate eye lotion or chloramphenicol eye ointment. (2 hrs)

7.3 Transfer sterile product under aseptic condition. (Laminar airflow). [2 hrs]

Unit 8: Cosmetics and Toiletries **8 hours**

- Prepare cold creams and vanishing creams.
- Prepare tooth paste and tooth powder.
- Prepare shaving cream.

Text Books and References

1. Gaud. Pharmaceutics, 2003, India.
2. Gaud and Gupta. Practical Pharmaceutics, 2004, India.
3. Gaud and Gupta. Practical Physical Pharmacy, 2004, India.
4. Gaud. Text book of pharmaceutics, 2004, India.
5. Gupta, A. K. Pharmaceutics: Practical manual (Part I & II), 2004, India.
6. Gupta, A. K. Introduction to pharmaceutics-II. , 2004, CBS publisher and distributors, India.
1. E. A. Rowlins (ED):Bently's The Text book of pharmaceutics latest edition, Bailliere Tindall,London.
7. The extra pharmacopoeia (Martindale).
8. Remington: The Science and Practice of Pharmacy, 20th Edition, Vol I & II.
2. The Theory and Practice of Industrial Pharmacy, Leon Lackman, H. A. Lieberman, J. L. Kanig, Third Edition, Varghese Publishing House, Hind Rajasthan Building, Dadar, Bombay – 400 014.
3. Pharmaceutical Dosage Forms and Drug Delivery Systems. H. C. Ansel, L. V. Allen and N. G. Popovich, Seventh Edition, Lippincott Williams and Wilkins.
9. Pharmaceutics: The Science of Dosage Forms, M. E. Aulton, Churchill Livingstone.
10. Indian pharmacopeias.
11. British pharmacopeias.
12. Cooper and Gunn's Tuitorial Pharmacy, Sixth Edition.
13. B.M. Mittal, R.N. Saha, A hand book of cosmetics, Vallabh Prakashan, Delhi
14. Pouchers, 'Perfumes, cosmetics and soaps', Chapman & Hall London, London, UK; Ninth edition,1994. Latest editions of the following books.
15. J.B. Wilkinson, R.J.More; 'Harry Cosmeticology', Longman Singapore , Publishers Pvt.Ltd., Singapore; Eight edition.

16. Balsam M.S. and Sagarin Edward, 'Cosmetics Science and Technology' (Vol. I & II, III) Krieger Publishing Company, Malabar, Florida; second Edition, 1974. Reprint edition-1992.
17. Sharma, P. P., 'Cosmetics-Formulation, manufacturing and Quality Control:' Vandana Publications, Delhi; Second Edition. 2002.
18. E.G. Thomson, 'Modern Cosmetics'; Universal Publishing Corporation, Bombay, First Edition-1951, Reprint-1985.
19. Louis Appell, 'Cosmetics Fragrances and Flavours;' Micelle press-England, United Book and Periodicals, Bombay, India, Revised edition – 1994.
20. Pouchers, 'Perfumes, cosmetics and soaps', Chapman & Hall London, London, UK; Ninth edition,1994.

Subject Title: Pharmacology and Pharmacotherapeutics II

Theory total: 117 hrs
Practical total: 78 hrs

Full marks: 150 (Th: 100+pr.50)
Pass marks: 70 (Th: 40+pr.30)

Course Description

This course is designed to help students to acquire the knowledge and skills on drug action, handling by body and therapeutics concerned with the application of pharmacology in prevention and treatment of diseases. This course deals with pharmacotherapeutic agents and their role in different pathophysiological conditions. Additionally, this course focuses on the mode of action, the uses and adverse effects, drug interaction, and precautions to be taken for drugs to be used.

Course objective

After completion of the course the student will be able to:

1 Understand the specific action and use of drugs on different body systems.

2 Explain the principles of phamacotherapeutics and drug safety

3 Know the action, use, mechanism of action, interaction, adverse reactions, and market availability mainly with reference to counseling to patients & care taker on rational use of following drugs:

Cardiovascular drugs
Histamine and antihistamine
Hormones and related drugs
Drug acting on peripheral nervous system
Drug acting on CNS
Chemotherapy and neoplastic drugs
Drugs acting on skin and mucous membrane
Nutritional supplement
Eye, Ear and Nasal preparation
Life saving and emergency drugs
Urinary acidifiers and alkalizers

Unit 1 Cardiovascular drugs **25hrs**

1.1 Describe Hypertension, Angina, Congestive cardiac Failure, Arrhythmia, Coagulation, Hyperlipidemia, Myocardial infarction

1.2 Classifications, General mechanism of action, use, side effect, contraindication, precaution and dose of commonly used

- Diuretics and anti diuretics: Frusemide, Hydrochlorothiazide, Spironolactone, Mannitol Acetazolamide
- Beta Blockers: Atenolol
- Calcium channel Blockers : Amlodipine, Verapamil, Nifedipine
- ACE inhibitors: Enalapril, Ramipril
- ACE-II inhibitors: Losartan, Telmisartan
- Cardiac glycosides: Digoxin
- Lipid lowering: Atorvastatin, Simvastatin, Clofibrate, Fenofibrate
- Anti platelet: Aspirin
- Anticoagulant: Heparin, Warfarin, Enoxaparin

Unit 2 Histamine and antihistamine 4hrs

2.1 Classifications, General mechanism of action, use, side effect, contraindication, precaution and dose of commonly used

- Antihistamines: Chlorpheniramine, Pheniramine, Cetrizine, Levocetrizine, Fexofenadine, Loratidine, Promethazine
- Decongestants: Local: Oxymetazoline, Xylometazoline, Nafazoline
  Systemic: Phenylepherine, Pseudoephedrine

