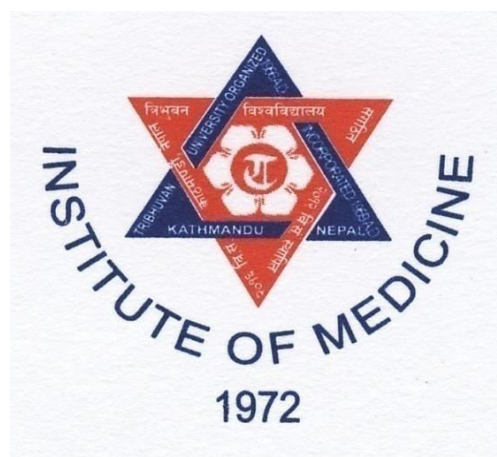


**Curriculum**  
**on**  
**Bachelor in Pharmacy**  
**(B. Pharm)**



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## AYURVEDIC PHARMACY AND HERBAL TECHNOLOGY

Subject: Theory	Year: Third	Code: BP 604 A
Full Marks: 100	Total Teaching hours: 90	Credit hour: 6

**Course Description:** This course deals with isolation, biogenesis, pharmacological actions and drug discovery of different secondary metabolites. It also deals with the significant aspects of traditional system of medicine.

### General objectives:

At the end of the course, the student should be able to

- a. Discuss of basic philosophical concepts of Ayurveda system of medicine
- b. Discuss various formulation and pharmacological profile of marketed Ayurvedic preparations
- c. Describe various aspects of herbal formulation and development as per industrial requirement
- d. Explain in vitro and in vivo biological screening of herbal drugs for various diseases and disorders.
- e. Discuss different Approaches to discovery and development of natural products

### Specific objectives:

#### Unit 1: Principle of Ayurveda [6 Hrs]

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

- a Explain detoxification and treatment techniques in Ayurveda.
- b Discuss research and regulatory prospects of Ayurveda in Nepal.
- c Explain GMP requirements for Ayurvedic/Herbal Industry in Nepal

#### Unit 2: Ayurvedic Pharmaceutics (Bhaishajya Kalpana) [12 Hrs]

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

- a Discuss Panchavidha kasaya Kalpana.
- b Explain preparation and standardization of different, Ayurvedic dosage forms. Asavas and Aristas, Arkas, Avalehas, Churnas, Ghritas and Tailas, Vatika and Bhasmas to references to marketed products.
- c Discuss pharmacological profile of Chyawanprash, Triphala churna, Sitoplaladi churna, Chandraprabha Vati, Shankh Bhasma, Dashmularishta, Ashokarishta, Vasavaleha and Rasasindoor.

#### Unit 4: Herbal Extracts [11 Hrs]

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

- a Describe different extraction methods (Maceration, Decoction, Infusion, Percolation, Supercritical fluid extraction, Microwave assisted techniques and Distillation).
- b Outline eluotropic series.
- c Describe recent advances in Deep Eutectic Solvents (NADES) as extraction solvent.

- d Discuss methods for drying of extracts (including rotavapour, nitrogen gas drying).
- e Discuss production of standardized extracts by suitable techniques with special reference to some folklore medicinal plants.
- f Explain secondary metabolites extraction techniques from microorganisms (bacteria, fungus).

#### **Unit 5: Herbal standardization [5 Hrs]**

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

- a Discuss WHO guidelines for quality control of herbal drugs.
- b Explain DNA barcoding.
- c Discuss Herbal pharmacopoeias.

#### **Unit 6: Basic principles of Biological standardization [12 Hrs]**

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

- a Discuss Pharmacological activity testing methods: antioxidant, cytotoxicity (brine shrimp), antimicrobial, cardiac, psychopharmacological, hepatoprotective, anti-inflammatory, analgesic and anti-diabetic activity.
- b Discuss laboratory guidelines for animal care
- c Discuss ideal requirements and problems in Pharmacological screening.

#### **Unit 7: Drug discovery from plants [18 Hrs]**

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

- a Discuss role of traditional medicine knowledge in the development of new pharmaceutical agents
- b Discuss bioactivity-guided purification.
- c Discuss recent advances in High throughput Screening.
- d Discuss applications of chromatographic methods: TLC (Different types of spraying reagents), HPTLC, HPLC, MPLC, GLC, LC-MS, Counter Current Chromatography in drug discovery.
- e Explain recent advances in phytochemical research in anticancer, antidiabetic, anti HIV Virus.
- f Explain advances in Metabolomics in drug discovery.
- g Discuss drug discovery from marine source.
- h Challenges in drug discovery from natural products
- i Discuss the role of endophytes/microorganisms in secondary metabolite production in plants.
- j Explain Intellectual property rights governing discovery and development of drugs from natural sources.

