

**Center for Traditional Knowledge and Informatics
The University of Transdisciplinary Health Sciences and
Technology (TDU) Bangalore**

**COURSE TITLE: NETWORK PHARMACOLOGY FOR DRUG DISCOVERY
BASED ON AYURVEDA DRAVYAGUNA**

Focus Area/Subject Area: Network Pharmacology for Drug Discovery based on *Ayurveda Dravyaguna*

Credits: 2

Eligibility: Under Graduation (UG) Degree

Prerequisite: Having Science Background with knowledge of Botany and *Ayurveda*

Details of Instructors:

1. Dr. Venugopalan Nair, Professor, TDU
2. Dr. Tabassum, Assistant Professor, TDU
3. Dr. CN. Vishnuprasad, Associate Professor, TDU
4. Dr. Subrahmanya Kumar K, Associate Professor, TDU

Course Objectives:

1. Explore the principles and applications of **Network Pharmacology (NP)**.
2. *Dravyaguna* Profile mapping and networking
3. Study the relationships of *Dravyaguna* profile (*Rasapanchakas*) of *Ayurvedic* plants and its recommended indications or formulations using NP methods in relation with bioactives and its targets and disease pathways.
4. Suggest a list of shortlisted medicines or plants for a given clinical conditions or disease using the outcome of the study.
5. Gain proficiency in **Gene Ontology (GO)** and pathway analysis for identifying drug targets and mechanisms.
6. Acquire hands-on experience with tools such as *Cytoscape* and *ClueGO*.
7. Discuss the relevance of network pharmacology in drug discovery, with a focus on traditional medicine and *Ayurvedic* formulations.

Learning Outcome:

By the end of this course, the participants will be equipped to explore the molecular basis of plant drugs, especially of those used in Indian Traditional Medicine; also explore the new avenues in drug discovery and contribute to the advancement of healthcare through evidence-based approaches in herbal medicine.

SYLLABUS

Module 1: Introduction to Network Pharmacology and *Rasapanchaka*

- Challenges in traditional drug discovery approaches
- Principles of Network Pharmacology
- Significance of multi-component and multi-target interactions
- Concept of *Rasapanchaka*

Module 2: Network Pharmacology for Ayurvedic *Rasapanchaka*

- Gather data on the relationship between "*Rasapanchaka*" and *Ayurvedic* plants, and establish connections.
- Extract phytochemicals and disease pathways through data mining, and identify disease targets from open-source databases.

Module 3: Target Retrieval and Network Construction

- Methods for target retrieval from biological databases
- Techniques for Network Construction and Visualization

Module 4: GO and Pathway Analysis

- Understanding **Gene Ontology (GO)** and pathway databases
- Practical application of GO and pathway analysis in drug target identification

References/ Learning Resources:

1. Mohanraj K., Karthikeyan B.S., Vivek-Ananth R.P., Chand Bharath R.P., Aparna S.R., Mangalapandi P., and Samal A., 2018. IMPPAT: *A curated database of Indian Medicinal Plants, Phytochemistry and Therapeutics*, Nature, Science Reports, 8:4329, DOI:10.1038/s41598
2. Sastry K (ed.) *Charaka Samhita-Hindi translation*, part-1&2, Chowkhamba Orientalia Varanasi.
3. Sharma PV. *History of medicine in India*, Chowkhamba Orientalia Varanasi.
4. K.R. Srikantha Murthy. *Astanga Hrdayam*, Chowkhambakrishnadas Academy, Varanasi; 2018.
5. Chandran Uma, Mehendale Neelay, Tillu Girish and Patwardhan Bhushan, 2015. *Network Pharmacology of Ayurveda Formulation Triphala with Special Reference to Anti-Cancer Property*, Combinatorial Chemistry & High Throughput Screening; 18(9). [Link](#)
6. Chandran, Uma *et al.*, 2017. "Network Pharmacology." *Innovative Approaches in Drug Discovery*. 127–164. doi:10.1016/B978-0-12-801814-9.00005-2

7. Liu AL, Du GH. 2010. *Network pharmacology: new guidelines for drug discovery*, *Yao Xue Xue Bao*. Dec;45(12) 1472-1477. PMID: 21351485.
8. Li S, Shao Y, Chen H, Wang J., 2022. *Using Network Pharmacology to Systematically Decipher the Potential Mechanisms of Jisuikang in the Treatment of Spinal Cord Injury. Evidence-based Complementary and Alternative Medicine: Ecam.*;2022:4932153. DOI: 10.1155/2022/4932153. PMID: 35265147; PMCID: PMC8898796.
9. Mukherjee P.K., Shiv Bahadur, Ranjit K.Harwash, Sayan Biswas, Subhsdip Banerjee, 2017. *Paradigm shift in natural product research: traditional medicine inspired approaches*, Springer, *Phytochem Rev* 16: 803-826, DOI 10.1007/s11101-016-9489-6
10. Nair SNV, 2018. *Network Pharmacology as an Appropriate Bioinformatics Tool for Drug Discovery*, *Bioinformatics and Proteomics Open Access Journal*, Vol 2, Issue 1
11. Sakle, N.S., More, S.A. & Mokale, S.N. 2020. A network pharmacology-based approach to explore potential targets of *Caesalpinia pulcherima*: an updated prototype in drug discovery. *SciRep* **10**, 17217. [Link](#)