Unit 3 hormones and related drugs 20hrs

3.1 Classifications, General pharmacological actions, mechanism of action, use, side effect, contraindication, precaution and dose of commonly used

- drugs used in hypothyroidism and hyperthyroidism: Thyroxine, Propylthiouracil carbimazole
- anti-diabetic drugs: Insulin, Glimeperide, Metformin, Sitagliptin, Pioglitazone, Glipizide, Gliblencamide
- glucagon
- corticosteroids: Betamethasone, Dexamethasone, Hydrocortisone
- Gonadol hormones and their antagonist: Testesterone, Progesteron, Estrogen, Tamoxifen, Clomiphene citrate
- oxytocin

Unit 4 Drugs acting on peripheral nervous system 6hrs

Classifications, General pharmacological actions, mechanism of action, use, side effect, contraindication, precaution and dose of commonly used

- Skeletal muscle relaxant drugs: Suxamethonium, Tizanidine. d-tubocurarine (Curare drugs)
- local anaesthetics: Lignocaine, Procaine, Oxythiazine

Unit 5 drugs acting on central nervous system 22 hrs

5.1 Classifications, General pharmacological actions, mechanism of action, use, side effect, contraindication, precaution and dose of commonly used

- general anaesthetics: Nitrous, Oxide, Halothane, Ketamine, Propofol
- sedative, hypnotics : Diazepam, Alprazolam, Zolpidem, Phenobarbitone, Chlordiazepoxide
- antiepileptic drugs: Carbamazepine, Phenytoin, Valproic Acid
- antiparkinsonian drugs: Levodopa, Carbidopa
- Opoid analgesics and antagonists: Morphine, Pethidine, codeine, Naltrexone, Naloxone
- antipsychotic, antianxiety, antimanic and antidepressant drugs: Fluoxetine, Amitryptylline, Chlorpromazine, Haloperidol, lithium salts

5.2 pharmacological actions and guidelines for safe drinking of ethyl and methyl alcohol

5.3 management of migraine headache: Ergometrine

Unit 6 chemotherapy and neoplastic drugs 10 hrs

6.1 Mechanism of action, use, side effect, contraindication, precaution and dose of commonly used anticancer drugs: Cyclophosphamide, Methotrexate, Doxorubicin, Bleomycine, Taxol, Vincristine, Cytarabine, Cisplatin)

6.2 handling of anticancer drugs

Unit 7 Miscellaneous drugs **6 hrs**

7.1 Classifications, mechanism of action, use, side effect, contraindication, precaution and dose of commonly used immunosuppressant

7.2 application of gene therapy

Unit 8 Drugs acting on skin and mucous membrane **8 hrs**

8.1Definition and Uses of following

- Demulcents
- Emollients
- adsorbents and protectives
- astringents
- irritants and counter irritants
- keratolytics
- antiseborrheics
- antipsoriasis
- drugs for acne vulgaris
- antiseptic and disinfectant with their classification and spectrum of activity
- drugs scabies and pediculosis
- single versus combination therapy for management of skin disease

Unit 9 nutritional supplement **10 hrs**

9.1 classification, sources and roles of commonly used vitamins: Water soluble and Fat soluble vitamins

9.2 sources and therapy of iron and common minerals in the body

9.3 management of anemia

Unit 10 Lists different types of Eye, ear and nasal preparation **2 hrs**

10.1 Toxicology with emphasis on organophosphorous Paracetamol, Barbiturates and Opioid poisoning

Unit 11. List of life saving and emergency drugs **2 hrs**

Classification according to the condition they used

1. Drugs used in Anaphylactic shock
2. Drugs used in Myocardial infarction and cardiogenic shock
3. Drugs used in peripheral circulatory collapse
4. Drugs used in status epilepticus
5. Medicines for Hypertensive Crisis
6. Antisnake venom for snake bite

Unit12. Urinary acidifiers and alkalizers **2 hrs**

PRACTICAL

78 hrs

Unit 1. Case studies **18 hrs**

1.1 Drug crossing the blood brain barrier
1.2 Drugs not crossing the blood brain barrier
1.3 Dose adjustment in hepatic disease , kidney disease , elderly patients , pregnancy and during lactation

Unit 2 Drug effects **20 hrs**

2.1 carry out the study on the effect of cholinergic and anticholinergic drugs on rabbit cornea

Unit 3 Behaviour test in mice **10 hrs**

3.1 handling of mice
3.2 Dose Calculation

Unit 4. Other theory related case studies **30 hrs**

Subject Title: Pharmaceutical Chemistry

Theory total: 156 hrs (4 hrs/week) **Full marks: 150 (Th. 100+Pr. 50)**
Practical total: 78 hrs (2 hrs/wee) **Pass marks: 70 (Th. 40+Pr. 30)**

Course description
This course is designed to acquaint students with the knowledge and skills on physico-chemical. Properties of inorganic and organic pharmaceutical ingredients including biological action in relation to their chemical structure and recommended method/s of their quality control.

Course objective
After completion of this course student will able to:
1. Understand the inorganic and organic pharmaceutical ingredients, their official monographs and articles.
2. Explain nomenclature of organic compounds with special reference to heterocyclic system.
3. Explain structure, storage, handling and quality assurance of the organic drug molecules.

Theory

Unit 1 : Acid, Base, Buffer, Antioxidants – Hcl, NaOH, Citric acid, Sod. Benzoate, Sod Metabisulphide 4 hrs
Unit 2: Gastrointestinal Agents- Hcl, $Al(OH)_3$, Charcoal, Kaolin 4 hrs
Unit 3: Topical Agents – Talc, H_2O_2, $KMnO_4$, Povidine Iodine$ZnSO_4$ 4 hrs
Unit 4: Major Intra & extra Cellular electrolytes – Acid base balance, Replacement Therapy, NaCl, KCl, Ringer Lactate, ORS 4 hrs

Unit 5: Nomenclature of organic compounds with special reference to heterocyclic system. 8 hrs

5.1 Explain the Nomenclature of Organic Compounds, IUPAC rule special reference to heterocyclic system.
5.2 Explain the numbering system different position of benzene ring.

