DISCIPLINE SPECIFIC ELECTIVE COURSE: BRIDGING ANCIENT MEDICINE AND PRACTICES WITH MODERN BIOMEDICAL RESEARCH

Course title & Code	Credits	Credit distribution			Eligibility criteria	Pre-requisite of the course
		Lecture	Tutorial	Practical		
Bridging Ancient Medicine and Practices with Modern Biomedical Research	**4**	**2**	**-**	**2**	**XII Passed**	**Basic knowledge of Biological Sciences**

Learning Objectives:

The Learning Objectives of this course are as follows:

- Students will be introduced to the field of ancient medicine like Ayurveda, Naturopathy and Yoga.
- Students will develop scientific and hands-on practical skills in investigating ancient medicine applications in modern biomedical research that will be useful for higher studies and research.

Learning Outcomes:

The Learning Outcomes of this course are as follows:

- Students will be introduced to the concept, scope and relevance of various ancient medical practices and the role of ancient medicine applications in modern biomedical research.
- Students will gain insights into the clinical applications of nutraceuticals, Yoga and basis of ethnopharmacological practices for drug development.
- Students will be able to appreciate the genomic context of ayurvedic classification.
- Students will perform project work to analyze the health benefits of Ancient traditional medicine.

SYLLABUS **(30 hours)**

Unit I (a): Introduction to Ancient Medicine Knowledge **(4 hours)**

Introduction and historical account of ancient medical practices including Ayurveda, Naturopathy and Yoga. Concept of Five elements (Pancha mahabhuta), Pancha kosha, Yoga sutras and Nature cure. Contribution of Charaka and Sushruta. Ayurvedic Pharmacopoeia of India, Traditional knowledge digital library, ICMR Research programmes on traditional medicine, WHO traditional medicine strategy.

Unit I (b): Ayurgenomics **(6 hours)**

Tridosha theory of Ayurveda (Vata; Pitta; Kapha), Concept of Prakriti and Vikruti, Prakriti types (Vata; Pitta; Kapha; Vata/Pitta; Pitta/Kapha; Vata/Kapha; and Vata/Pitta/Kapha), Scientific explanation for Prakriti: Ayurgenomics (Integration of the principles of Ayurveda with the genomics), P4 medicine (four Ps are predictive, preventive, personalized and participatory compounds) synthesis. They will understand the natural product isolation and identification of their phytochemical constituents. They will also learn to identify biomolecules.

Case studies on expression levels of genes involved in immunity, cell division, blood coagulation, etc with respect to different Prakriti types, Studies on the Genetic Basis of Prakriti (high-altitude adaptation, rheumatoid arthritis, human leukocyte antigen), Studies on Physiology, Disease and Prakriti (Triglyceride, VLDL and LDL levels, Diabetes, Parkinson's disease), Epigenetics in Ayurveda.

Unit II: Health Benefits of Yoga (6 hours)

Yoga Practices including postures (overview of asanas), breathing techniques (pranayama), meditation (dhyana/dharana), and relaxation for health promotion and therapeutics: Immune modulation (treating infectious diseases), headache, migraine, obesity, hyperthyroidism, diabetes, PCOD, hypertension (Savasana), anxiety and depression (Hatha Yoga), arthritis and cancer.
Learning outcomes of experimental studies related to yoga in Mental Health, Stress, Cardiovascular Disease, Musco-skeletal disorders, Neurological Disorders, etc.

Unit III: Ethnopharmacology: Traditional medicine in modern drug discovery (7 hours)

Introduction, scope and relevance. Quantitative and Comparative Methods in Ethnopharmacology (Materia medica and cultural consensus, Pharmacological research), Biodiversity, Conservation and Ethnopharmacology. Stages of ethnopharmacological research in drug discovery (ethnobotanical surveying and fieldwork/Screening and evaluation of traditional medicine, the pharmacological assessment of activity with diverse targets in the laboratory, and the transfer of results back to indigenous communities). Understanding the basis of ethnopharmacological practices for the development of early medicines using the examples of morphine, aspirin and digitalis. Recent drug discovery projects with ethnopharmacological association (Artemisinin for malaria, Prostratin as antiviral). Challenges in Ethnopharmacology (Biopiracy)

Unit IV: Nutraceuticals (7 hours)

Introduction, scope and relevance. Difference Between Nutraceuticals, functional foods and Pharmaceuticals, Main categories of Nutraceuticals (Herbals, Nutrients and Dietary supplements), Ayurvedic Classification and Nutraceuticals- Classification of food according to the doshas (Vata, Pitta, and Kapha), Studying specific bioactive compounds in foods and herbs that target doshic imbalances (Ashwagandha for stress (Vata imbalance), Turmeric for inflammation (Pitta imbalance), Ginger for digestion and metabolism (Kapha imbalance).
Research evidence based applications of nutraceuticals with examples related to neural (*Bacopa monnieri, Curcuma longa*), cardiovascular (flavanoid rich grapes, tea polyphenols), Diabetes (*Psyllium, Momordica charantia*) and renal disorders (*Tribulus terrestris,* Stevia). Nutraceuticals for health promotion, immune-boosting and protection. Adverse effects of Nutraceuticals.