#### **Unit 8: Dereplication for natural products [8 Hrs]**

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

- a Discuss recent advances in dereplication techniques, and Molecular networking.
- b Explain development of dereplication protocols with examples.
- c Discuss combinatorial library for constituents obtained from natural resources, extracts used for developing new drugs.

### **Unit 10: Modern Herbal dosage forms [9 Hrs]**

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

- a Discuss formulation development and quality control of herbal cosmetics used in hair dyes, lipsticks, face packs, creams, lotions, jels, oils and shampoos.
- b Discuss significance of substances of natural origin as excipients: (colorants, sweeteners, binders, diluents, viscosity builders, disintegrants, flavors and perfumes)
- c Discuss general information of granulation technology in Ayurvedic pharmaceuticals
- a. Discuss requirements for preparation of liquid herbal dosage forms with suitable case study
- b. Discuss requirements for preparation of solid herbal dosage forms with suitable case study

### **Unit 11: Herbal Nutraceuticals [3 Hrs]**

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

- a Discuss general aspects, market, growth, scope and types of products available in the market.
- b Discuss role of Nutraceuticals in ailments like Diabetes, CVS diseases, Cancer, Irritable bowel syndrome and various Gastro intestinal diseases (Reference from marketed nutraceuticals).

### **Unit 12: Pharmacological aspects medicinal plant [6 Hrs]**

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

Discuss Formulation and Pharmacological aspects of following medicinal sources.

- a. **Hepatoprotectives:** Andrographis paniculata, Lawsonia innermis, Phyllanthus amarus and Silybum marianum, Picrorhiza
- b. **Cardioprotectives:** Coleus forskohli, Garcinia cambogia, Thevetia nerrifolia, Viscum album and Veratrum
- c. **Insecticides and Insect repellants:** Tobacco, Neem, Pyrethrum
- d. **Tumor inhibitors:** Taxus, Camptotheca, Vinca and Podophyllum
- e. **Immunomodulators/Adaptogen:** Withania, Ginseng, Moringa, Shilajit, and Yarsagumba
- f. **Reproductive disorders:** Saraca indica, Ruta graveolens, Nigella sativa, Claviceps purpurea, Myristica fragrance.
- g. **Diabetes:** Gymnema sylvestre, Melia azadirchta, Momordica charantia, Syzygium cumini.

## AYURVEDIC PHARMACY AND HERBAL TECHNOLOGY

Subject: Practical	Year: Third	Code: BP 604 B
Full Marks: 50	Total Teaching hours: 90	Credit hour: 2

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

1. Formulate and evaluate Ayurvedic formulations mentioned in Course.
2. Formulate and evaluate herbal cream.
3. Formulate and evaluate herbal gel.
4. Formulate and evaluate herbal oil.
5. Formulate and evaluate herbal lotion.
6. Formulate and evaluate herbal moisturizer
7. Formulate and evaluate herbal sun screen
8. Formulate and evaluate herbal face packs.
9. Determine in-vitro antioxidant activity of given extract by UV-spectrophotometer.
10. Determine in-vitro cytotoxicity of given extract by UV-spectrophotometer
11. Determine in-vitro anti-inflammatory of given extract by UV-spectrophotometer
12. Determine in-vitro antidiabetic activity of given extract by UV-spectrophotometer
13. Demonstrate Finger-printing of crude drugs by HPTLC/HPLC/LC-MS (From published Literature)
14. Prepare a scheme for isolation and characterization of any one novel compound (From published Literature).
15. Review of all natural molecule used in modern medicine practice with reference to current pharmacopeia
16. One Visit to Herbal Drug/Cosmetic Industry for observation of Production and Quality control operations.

### Reference books (Latest Editions)

1. Lad V. Textbook of Ayurveda. Ayurvedic Press.
2. Dewick P. M. Medicinal natural products, a biosynthetic approach. John Wiley and Sons.
3. Pridham J. B, Swain T. Biosynthetic pathway Higher Plants, Academic Press, New York
4. Ikan R. Natural products: a laboratory guide. Elsevier.
5. Harborne J. B. Methods of plant analysis. Springer, Dordrecht.
6. Nakanishi K, Goto T, Itô S. Natural products chemistry. Academic press.
7. Patwardhan B, Vaidya A. D, Chorghade M. Ayurveda and natural products drug discovery. Current science.