Unit 6: Structure, storage, handling and quality assurance of the molecules of following organic drugs (from section 6.1 to 6.17) 132 hrs

6.1. Antiseptic & disinfectants – formaldehyde, Benzylkonium Chloride, Cetrimide, GBHC, Benzyl benzoate. (3 hrs)
6.2. Sulpha Drugs & Antileprotics – Sulphonamide, co-trimoxazole, Introduce Silver Sulfadiazine, Dapsone and Clofazemin. (6 hrs)
6.3. Penicillins and Cephalosporins: (4 hrs)
- Explain Amoxicillin.
- Explain Benzylpenicillin,Ampicillin, Cephalexin, Cefaclor, Cefotaxime, Cefixime, cefadroxil.

6.4 Chloramphenicol and Tetracycline: (2 hrs)
- Explain Chloramphenicol, Thetacycline HCl, Doxycycline.

6.5 Aminoglycosides and Macrolides: (2 hrs)
- Explain Erythromycin, Gentamicin, Azithromycin, Kanamycin..

6.6 Quinolones and Fluoroquinolones. (4 hrs)
- Describe Nitrofurantoin, Nalidixic acid, Norfloxacin, Ciprofloxacin, Ofloxacin.

6.7 Antitubercular medicines: (6 hrs)

- Explain INH, PAS, Rifampicin, E-butol, Pyrizinamide, Streptomycin and Thiacetazone. Anti-leprotic: Dapsone and clofazemine.

6.8. Anti-amoebic and Anthelmentics: (12 hrs)

- Explain Metronidazole, albendazole and chloroquin.
- Explain Tinidazole, Secnidazole, Diloxanide fuorate, Mebendazole, Paryntel pamoate, DEC. Anti-malarials: Quinine group (Chloroquine and others) TMP and pyremethamine, Artemisenine derivatives.

6.9. Introduction to Psychotropic Agents 15Hrs

- Define Antipsycotics and introduce Chlorpromazine, Haloperidol,Dizepam, Lorazepam.
- Define Hypnotics and introduce Barbiturates, Nitrazepam.
- Define Anti-depressantsand introduce Amitryptilline, Imipramine, Alprazolam.
- Define Antiepileptics, Anticonvoulsants and antirigidity. Introduce Carbamazepine, Phenytoin, sodium Valproate, Trihexyphenydyl.

6.10. Drugs acting in CNS, ANS 28 Hrs

- Define General anaesthetic, Halothane, Methohexital, Trichloroethylene, Ketamine.
- Define Local Anaesthetic, Lignocaine, Benzocaine, Ethyl Chloride.
- Define Adrenergic Drugs, Adrenaline, Noradrenaline, Salbutamol, Ephedrine, Pseudoephedrine.
- Define Cholinergics: Neostigmine, Pyridostigmine, Pilocarpine
- Define Cholinergic Antagonist: Atropine sulphate group including Tropicamide.

6.11. Cardiovascular drugs 10 Hrs

- Explain Frusomide, Amlodepine, Atenolol , Enalapril and Aspirin.
- Explain Thiazides, Urea, Mannitol, Nitrate anti-anginals, Quinidine, Procainamide, Heparin, Warferin, Dypyridamol, Ticlopidine, Aspirin, Ethamsylate, Cumarins, Digitalis, Simvastatin.

6.12. Hormones & related drugs 12 Hrs

- Explain Insulin, Chlorpropamide, and dexamethasone.
- Explain Gliblenklamide,Metformin, Phenformin, Rosiglitazone, Thyroxine, Carbimazole, Methylthiouracil, Steroids (Dexamethasone, Prednisolone, Betamethasone), Testosterone, estrogens and Progesterone.

6.13 Histamines and Antihistamines: (4 hrs)

- Explain chlorpheniramine and cetrizine
- Explain Pheniramine, , Diphenhydramine, Promethazine, Cyproheptadine.

6.14. NSAIDS and Muscle Relaxants 6 Hrs

- Explain Codeine, Paracetamol and Ibuprofen.
- Explain Pethidine, Tramadol, Petazocin, Diclofenac, Mefenamic acid, Nimesulide and Glucosamine.
- Describe muscle relaxant and introduce Chlorzoxazone and Tizanidine.

6.15. Anti neoplastic 4 Hrs

- Explain Cisplatin, Mercaptopurine, Fluorouracil, Tamoxifen, Vincrestine, Taxol, Doxorubicin and mitomycin.

6.16. Vitamin, Minerals & enzyme (roles & deficiency) 12 Hrs

- Explain Vitamin A, Vitamin B group, Vit. C, Vitamin D, Niacinamide, D-panthenol, Iron salts and iron soluble polymers, Folic acid.
- Explain Vitamin E, Vitamin K, Calcium, Zn, Cu, Mn,, Diastase, Pepsine, Pancreatin, Serratiopeptdase, Chemotrypsine.

6.17. Diagnostics 2 Hr

- Define BaSO4, Iopanoic acid, Propylidone and Meglumine.

Practical

Unit 1: Experiments for simple laboratory procedures 30 hrs

1.1. Perform filtration and drying of talc suspension and aqueous solution of Aspirin. Extract Ibuprofen from its tablet.

