

# MAR IVANIOS COLLEGE (AUTONOMOUS) THIRUVANANTHAPURAM

## MICC 109: CERTIFICATE COURSE IN PRINCIPLES OF PHYTOCHEMISTRY

### **Course Objectives:**

Certificate Course in Principles of Photochemistry provides a comprehensive exploration of phytochemistry basics and the practical use of medicinal molecules in traditional system of medicine. The course offers a deep understanding of how to develop necessary skills for isolation of phytochemicals from medicinal plants and gives an exposure to different separation techniques (chromatography) used in phytochemistry. It also provides knowledge about the structural elucidation of the natural products and its biological significance.

### **Course outcomes:**

**The students after completing the course, should be able to**

1. Understand the principles of chromatographic separation used in the field of phytochemistry.
2. Familiarize with the extraction, isolation and identification techniques of phytochemicals.
3. Acquire good knowledge about the various spectroscopic methods applied in phytochemistry.

### **Course Syllabus:**

The total course will be divided into five modules. Course duration will be 30 hours.

#### **Module I: Introduction to Phytochemistry**

**(6 Hours)**

Introduction to Phytochemistry and natural products, Classification of phytochemicals and their biosynthesis. Tests for phytochemical screening. Structure and functions of major plant metabolites. Use of phytochemicals as therapeutic agents. Extraction techniques in Phytochemistry.

**Module II: Separation techniques in Phytochemistry****(6 Hours)**

Principles of Chromatography, Column Chromatography, Thin Layer Chromatography (TLC), High Performance Thin Layer Chromatography (HPTLC), Paper Chromatography (PC), High Performance Liquid Chromatography (HPLC), Gas Liquid Chromatography (GLC), Supercritical Fluid Chromatography.

**Module III: Spectral techniques in Phytochemistry-I****(6 Hours)**

Principles of Spectroscopy, Theory, Instrumentation of UV-Visible spectroscopy, Choice of solvent and solvent effect, Applications. Infrared Spectroscopy – Theory, Modes of molecular vibrations, Sampling techniques, Factors affecting vibrational frequencies, Identification of functional groups by IR spectroscopy.

**Module IV: Spectral techniques in Phytochemistry-II****(6 Hours)**

Principle, Instrumentation and Solvent requirement in NMR, Chemical shift, Factors influencing chemical shift, Spin-spin coupling, Relaxation processes, Principle of  $^{13}\text{C}$  NMR, DEPT, COSY and its Applications. Principle of Mass spectrometry, Different ionization techniques – EI, CI, FAB and MALDI, Mass analyzers, Mass fragmentation and its rules, Isotopic effects.

**Module V: Biological Significance of natural products****(6 Hours)**

Importance of medicinal plants as source of bioactive compounds. Role of phytochemicals for the development of drugs and drug discovery. Use of Phytochemicals as antioxidants, anti-inflammatory, antimicrobial and anticancer compounds. Structure elucidation of promising phytochemicals from medicinal plants and its biological significances.

**References:**

1. Phytochemical Methods. J. B. Harborne., Chapman and Hall, London.
2. Phytochemical Techniques. N. Raaman., New India Publishing Agency, New Delhi.
3. Organic Spectroscopy. W. Kemp., 3<sup>rd</sup> edn. Palgrave, New York.
4. Organic Chemistry of Natural Products. Vol. I & II Gurdeep R. Chatwal, Himalaya Publishing House, Mumbai.

5. Natural Products from Plants. 2<sup>nd</sup> edn. L. J. Cseke., A. Kirakosyan., P. B. Kaufman., S. L. Warber., J. A. Duke and H. L. Briemann., CRC Press, Boca Raton.
6. Chemistry of Natural Products. S.V. Bhat., B.A. Nagasampagi and N. Sivakumar., 2<sup>nd</sup> Edn. Narosa Publishing House, New Delhi.

**Eligibility criteria:** Final year UG/PG students (Science stream) of Mar Ivanios College (Autonomous) are eligible to join.

**Intake:** Each batch will be limited to a maximum of 30 students.

**Evaluation and Grading:** At the end of the course, an examination will be conducted. Students who have more than 75% attendance will be eligible to write the examination after completion of the course. Grades will be awarded according to the marks obtained, as follows:

Marks	Grade	Performance
≥ 90%	A+	Outstanding
80% - 90%	A	Excellent
70% - 80%	B	Very Good
50% - 70%	C	Good
40% - 50%	D	Satisfactory
< 40 %	F	Need to Improve

Certificates will be issued to all those who successfully complete the course.

**Duration of the course:** 30 hours.

**Course Fee:** Rs. 1000/- (Due to Covid-19 pandemic, the course is offered free of cost during 2020-21).

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