Practical: 60 hours

Group project work to analyze the health benefits of Ancient traditional medicine

- Identification of Problem/Hypothesis through literature review (2 weeks)
- Questionnaire preparation (3 weeks)
- Survey after due ethical clearance/Data collection from published data or scientific literature (4 weeks)

- Data Analysis (4 weeks)
- Compilation and Presentation of results (2 weeks)

Essential Readings:

- Sebastian, T. (2024). Cell line studies in Ayurveda: Bridging ancient wisdom and modern science. International Journal of Biological and Pharmaceutical Sciences Archive, 7(1), 158-161. (DOI: 10.53771/ijbpsa.2024.7.1.0030)
- Mohan, S, Abdollahi, S, & Pathak, Y (Eds.). (2023). Applications of Functional Foods and Nutraceuticals for Chronic Diseases: Volume I. CRC Press. e-book ISBN: 9781003220053
- Heinrich, M, Jäger, AK (Eds.) (2015) Ethnopharmacology. Wiley. ISBN: 978-1-118-93074-8.
- Wiart, C (2007). Ethnopharmacology of Medicinal Plants: Asia and the Pacific. Netherlands: Humana Press. e-book ISBN: 9780429125263.
- Cosola C, Sabatino A, Di Bari I, *et al.* (2018) Nutrients, Nutraceuticals, and Xenobiotics Affecting Renal Health. Nutrients. (DOI: 10(7):808. (https://doi.org/10.3390/nu10070808)
- Huang Z, Chavda VP, Bezbaruah R, *et al.* (2022) An Ayurgenomics: A new approach in personalized and preventive medicine Development for Personalized Care. Front Pharmacol. 13:866827. (DOI: 10.36348/SIJB.2019.v02i10.001)
- Mukerji, M, & Prasher, B (2011). Ayurgenomics: A new approach in personalized and preventive medicine. Sci Cult, 77(1-2), 10-7.
- Khalsa, S B, Cohen, L, McCall, T, *et al.* (2016). Principles and Practice of Yoga in Health Care. United Kingdom: Jessica Kingsley Publishers. ISBN: 9781909141209.
- Basu-Ray I, Metri K, Khanra D, *et al.* (2022). A narrative review on yoga: a potential intervention for augmenting immunomodulation and mental health in COVID-19. BMC Complement Med Ther., 22(1):191. doi: 10.1186/s12906-022-03666-2. PMID: 35850685; PMCID: PMC9289356.
- Bunn, M. (2010). Ancient Wisdom for Modern Health: Rediscover the Simple, Timeless Secrets of Health and Happiness. Australia: Enlightened Health Publishing.

Suggested Readings:

- Chakrabarti, D. (2024). History of Ancient India (11 Volume Series). Sage Publications. New Delhi. ISBN: 9789353887009.
- PHOSP-COVID Collaborative Group (2022). Clinical characteristics with inflammation profiling of long COVID and association with 1-year recovery following hospitalisation in the UK: a prospective observational study. The Lancet. Respiratory medicine, 10(8), 761–775. (DOI: 10.1016/S2213-2600(22)00127-8)
- Wal P, Aziz N, Dash B *et al.* (2023) Neuro-nutraceuticals: Insights of experimental evidences and molecular mechanism in neurodegenerative disorders. Futur J Pharm Sci. 9, 31. (DOI: 10.1186/s43094-023-00480-6)
- Gupta R C, Doss R B, Garg R C, *et al.* (2021). Nutraceuticals for diabetes and glucose balance. In Nutraceuticals (pp. 83-100). Academic Press. ISBN: 9780128210383. (DOI: 10.1016/B978-0-12-821038-3.00006-9)
- Sosnowska B, Penson P, Banach M (2017) The role of nutraceuticals in the prevention of cardiovascular disease. Cardiovasc Diagn Ther. (Suppl 1):S21-S31. (DOI: 10.21037/cdt.2017.03.20)

- Ghani U, Naeem M, Rafeeq H, *et al.* (2019). A novel approach towards nutraceuticals and biomedical applications. Sch. Int. J. Biochem, 2, 245-252. (DOI: 10.36348/SIJB.2019.v02i10.001)
- Kim C H, Heinrich M, Yen H R, *et al.* (2023). Insights in ethnopharmacology: 2022. Frontiers in Pharmacology, 14. (DOI:10.3389/fphar.2023.1264063)
- Wallace R K (2020) Ayurgenomics and Modern Medicine. Medicina (Kaunas). 56(12):661. (DOI:10.3390/medicina56120661)
- McCall, T (2007). Yoga as Medicine: The Yogic Prescription for Health and Healing. United Kingdom: Random House Publishing Group.
- Pondomatti, S. C., Tyagi, I., Shrivastava, K. K., Mahajan, S., Patel, J., & Shinde, M. A. (2024). A Literature Review of the Integration of Ancient Indian Mythology in Clinical Medicine: A Holistic Approach to Health and Healing. Cureus, 16(7), e63779. (DOI: 10.7759/cureus.63779)
- Latest developments in associated fields through research articles. (https://scholar.google.com/scholar?hl=en&as_sdt=0%2C5&q=ayurveda+%2B+ayurgenomics+%2B+naturopathy+%2B+yoga+%2B+ethnopharmacology+%2B+nutraceuticals&btnG=)