1.2 Perform distillation of 60% acetic acid in water and determine the percentage of acetic acid in distillate.

1.3 Determine melting point of Paracetamol, Metronidazole, Ibuprofen, Aspirin and amoxicillin.

1.4 Determine viscosity of Sodium CMC and starch slurry.

1.5 Determine optical rotation of aqueous solution of dextrose.

Unit 2: Experiments for Systemic qualitative test of Organic pharmaceutical Ingredients 28 hrs

2.1 Determine solubility and melting point of Paracetamol, Metranidazole, Amoxicillin, Tetracycline and Citric acid.

2.2 Determine Boiling point of alcohol and Glycerin.

2.3 Detect functional group of Penicillins, Cephalosporin, Phenolic hydroxyl, Aromatic Amine and sulphanomides.

2.4 Carry out Identification test of at least five common active pharmaceutical ingredients and excipients (Starch, lactose, Chlorpheniramine maleate, Tetracycline, Iodine).

Unit 3: Identification of functional group. 20 hrs

3.1 Identify at least two unknown organic compounds.

Referneces

(Latest edition to be referred of all the Books)**:**

14. Mahadik KR and Kucher BS- Concise inorganic Pharmaceutical chemistry, Nirali Prakashan, 2004.

15. Mahadik KR and Kucher BS- Concise organic Pharmaceutical chemistry, Nirali Prakashan, 2004.

16. Kasture AV and Wadker- Pharmaceutical chemistry I & II Nirali Prakashan.

17. Bekeet AH and Stenlk- Practical Pharmaceutical Chemistry 4th edition Part I & II.

18. Kasture AV and Wadker- Practical Pharmaceutical chemistry I & II, Nirali Prakashan.

19. Antheron LM-Bently's & Drivers text book of Pharmaceutical chemistry, Oxford University Press London.

20. Kadam et.al – Principles of Medicinal Chemistry Vol. I & II.

21. Kasture AV et.al – Pharmaceutical analysis Vol I & II, Nirali Prakashan.

22. Daniel C Harris- Quantitive Chemical Analysis, W H Freeman and Company.

23. Jeffrey GH et.al-Vogel's Textbook of Quantitative Chemical Analysis 5th Edition.

24. Tipins HP Dhake AS- Inorganic Pharmaceutical chemistry, Career publication, Dec 2002.

25. Belsare P and Dhake AS- Inorganic Chemistry (Practical), Career publication.

26. Indian Pharmacopoeia latest edition.

27. British Pharmacopoeia latest edition.

Subject Title: Hospital and Clinical Pharmacy

Theory total: 117 hrs (3 hrs/week) Full marks: 100 (Th. 80+Pr. 20)
Practical total: 78 hrs Pass marks: 44 (Th. 32+Pr. 12)

Course description
This course enriches the students with the knowledge and skills for managing the pharmacy department of hospital and community pharmacy. Hospital pharmacy focuses on drug distribution system in hospital, extemporaneous preparations, inventory management, nomenclature and uses of surgical instruments and hospital equipment and drug monitoring. Similarly, clinical pharmacy focuses drug Interactions, adverse drug reaction, therapeutic drug monitoring, and concept of patient counselling, store handling and rational dispensing.

Course Objectives
After completion of this course students will be able to:

1. Handle pharmacy department of hospital for providing the services to outpatient department and in-patient department.
2. Provide the patient counselling services for rational drug use.
3. Familiarize with drug procurement system in hospitals
4. Familiarize with Pharmacovigilence programme
5. Management of drugs and store
6. Train them for the management of common illness
7. Familiarize with common laboratory and diagnostic tests

Part A: Hospital Pharmacy

Unit 1: Hospitals 3 hrs

1.1. Define Hospital and its function; classify hospitals based on various criteria, organization, management and delivery system in Nepal.

Unit 2: Hospital Pharmacy 10 hrs

2.1 Define hospital pharmacy.
2.2 Explain functions and objectives of hospital pharmacy services.
2.3. Layout design of hospital with flow of materials and men.
2.4. Regulatory and professional requirement for hospital pharmacy practice
2.5 Explain requirements and abilities required for hospital pharmacists.

Unit 3: Drug distribution system in hospital 15 hrs

3.1 Explain drug distribution system in hospitals with emphasis on:

- Outpatient services.
- In-patient services.
- Types of services.
- Detailed discussion of unit dose system.
- Floor/ward stock system.
- Satellite pharmacy system.
- Central sterile services.
- Bedside pharmacy.

Unit 4: Extemporaneous compounding and dispensing 5 hrs

4.1 Requirements for compounding

- Personnel
- Sources for chemicals and drugs

- Equipments (Measuring, Moulding, Mixing, Packaging)
- Location of compounding area
- Sources of information.

4.2 Expiry date of different preparations
4.3 Concept of Total Parenteral nutrients.

Unit 5: Medicine and Therapeutic Committee 5 hrs

- Hospital Pharmacy Service Guidelines 2070
- Introduction to Medicine and Therapeutic committees
- Goals, objectives, structure, principle and Functions of the MTC
- Formulary (formulary list (essential medicines list), formulary manual, Standard treatment guidelines (STGs))

Unit: 6: General concept on Surgicals and Sterilization 5 hrs

6.1 Familiarize with surgical dressing like cotton, gauze, bandages and adhesive tapes, Sutures, I.V. sets, Ryle's tubes, Catheters, Syringes.
6.2. Health Accessories
6.3. Sterilization and CSSR

Unit 7: Store management 10 hrs

- Estimation and Demand
- Materials (drugs including narcotics, non-drugs, consumables), Medicine cycle, ABC analysis, VED Analysis, FSN analysis, FIFO, FEFO.
- Handling of cytotoxic drugs and radioisotopes.

Unit 8: Application of computers in Pharmacy 5 hrs

8.1 Explain application of computers in maintenance of records, inventory control, medication monitoring, drug information and data storage and retrieval in hospital and retail pharmacy establishments.

