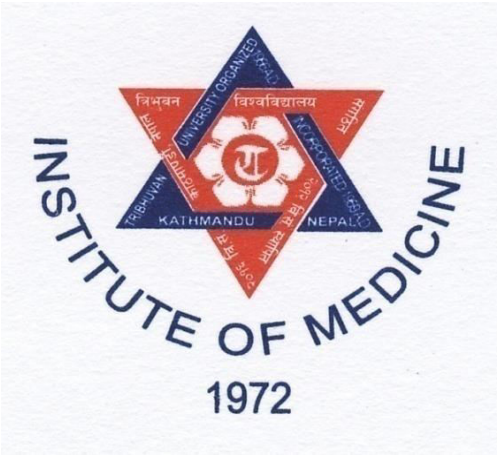
Curriculum

on

Bachelor in Pharmacy

(B. Pharm)



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

10. Curriculum structure of Bachelor of Pharmacy

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

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

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

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

PHARMACEUTICAL MICROBIOLOGY

Subject: Theory	Year: First	Code: BP 406 A
Full Marks: 100	Total Teaching hours: 90	Credit hour: 6

Course Description: Scope of microbiology is the study of all organisms that are invisible to the naked eye- that is the study of microorganisms. Microorganisms are necessary for the production of bread, cheese, beer, antibiotics, vaccines, vitamins, enzymes etc. Microbiology has an impact on medicine, agriculture, food science, ecology, immunology, molecular microbiology etc.

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

- **a.** Explain methods of identification and preservation of various microorganisms
- **b.** Discuss importance of sterilization in microbiology.
- **c.** Perform sterility testing of pharmaceutical products.
- **d.** Describe microbiological standardization of Pharmaceuticals.
- **e.** Use different techniques in the production of Pharmaceutical products, quality assurance of different pharmaceutical preparations
- **f.** Acquire knowledge on selection of suitable antimicrobial agents for treatment of infection.

Specific objectives:

Unit 1: Introducvtion to microbiology [2 Hrs]

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

Discuss Historical Development of Microbiology and Scope and importance of Pharmaceutical Microbiology

Unit 2: Classification of microbes [10 Hrs]

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

Discuss classification of medical important microorganism, eukaryotes and prokaryotes (bacteria, virus, fungi and parasites).

Unit 3: Growth and preservation of bacteria. [10 Hrs]

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

Discuss nutritional requirement and environment factor for growth and preservation of bacteria

Unit 4: **Control of microbes by physical and chemical method [18 Hrs]**

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

a. Explain different methods of sterilization, sterilization process control and sterility testings of products.
b. Discuss Chemical disinfectants, antiseptics and preservatives.

Unit 5: Isolation and identification of bacteria [15 Hrs]

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

a. Discuss different methods used in isolation and identification of bacteria with use of different culture , staining technique and biochemical reaction.
b. Discuss methods of bacterial counts.

Unit 6: Antibiotics [13 Hrs]

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

a. Discuss manufacture of antibiotics: Production of penicillin and streptomycin
b. Discuss mode of action of antibiotics (cell wall cytoplasmic membrane, cytoplasm and compounds)
c. Discuss clinical use of antimicrobial drugs is different body system
d. Discuss mechanism and type of bacterial resistance
e. Discuss problems in antibiotic therapy due to resistance
f. Discuss Microbiological assay of antibiotics
g. Discuss Antibiotic susceptibility testing [Disc diffusion technique, Dilution technique (MIC, MBC), Evaluation of Static activity (fungus, bacteria) and Evaluation of Germicidal activities (fungus, bacteria)]

Unit 7: Normal flora of human body [3 Hrs]

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

a. Mention normal flora in human body
b. Discuss principle of microbial pathogenicity.

Unit 8: Fundamental of immunology/Molecular microbiology [19 Hrs]

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

a. Discuss Infection and immunity
b. Describe Antigen and antibody reaction
c. Discuss Toxin, toxoid and vaccine.
d. Discuss Recombinant DNA and protein based vaccines
e. Describe types of hypersensitivity
f. Discuss Serodiagnostic tests and use of molecular microbiology in pharmaceutical industry.
g. Discuss Complement system: Components of Complement system. Three pathways of complement activation
h. Discuss Animal models and transgenic animals and their use in immunological studies, Transgenic animals
i. Discuss Techniques in molecular immunology: Hybridoma technology (Monoclonal antibody), Antibody engineering, Chimeric antibodies, Antisense oligonucleotides and Phage display
j. Discuss Experimental immunology: Vaccine development (Recombinant, Combined and polyvalent vaccines) and Stem cell technology. Reverse vaccinology

PHARMACEUTICAL MICROBIOLOGY

Subject: Practical	Year: First	Code: BP 406 B
Full Marks: 50	Total Teaching hours: 90	Credit hour: 2

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

a Mention rules and regulation, code of conduct and safety precautions in microbiology laboratory.
b Demonstrate lab equipments used in microbiology.
c Prepare , chemicals, reagents and sterilize including glassware
d Perform Staining technique: Gram stains, Ziehl Neelsen stain.
e Prepare different culture for isolation of microorganisms
f Perform inoculation technique for isolation of pathogen (pure culture) from clinical specimens
g Demonstrate Biochemical and motility tests
h Perform antibiotic susceptibility test
i Determine Minimum Inhibitory Concentration (MIC)
j Antibiotic evaluation: Perform microbiological assay of antibiotics by cup plate method
k Perform sterility testing for powders, liquids and solution
l Perform isolation of antibiotic producing microorganism from soil sample
m Perform Sero-diagnosis of microbial disease by Kit and ELISA techniques
n Demonstration of molecular techniques (PCR)
o Demonstrate quality control pharmaceuticals product samples in relation to microbiology

Reference books (Latest Editions)

a. Essentials of Medical Microbiology. Apurba Sankar Sastry, Sandhya Bhat K. JP Borthers Medical Publishers. 1st edi. 2016
b. Hugo W. B, Russel A. D. Pharmaceutical Microbiology. Blackwell Scientific Publications, UK.
c. Pelczar M. J, Chan E. C, Krieg N. R, Edwards D. D, Pelczar M. F. Microbiology: concepts and applications. New York: McGraw-Hill.
d. Remington J. P, Osol A, Anderson JT, Hoover JE. Remington's pharmaceutical sciences.
e. Kokare C. R. Pharmaceutical microbiology-principles and applications. Nirali Prakashan.
f. Ghimire P. Hand book of Practical Microbiology, 2003, Pravesh Publication, Kathmandu