| 23EV803 | Biological Activity of Natural Products | 4 0 0 4 |
|---|---|---|

**Course Objective**

- To understand the basic concepts of various biological activities and effects by drug like molecules in human body
- To study the methods and techniques for biological activity studies
- To study the role of various natural products and drugs in curing ailments.

**Course Outcome**

CO1: Comprehend the principles of bacterial and fungal actions.

CO2: Knowledge of the performance of bioassays and their significance in biomedical research.

CO3: Interpreting and integrating data obtained from various bioassays and their real-world applications.

**Unit – 1**

Introduction to biological assays, Classification of biological assays, Antimicrobial Analysis-Principles of antimicrobial analysis, MIC and MBC determination, various methods for assessing antimicrobial activity – Antifungal, antibacterial, antiviral Activity – Disc diffusion method, Well diffusion method, broth dilution method, and agar dilution method. Techniques for evaluating antifungal activity: agar diffusion, broth micro dilution, and biofilm susceptibility assay, Data interpretation and reporting. Understanding the concept of biocompatibility and its relevance in phytochemicals and biomaterials, In vitro and In vivo biocompatibility tests: cytotoxicity, hemocompatibility, and genotoxicity assay.

**Unit – 2**

Antidiabetic activity, antihypertensive activity, anti-inflammatory activity, hepatoprotective activity

**Unit – 3**

Antioxidant analysis: oxidative stress and its implications in various diseases, methods for evaluating antioxidant activity: DPPH, ABTS, and FRAP assay, Data analysis and comparison of antioxidant potential in different samples. Cytotoxicity assays: cytotoxicity and its importance in the drug screening and safety assessment, In vitro cytotoxicity assay- MTT assay, XTT assay, and LDH release assay, Data interpretation and assessing cell viability.

**Unit – 4**

Anticancer assays- Anticancer drug screening and development, cell based assays for evaluating anticancer activity-cell proliferation assay, analyzing and comparing the efficacy of potential anticancer agents, understanding of MTT assay and CCK-8 assay principle, performing MTT assay, CCK-8 assay. Integrating data from different assays to assess the overall biological activity, real world applications of biological assays in drug discovery and biomedical research. In silico approaches in bioactivity analysis.

**Evaluation Pattern:**

| Assessment | Internal | External |
|---|---|---|
| Mid-Term Examination | 30 | 0 |
| Continuous Assessment (CA)* | 30 | 0 |
| End Semester Examination | 0 | 40 |
| **Total** | **60** | **40** |

*CA - Can be Quizzes, Assignments, Projects, and Reports.

**Further Reading**


Mounyr Balouiri, Moulay Sadiki, Saad Koraichi Ibnsouda. 2016. Methods for in vitro evaluating antimicrobial activity: A review. *Journal of Pharmaceutical Analysis,* 6(2): 71-79.

Gunathilake KDPP, Ranaweera KKDS, Rupasinghe HPV. 2018 In Vitro Anti-Inflammatory Properties of Selected Green Leafy Vegetables. *Biomedicines*, 6(4):107. doi: 10.3390/biomedicines6040107. PMID: 30463216; PMCID: PMC6316011.

Lakshmi KS, Rajesh T. 2011. Separation and quantification of eight antidiabetic drugs on a high-performance liquid chromatography: its application to human plasma assay. ISRN Pharm. 2011;2011:521353. doi: 10.5402/2011/521353. PMID: 22389851; PMCID: PMC3263720.

Avataneo V, Fanelli E, De Nicolò A, Rabbia F, Palermiti A, Pappaccogli M, Cusato J, De Rosa FG, D'Avolio A, Veglio F. 2022. A Non-Invasive Method for Detection of Antihypertensive Drugs in Biological Fluids: The Salivary Therapeutic Drug Monitoring. *Front Pharmacol.*, 5 (12): 755184. doi: 10.3389/fphar.2021.755184. PMID: 35069191; PMCID: PMC8766966.


**References**


Teicher, A. 2004. Anticancer drug development guide-preclinical screening, clinical trials, and approval, Humana Press Totowa, New Jersey.

Torrence, P.F. 2005. Antiviral Drug Discovery for Emerging Diseases and Bioterrorism Threats. Edited by, John Wiley & Sons.

Brown, A. and Smith-Benson, H.S. 2014. Microbiological Applications, Laboratory Manual in General Microbiology, Short Version-McGraw-Hill Education.

Lu-qi Huang. 2013. Molecular Pharmacognosy, Springer, Singapore.

Gang, D.R. 2011. The Biological Activity of Phytochemicals, Springer.