Part B: Clinical Pharmacy

Unit 1: Introduction 5 hrs

1.1 Introduction to clinical pharmacy practice.
1.2 Define and elaborate clinical pharmacy

Unit 2: Taking Medication Histories 4 hrs

Demographic information, Dietary information, Social habits, Current and Past Prescription Medications, Current and Past Non prescription, Medication Allergies, ADR

Unit 3: Review of Common Laboratory and Diagnostic tests 3 hrs

Unit 4: Drug Interactions 10 hrs

4.1 Drug interactions:

- Define
- Explain Mechanism of drug interaction
- Elaborate drug-drug interaction (pharmacokinetics and pharmacodynamics) with reference to analgesics, diuretics, cardiovascular drugs, Gastro-intestinal agent, vitamins and hypoglycemic agents.
- Elaborate drug-food interaction

Unit 5: Adverse drug reaction **7 hrs**

- Adverse drug reactions, Type of ADR
- ADR monitoring and pharmacovigilence
- Durg induced diseases and teratogenicity.

Unit 6: Responding to Symptoms **20 hrs**

3.1 List and explain common daily terminology used in the practice of medicine.

3.2 Disease, manifestations and pathophysiology including salient symptoms to understand the disease like Tuberculosis, Hepatitis, Rheumatoid Arthritis, Cardio-vascular diseases, Epilepsy, Diabetes, Peptic Ulcer, Hypertension, COPD, Asthma, Gout, Thyroid Disease, Psoriasis. Cold and flu, Cough, sore throat, allergic rhinitis, mouth ulcers, motion sickness, constipation, diarrhoea, acne, cold sores, warts, headache, musculosketal problems, women's health (dysmennorea, ECP) common eye and ear problems

Unit 7: Drug Monitoring **5hrs**

7.1 Define Drug Monitoring.

7.2 Explain Importance of monitoring.

7.3 State the Techniques of monitoring.

7.4 Drug monitoring with special focus on narrow therapeutic index and its range.

Unit 8 Drugs used in Special population **5 hrs**

- Pregnancy
- Lactation
- Pediatrics
- Geriatrics

Practical **78 hrs**

1. Preparation of different extemporaneous preparation and dispensing.
2. Sterilize surgical instruments, glassware and hospital supplies.
3. Familiarize with different sutures, catheters, Ryle's tube, ET tube, IV sets, and blades.
4. Pharmacovigilence and Adverse Drug monitoring system.
5. Interpretation of Common laboratory values
6. Use of Glucometers, BP set, Insulin Devices, Inhaler, Rotahalers, pregnancy test kits, ECP.
7. Handle and use data processing software and equipments.

References

1. Remington's Pharmaceutical Sciences.
2. Martindale's Extra Pharmacopoeis.
3. Textbook of Hospital and clinical pharmacy, Dandiya, P. C., Mathur, Mukul, Vallabhai Prakashan.
4. WHO publication on Hospital and clinical Pharmacy.
5. Hospital Pharmacy Service Guidelines 2070 published by Government of Nepal, Ministry of Health and Population.

Subject Title: Social Pharmacy and Pharmaceutical Jurisprudence

Theory total: 117 hrs (3 hrs/week) Full marks: 100 (Th. 80+Pr. 20)
Practical total: 78 hrs Pass marks: 44 (Th. 32+Pr. 12)

Course Description
This course is designed to help students to acquaint with the knowledge and skills on different aspects of community Pharmacy. This course focuses on the different ethical aspects of pharmacy and different components of the community pharmacy. It also help students to acquaint with the knowledge and skills on different regulatory provision in the drug administration as well as related regulations of Nepal and basic differences on the regulatory provisions of India.

Course objectives
After completion of this course the students will be able to:
1. Describe different aspects of community pharmacy and community pharmacy management.
2. Develop communication skill and dispensing technique.
3. Process new and refill prescription orders
4. Understand the provision of drug laws and their regulations.
5. Explain drug policy.
6. Discuss the banned drugs and pharmaceutical ethics.

Theory

Part - One: Social Pharmacy

Unit 1: Social pharmacy 15 hrs

1.1 Describe profession & professionalism.
1.2 Explain pharmacy as profession.
1.3 Describe the role of community pharmacy in the society, Primary Health Care, public Health and role of community pharmacist.
1.4 Explain the different component of prescription.
1.5 Explain different steps of dispensing of prescription and dispensing techniques.
1.6 Explain the pharmaceutical abbreviations and calculations.
1.7 Explain extemporaneous dispensing.
1.8 Explain labeling of dispensed products.
1.9 Explain patient counseling.
1.10 Explain patient compliance.
1.11 Explain patient profile.
1.12 Explain Drug profile.

Unit 2: Management of a community pharmacy 12 hrs

2.1 Explain location analysis.
2.2 Describe establishing and financing a community pharmacy.
2.3 Illustrate the development of the business plan.
2.4 Describe pharmacy layout design.
2.5 Describe legal structure of ownership.
2.6 Explain business law for community pharmacy.
2.7 Explain risk management and insurance.
2.8 Describe pricing decision for products and services.
2.9 Elaborate on purchasing and inventory control.
2.10 Explain the Good Pharmacy Practice.

2.11 Explain the development and innovative services.
2.12 Describe credit management efficiency.
2.13 Explain about computerization of pharmacy

Unit 3: Communication skills **5 hrs**

3.1 Explain nonverbal communication.
3.2 Explain patterns of behavior in communication.
3.3 Explain questioning and listening skill.
3.4 Explain barriers of communication.
3.5 Explain confidentially.

Unit 4: Good community pharmacy practice **5 hrs**

4.1 Describe the requirements of premises/layout.
4.2 Describe the requirements of equipments.
4.3 Describe the requirements of manpower.
4.4 Describe the requirements of material.
4.5 Describe the requirements of storage and inventory control.
4.6 Describe the requirements of services.
4.7 Describe the requirements of documentation.

