**Course Description**

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| **Faculty** | **Pharmacy** | | | | | | |
| **Department** | Pharmacutical Chemistry | | | **Level** | | |  |
| **Course** | Phytochemistry | **Code** | **1703322** | **Prerequisite** | | | 1703105 |
| **Credit hours** | 2 | **Theoretical** |  | **Practical** | | |  |
| **Coordinator** |  | **Email** |  | | | | |
| **Teachers** |  | **Emails** |  | | | | |
| **Lecture Time** |  | **Place** |  | | **Attendance mode** |  | |
| **Semester** |  | **Preparation date** |  | | **Modification Date** |  | |

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| **Abstracted Course Description** |
| The Biosynthesis, isolation and identification of the primary and secondary plant constituents and discussion of natural drugs containing these constituents to build up knowledge regarding the chemistry of medicinal plants. During this course the main active components from chemical and pharmacological point of view will be covered. The course will discuss topics related to of primary and secondary metabolism such as carbohydrates, lipids, phenolic compounds and alkaloids. |
| **Course Goals** |
| * To Explore the biosynthesis mechanisms of the chemically distinguished and biologically active compounds from natural sources * Students have to realize the true classification of the known isolated natural compounds according to their chemical basis or botanical references * Understand the biosynthesis of some common pharmacologically active natural compounds in plants as well as in human body, such as prostaglandins, in order to investigate the mechanism of action of some available medicines interfering with the biosynthesis mechanisms * Understand the importance of enzymatic reactions directing the biosynthesis of these secondary metabolites towards the benefits of the organisms |

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| **CILOs** | | | | | |
| **Knowledge** | | | | | |
| 1. Know the main four metabolic pathways responsible for the biosynthesis of secondary metabolite 2. Based on and building on the information acquired from the pre-requisite courses, to explore in this course the major pharmacologically important secondary metabolites from natural sources, in particular, plants. 3. Identify the basic structure of each secondary metabolite class | | | | | |
| **Skills** | | | | | |
| B.1 Correlate the chemical classification of the secondary metabolites and its expected biological activity  B.2 Correlate the chemical functional group and its effect on the biological properties of the natural product  B.3 To apply the gained to knowledge in biosynthesize or semi-synthesize of analogues to the natural medicines  . | | | | | |
| **Competencies** | | | | | |
| C.1 To predict the claimed activity of the secondary metabolite according to its classification  C.2 To explore the responsible enzymes and co-factor as a determinant factor of secondary metabolite biosynthesis C.3 To apply the knowledge from their study in preparing pharmaceutical formulations derived from natural materials for specific uses  . | | | | | |
| **Learning Methods** | | | | | |
| * Lecture material and notes ,Homework and Assignments, Projects, Presentation, | | | | | |
| **Evaluation Tools** | | | | | |
| Exams,Presentation, project, assignments. | | | | | |
| **Week** | **Topics** | **Learning methods** | **Evaluation tool** | **ILOs** | **Hours** |
| **1.** | * Introduction to secondary metabolites: * Primary and secondary metabolites from plants * The building blocks of different metabolites   The construction mechanism | Lecture material and notes | Exams | **A1,a2,b1,b2,c1** | **6** |
| **2.** |
| **3.** | **The acetate malonate pathway**   * General introduction * Saturated fatty acids biosynthesis * Unsaturated fatty acids biosynthesis * Prostaglandins * Thromboxanes * Leukotrienes * Aromatic polyketides   Anthraquinones | Lecture material and notes | Exams | **A2,a3,b1,b3,c2,c3** | **9** |
| **4.** |
| **5.** |
| **6.** | **The shikimate pathway and phenypropanoids**   * Aromatic amino-acids * Cinnamate drivatives * Lignans and lignins * Phenylpropenes * Coumarins * Styrylpyrones   Flavonoids and stilbenes | Lecture material and notes | Assignments, | **A1,a2,b1,b2,c1** | **9** |
| **7.** |
| **8.** |
| **9.** | **The Mevalonate and Deoxylulose Phosphate Pathways: Terpenoids and Steroids**  **-** Terpenoids  - Iridoids  - steroids  - cardio-active glycosides  - Phytosterols  - Vitamin D | Lecture material and notes  Homework and Projects, Presentation, … | Exams | **A1,a2,b1,b2,c1** | **6** |
| **10.** |
| **11.** | **Alkaloids**   * Introduction * Alkaloids derived from ornithine * Alkaloids derived from Lysine * Alkaloids derived from Nicotinic acid * Alkaloids derived from Tyrosine * Alkaloids derived from Tryptophan * Alkaloids derived from Anthranilic acid * Alkaloids derived from Histidine * Alkaloids derived from amination reaction * Terpenoid-alkaloids * Steroidal alkaloid   Purine alkaloids | Lecture material and notes  Homework and Assignments, Projects, Presentation, | Assignments, | **,A1,a2,a3,b1,b2,c1,b3,c2,c3** | **12** |
| **12.** |
| **13.** |
| **14.** |
| **15.** | **F**inal Exams | | | |  |
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| |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | **Plan of Course Evaluation** | | | | | | | | | | **Evaluation Tools** | | **Mark** | **ILOs** | | | | | | |  |  |  |  |  |  | | **First Exam (Mid-term)** | | **30%** | **A1,a2,b1,b2,c1** |  |  |  |  |  | | **Second Exam (If available)** | |  |  |  |  |  |  |  | | **Final Exam** | | **50%** | **A1,a2,a3,b1,b2,c1,b3,c2,c3** |  |  |  |  |  | | **Activities** | |  |  | | | | | | | **Activities Evaluation** | Homework/Tasks | 10% | **a3,b1,b2, b3,c2** |  |  |  |  |  | | Case Study |  |  |  |  |  |  |  | | Discussion and Interactions |  |  |  |  |  |  |  | | Group Activities |  |  |  |  |  |  |  | | Laboratory Exams |  |  |  |  |  |  |  | | Presentations |  |  |  |  |  |  |  | | Quizzes | 10% | **a3,b1,b2,** |  |  |  |  |  | | Others |  |  |  |  |  |  |  | | **Total** | | 100% | **A1,a2,a3,b1,b2,c1,b3,c2,c3** |  |  |  |  |  |   **Components** | |
| **Book** | * Medicinal natural products, A Biosynthetic approach   *By Paul M. Dewick*   * Plant secondary metabolites, Occurance, Structure, and role in the human diet   *By A. Crozier, M.N. Clifford, and H. Ashihara*   * Pharmacognosy   By Trease *and* Evans |
| **References** |  |
| **Recommended Readings** |  |
| **Electronic materials** |  |
| **Other websites** |  |

**Subject Coordinator:**

**Head of Curriculum Committee:**

**Department Head:**

**Faculty Dean:**

**Last update date:**