Unit 5: Ethical aspects of Pharmacy **3 hrs**

5.1 Describe rules of moral conduct in pharmacy
5.2 Describe how pharmacy profession is different from other profession with suitable example
5.3 Describe the importance of ethics in pharmacy

Part-2: Pharmaceutical Jurisprudence

Unit: 1 History of pharmaceutical legislation, pharmaceutical industry, pharmaceutical education system of Nepal **3 Hrs**

Unit: 2 An Explain the study of the following **25 Hrs**

- Drugs Act, 2035 /1978
- Drug Consultation Council and Drug Advisory Regulation 2037(1980).
- Drug Registration Regulation 2038(1981).
- Drug Inspection Regulation 2040(1983).
- Drug Standard Regulation 2043(1986).
- Drug Manufacture Codes 2041(1984).
- Drug Sale and Distribution Codes 2041(1984).
- Good Manufacturing Practices (Ausadi Utpadan Sangita 2041)
- Pharmacy Council Act (NPC- 2057(2000).

Unit: 3 A brief accounts on the following **10 Hrs**

- Regulatory provisions for veterinary, ayurvedic and other system of medicines
- Company Act of Nepal
- Patent Act of Nepal 1970
- National Health policy
- National Drug policy
- Consumer Protection Act 2054(1998).
- Narcotic drug control act relating to pharmaceutical product and the relation of act with Drugs Act 1978
- Control of poisonous and hazardous chemical substances and their control mechanism
- Pharmaceutical Institutions and organizations of Nepal and their function

- Drugs banned in Nepal and the reason of drug banning
- Nepal Black Market Act

Practical

Part -1: Social Pharmacy 50 hours

1. Draw a model prescription showing different parts of the prescriptions.
2. Collect the label of different dosages form and comment on the label on the basis of general labeling requirements.
3. Role plays in for communication skill.
4. Pharmacy design and layout.
5. Prescription handling.
6. Good pharmacy practice audit.
7. Extemporaneous preparation calculation in different dosage forms.

Practical Part -2: Pharmaceutical Jurisprudence 28 hours

1. Seminar on National Health policy
2. Seminar on National Drug policy
3. Discuss the banded list of drugs with rational and enlist the detail list.
4. Seminar on veterinary, ayurvedic and other system of medicines
5. Discuss the importance and provision of different "Anusuchies" included in the following regulations:

1. Drug Registration Regulation 2038(1981).
2. Drug Inspection Regulation 2040(1983).
3. Drug Standard Regulation 2043(1986).
4. Drug Manufacture Codes 2041(1984).
5. Drug Sale and Distribution Codes 2041

References:

1. Alfonso R. Gennaro: Remington the Science and Practice of Pharmacy, Volume II (20th Edition) 2002, Lippincott Williams & Wilkins, Philadelphia.
2. J. Winfield and R. M. E. Richards: Pharmaceutical Practice (2nd Ed.) 1998, Churchill Livingstone, Edinburg.
3. Kevin Taylor and Geoffrey Harding – Pharmacy Practice. Taylor and Francis, Latest edition.
4. Regulations and others guidelines of DDA related to community Pharmacy, MOHP, Government of Nepal.
5. Drug Act 2035 and Rules and Regulations under it. Government of Nepal. MOHP.
6. Patent Act and Company Act of Nepal, Government of Nepal, MOIC.
7. Health Related Regulations and Policies, Government of Nepal. MOHP.
8. Consumer Protection Act 2054(1998), Government of Nepal.
9. Nepal Pharmacy Council Act 2057 (2000)
10. National Drug Policy 1995.

Subject Title: Community Pharmacy & First Aid

Theory total: 78 hrs (2 hrs/week) Full marks: 100 (Th. 50+Pr. 50)
Practical total: 78 hrs (2 hrs/week) Pass marks: 50 (Th. 20+Pr. 30)

A. Course Description
This course is designed to help students to acquaint with the knowledge and skills on different regulatory provision in the community pharmacy as well as related first aid techniques. This course also focuses on the different ethical aspects of pharmacy and different components of the community pharmacy.

B. Course Objectives:
After completion of this course the students will be able to:
1. Provide first aid treatment/ management
2. Recognize common emergency problems and manage them at community/local set up and refer in time at appropriate health care centre.
3. Manage simple and common problems.
4. Give proper counseling at their best.
5. Describe different aspects of community pharmacy and community pharmacy management.
6. Develop communication skill and dispensing technique.

Theory

1. Circumstances of working fields- 5 hrs
Approach to the patients
a. History taking
b. Physical examination

2. Gastro Intestinal System- 5 hrs
2.1 Abdominal Pain
Identify
a. Acute and Chronic abdomen
b. Cause an severity
c. Anticipate the outcome/prognosis

2.2 Acute Gastro enteritis
- Diarrhea and dysentery
- Vomiting
Manage according to IMCI guidelines

3 Respiratory system- 8 hrs
- Develop skill to approach the patient with
- Chest pain.
- Cough cold/ARI
- Cough in children and Adult
- Difficulty in breathing
- Blood in sputum and cough

4 Genitourinary system- 3 hrs

- Difficulty in passing urine
- Blood in urine
- Retention of urine
- Sexually transmitted disease infection (STI)

5 Gynecology/obstetric - 2 hrs

- Pregnancy related condition
- Anemia, Bleeding, pre-eclampsia etc.

6 Oral Cavity - 3 hrs

- Tooth ache
- Caries
- Ulcers
- Gingivitis and stomatitis

7 Soft tissue inflammation- 2 hrs

- Cellulitis
- Abscess

8 Neurology- 2hrs

- Seizure

9 Skin - 2 hrs

- Scabies
- Ring worms
- Eczema and dermatitis

10 Muscle Skeletal / Muscular pain- 2 hrs

- Bone and Joint pain
- Fracture, dislocation and sprain

11 Nutrition- 8 hrs

- Failure to gain weight in children
- Weight loose in adult
- Nutrition deficiency diseases

12 Eye - 2 hrs

- Red eye
- Xerophthalmia
- Corneal ulcer

13 ENT- 5 hrs

- Foreign body
- Wax
- Ear discharge
- Throat pain
- Foreign body
- Nasal block and discharge
- Epistaxis

14 Common symptoms - 8 hrs

- Fever
- Headache
- cough
- Generalize body ache
- Loss of appetite
- Rashes
- Insomnia
- Itching

15. Common Emergency problems - 22 hrs

- Poisoning
- Shock
- Drug/ Anaphylactic reaction
- Heat stroke
- First bite
- Snake and insect bite
- Hemorrhage
- Convulsion
- Cuts and injuries
- Choking
- Road traffic accident (RTA)
- Drowning
- Burns

Practical: 78 hrs

- Lab demonstration, Seminars and Students presentation on the following topics Practical is included in community pharmacy comprehensive field)
- Injection – IV, IM, Sc, ID
- Catheterization
- NG tube insertion
- Enema
- Dressing of wound
- Incision and Drainage
- Wound stitching / suture and its removal
- Splinting / Immobilization
- Removal of uncomplicated foreign body
- Application of tourniquet
- Preparation of ORS
- Cardio Pulmonary Resuscitation (CPR) /BLS

References

1. Clinical Health I, Vidarthy Prakashan
2. Clinical Health II, Krishna Prasad Nagila
3. Medical Problems for Health post worker- David H.
4. Springhouse and Michael Shaw- Nursing Procedures Made Incredibly Easy!

Subject Title: Comprehensive Professional Field Practice

Comprehensive Professional Field practice should be carried out in the listed hospital pharmacy, Health post and community pharmacy approved by the Nepal Pharmacy council.

Nature: Practical **Full Marks: 200**
Total: 340 hrs **Pass Marks: 120**

Course description
This course is designed to help students to apply the knowledge and skills in the actual professional practice.

Course objective
After completion of this course the students will be able to:

1. Read and interpret prescription, interpret dose, dispense and council the patients in community and hospital setting.
2. Perform the overall hospital and community pharmacy activities as a pharmacy assistant.
3. Trained in responding to symptoms on minor illness.
4. Assist on adverse drug monitoring system and pharmacovigilance.
5. Assist the pharmacists on manufacturing, quality assurance, extemporaneous preparations and regulatory related functions as a pharmacist assistant.

Placement schedule
Students will be deputed to health facilities/hospital and community and retail pharmacies and visit will be made to industry, regulatory authority, drug quality control laboratories for the period of 8½ weeks (40 hrs per week that means 40x8.5=340 hrs).

S.No.	Subject/Area	Duration	Paper
1.	Industry	3 days field visit (Orientation Visit)	
2.	Drug Regulatory Bodies		
3.	QA-QC Lab		
4.	Hospital Pharmacy	4 weeks (170 hours)	I= 100
5.	Community Practice	4½weeks (170 hrs)	II= 100
	Total	8½ weeks (340 hours)	230

Evaluation
1. For all paper (Paper I, II) 50 % of the marks of paper, is allotted for internal assessment that will be given by the supervisor teacher from the college on the basis of practical site supervision plus report submitted by the student.
2. Final viva voce marks will be 50 % of each subject. Out of which 50% marks in each paper will be given by the external examiner (Pharmacist expert) nominated by CTEVT and a rest of 50% marks of each subject will be given by the internal examiner (relevant subject teacher) of the institute.
3. The students must to pass the paper I and II separately.
4. The students must obtain minimum of 60 % marks in each paper both in internal assessment and final viva voice separately.

Training Manual for Diploma in Pharmacy
Hospital Pharmacy

S. No	Activities	Days	Remarks
1.	**Orientation**	**1**	
	a. Tour of hospital and hospital pharmacy		
	b. Organizational charts		
	c. Layout design of the hospital and pharmacy		
	d. Rules and regulation of hospital pharmacy to the trainee		
	e. Familiarization with the pharmacy staffs		
	f. Location of the medicines		
2.	**Pharmacy Store**	**5**	
	a. Arrangement of medicines		
	b. Procurement process including bill entry		
	c. Receiving the medicine in store		
	d. Storage of different drugs including narcotics		
	e. Inventory control		
	f. Drug recall procedure		
	g. Ordering and order making procedure		
	h. Cold chain maintenance and log book system		
	i. Sorting of expired drugs		
	j. Storage of expired drugs		
	k. Medicine stock analysis		
	l. Selection of vendor		
	m. Surgical, Cosmetics, Health Consumer items, Food supplements		
	n. Expired medicine return procedure		
	o. Medicine distribution to different departments		
3.	**Dispensary**	**8**	
	a. Prescription Handling		
	b. In patient supply (ICU, OT, Floor stock)		
	c. Outpatient supply		
	d. Supply to emergency department		
	e. Computer software system		
4.	**Patient services**	**11**	
	Minor OT , wards and Dressing Room	**4**	
	First aid services	**2**	
	Medication record system	1	
	Medication counseling	2	
	ADR monitoring and pharmacovigilence	2	
5.	**Extemporaneous preparation compounding and labeling**	**4**	
6.	**Drug information system, DTC and Formulary system**	**3**	
7.	**Final Report sum up**	**1**	

Community Pharmacy Practice

S. No	Activities	Days	Remarks
1.	**Orientation**	**1**	
	a. Orientation of Community pharmacy		
	b. Services provided by the pharmacy		
	c. Layout of the pharmacy		
	d. Rules and regulation of pharmacy to the trainee		
	e. Location of the medicines		
2.	**Inventory Management**	**4**	
	a. Arrangement of medicines		
	b. Selection of Vendor		
	c. Procurement process including bill entry		
	d. Receiving the medicine		
	e. Storage of different drugs including narcotics		
	f. Medicine Stock Analysis		
	g. Selection and Arrangement of Medicine		
	h. Drug recall procedure		
	i. Sorting of expired drugs		
	j. Storage of expired drugs		
	k. Expired/Damage Medicine return/overstock medicine return		
	l. Surgical, Cosmetics, Health Consumer items, Food supplements		
	m. Listing of pharmacy inventory		
	Allopathic medicine		
	Cosmetics products		
	Surgical items		
	Medicine devices		
	Other system of medicines in pharmacy		
3.	**Prescription handling and Dispensing**	**15**	
	a. Prescription Handling		
	b. Dispensing of Ka, Kha, Gha medicines		
	c. Dispensing of OTC drugs and Counseling		
4.	**Patient services**	**10**	
	a. Medication record system		
	b. Medication counseling		
	c. ADR monitoring and pharmacovigilence		
	d. Responding to minor ailments (Diarrhoea, Constipation, Nausea/vomiting, cough/cold, sore throat, headache, abdominal pain, Muscoskeletal Disorder, Eye problems and skin problems		
5.	**Special product handling and documentation**	**1**	
	Cold chain management		
	Psychotropic and narcotic drug handling and documentation		
6.	**Enhance services in Community Pharmacy**	**4**	
	Patient medical Record Keeping &health history record		
	Medicine Home delivery service		
	Pharmacist Counseling Service		
	Medical device counseling service		
	Rotahaler/nebulizer Counseling Service		

	Insulin Injection Service		
	Vaginal tablet counseling		
	Blood Pressure Measurement Service		
	First Aid Service		
	Vaccination & Immunization Service and recording		
	Drug Information Service		
	Chronic Disease Management Service		
	Diabetic Care Service		
	Sugar monitoring		
	Blood Pressure Monitoring		
	Immunization Record Service		
	Marketing of community pharmacy		
	Final Report sum up	**1**	

Industry, QC Laboratory and Regulatory authority will be visited and the observation of the activities carried out there will be observed.

The field report should be submitted for the final assessment which must contain the case reports from hospital and community pharmacies.

Curriculum Revision Team:

1. Mr. Chandra Bhakta Nakarmi, Director, CTEVT/CDD
2. Mr. Deepak Prasad Poudel, Chief Curriculum Officer, CTEVT/CDD
3. Mr. Yegya Prasad Neupane, Chairman, Nepal Pharmacy Council, Kathmandu
4. Mr. Vijaya Yadav, Registrar, Nepal Pharmacy Council, Kathmandu
5. Mr. Dhan Prasad Poudel, Epidemiology Department, MoHP, Kathmandu
6. Mr. Gajendra Bahadur Bhuju, Director General, Department of Drug Administration, Kathmandu
7. Mr. Gorkha Bahadur D.C., Pharmacist, Department of Drug Administration, Kathmandu
8. Mr. Bharat Poudel, Drug Inspector, Department of Drug Administration, Kathmandu
9. Ms. Siwani Khadgi, Pharmacist, Nepal Medicine Laboratory, Kathmandu
10. Mr. Mukesh Goiet, Pharmacist, Pinacal Technical College, Lalitpur
11. Mr. Gulam Mohomad Khan, Coordinator, Pharmacy Programme, Pokhara University
12. Ms. Priti Manandhar, Lecturer, Hope International College, Lalitpur
13. Mr. Tirtha Ratna Shakya, Ex. Chief, Nepal Medicine Laboratory, Kathmandu
14. Ms. Susma Shakya, Pharmacist, Department of Drugs Administration, Kathmandu
15. Mr. Mohan Prasad Amatya, Director, Nepal Medicine Laboratory, Kathmandu
16. Mr. Nayan Manandhar, Lecturer, Institute of Medicine, Maharajgunj, Kathmandu
17. Mr. Sagar Shrestha, Lecturer, Hope International College, Lalitpur
18. Mr. Ashish Bastola, Coordinator, Kantipur College of Medical Science, Kathmandu
19. Prof. Dr. Dharma Prasad Khanal, Chief, Pharmacy Programme, Manmohan Memorial College, Kathmandu
20. Ms. Lapita Amatya, Coordinator, Nims College, Kathmandu
21. Mr. Nanda Kishor Bhatta, Principal, Shree Medical and Technical College, Bharatpur
22. Mr. Kiran Sundar Bajracharya, Lecturer, Manmohan Memorial College, Kathmandu
23. Mr. Pan Bahadur Chhetri, Pharmacist, Department of Drugs Administration, Kathmandu
24. Ms. Reena Mul, Coordinator, Holi Vision College, Kathmandu
25. Ms. Sanjeeta Bista, Pharmacist, Pinacal Technical College, Lalitpur
26. Mr. Sarad Pudasaini. HoD, Hope International College, Lalitpur
27. Mr. Keshab Dhoj Joshi, Chief, FDC Lab, Kathmandu
28. Mr. Pawan Rawat, Coordinator, Pinacal Technical College, Lalitpur
29. Ms. Sheela Sapkota, Lecturer, Little Angels College, Lalitpur
30. Mr. Radha Raman Prasad, Ex. DG, Department of Drugs Administration, Kathmandu
31. Dr. Menu Acharya, Health Consultant, CTEVT/CDD
32. Mr. Santosh Kumar Mahaseth, Technical Assistant, CTEVT/CDD

Curriculum Revised on: May 2014