|  |  |
| --- | --- |
| **Course Title:** | **TOXICOLOGY** |
| **Course Code:** | **445 PHCL-3** |
| **Program:** | **Pharmaceutical Sciences** |
| **Department:** | **Pharmacology** |
| **College:** | **Pharmacy** |
| **Institution:** | **Najran University** |

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# A. Course Identification

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1. Credit hours:** | | | | **3 (2+1)** | | | | | | | | | | | | |
| **2. Course type** | | | | | | | | | | | | | | | | |
| **a.** | University | |  | | College | | | **√** | Department | | | |  | Others |  |  |
| **b.** | | Required | | | | **√** | Elective | | |  |  | | | | | |
| **3. Level/year at which this course is offered:** | | | | | | | | | | | | **8th level/ Fourth year** | | | | |
| **4. Pre-requisites for this course** (if any)**: Pharmacology-2 (443 PHCL-3)** | | | | | | | | | | | | | | | | |
| **5. Co-requisites for this course** (if any)**: None** | | | | | | | | | | | | | | | | |
|  | | | | | | | | | | | | | | | | |

## 6. Mode of Instruction (mark all that apply)

| **No** | **Mode of Instruction** | **Contact Hours** | **Percentage** |
| --- | --- | --- | --- |
| **1** | **Traditional classroom** | 60 | 100% |
| **2** | **Blended** | -- | -- |
| **3** | **E-learning** | -- | -- |
| **4** | **Correspondence** | -- | -- |
| **5** | **Other** |  |  |

**7. Actual Learning Hours** (based on academic semester)

|  |  |  |
| --- | --- | --- |
| **No** | **Activity** | **Learning Hours** |
| **Contact Hours** | | |
| **1** | **Lectures** | 30 |
| **2** | **Practical classes** | 30 |
| 3 | **Tutorial** | -- |
| **Other Learning Hours\*** | | |
| **1** | **Study** | 45 |
| **2** | **Assignment/presentation** | 10 |
| **4** | **Library** | 5 |
| **5** | **Others** (specify) | -- |
|  | **Total** | **120** |

**\*** The length of time that a learner takes to complete learning activities that lead to achievement of course learning outcomes, such as study time, homework assignments, projects, preparing presentations, library times

# B. Course Objectives and Learning Outcomes

|  |
| --- |
| 1. Course Description This course provides students with the basic concepts of Toxicology including classification of toxic agents, sources of toxicity, chemical nature of the toxic substances, mechanisms, signs and symptoms of acute and chronic toxicities, concept of selective toxicity and general and specific lines of treatment of toxicity of each toxic substance. Besides understanding the concepts of carcinogenesis, teratogenicity and drug-induced toxicities. The practical part deals with demonstrating and training students on symptoms, diagnosis and treatment of different toxicities. |
|  |
| 2. Course Main Objectives |
| Students after the completion of this course will be:  • Aware of the science of poisons and different classes of Toxicology.  • Conversed with the different types of poisons, its sources, mechanism of toxic action and diagnosis of each type.  • Acquainted with applying different lines of treatment of toxicity and antidotal therapy.  • Aware of the concepts of drug-induced toxicity, teratogenicity, carcinogenicity, and abuse. |

## 

## 3. Course Learning Outcomes

| **CLOs** | | **Aligned****PLOs** |
| --- | --- | --- |
| 1 | **Knowledge and Understanding** |  |
| 1.1 | Students after the completion of this course will be able to:  Recognize the different types of toxic agents, selective toxicity, principles of treatment of toxicity and air borne poisons. | K4 |
| 1.2 | Discuss the symptoms and treatment of venom toxicity, heavy metals (lead, mercury, arsenic, copper, and iron) and corrosive toxicities. | K4 |
| 1.3 | Recognize the symptoms of toxicity and treatment of pesticides toxicity, drug-induced diseases, and different types of drug interactions. | K4 |
| 1.4 | Explain the concepts of carcinogenesis, teratogenesis and the symptoms and treatment of drug-induced toxicities in addition to principles of drug abuse. | K4 |
| **2** | **Skills:** |  |
| 2.1 | Summarize the general lines of treatment of toxicity, how to prevent, diagnose and treat acute and chronic toxicity of carbon monoxide, cyanide and methemoglobinemia. | S1 |
| 2.2 | Criticize the mechanism(s), symptoms, and treatment of heavy metals and corrosive toxicities besides causes and features of chemical carcinogenesis, teratogenesis drug-induced toxicities and drug abuse. | S1 |
| **3** | **Competence:** |  |
| 3.1 | Work independently, professionally, and communicate clearly by verbal and written means. | C2 |
| 3.2 | Professional use of IT and computer in preparing reports, assignments, and oral presentations and to be skilled in the use of electronic resources for self-directed learning. | C3 |

# C. Course Content

|  |  |  |
| --- | --- | --- |
| **No** | **A. List of Theoretical Topics** | **Contact Hours** |
| 1 | Introduction to Toxicology | 1 |
| 2 | General mechanisms of toxic action | 1 |
| 3 | Selective toxicity | 2 |
| 4 | General principles for treatment of poisoning | 1 |
| 5 | Antidotal therapy | 1 |
| 6 | Air born poisons-1 (carbon monoxide) | 1 |
| 7 | Air born poisons-2 (cyanide toxicity) | 1 |
| 8 | Air born poisons-3 (chlorine and kerosene toxicities) | 1 |
| 9 | Venom toxicity: (General mechanisms, snakes, scorpion) | 1 |
| 10 | Heavy metal toxicity-1 (Lead) | 1 |
| 11 | Heavy metal toxicity-2 (Mercury) | 1 |
| 12 | Heavy metal toxicity-3 (Arsenic, Copper, Iron) | 2 |
| 13 | Toxicity of corrosives (Mineral acids, Alkalis, Organic acids (Phenol) | 2 |
| 14 | Pesticide toxicity: (insecticides, rodenticides,) | 2 |
| 15 | Drug-induced Diseases-1 | 1 |
| 16 | Drug-induced Diseases-2 | 1 |
| 17 | Drug interactions-1 | 1 |
| 18 | Drug interactions-2 | 1 |
| 19 | Chemical Carcinogenesis | 2 |
| 20 | Chemical Teratogenicity | 2 |
| 21 | Digitalis toxicity | 1 |
| 22 | Salicylate toxicity | 1 |
| 23 | Drug Abuse and Dependence-1 | 1 |
| 24 | Drug Abuse and Dependence-2 | 1 |
| **Total** | | **30** |

|  |  |  |
| --- | --- | --- |
| **No** | **B. List of Practical Topics** | **Contact Hours** |
| 1 | Introduction, Environmental Pollution | 2 |
| 2 | General lines of treatment of toxicity and antidotal Treatment | 2 |
| 3 | Carbon Monoxide Poisoning | 2 |
| 4 | Cyanide Toxicity | 2 |
| 5 | Methemoglobinemia | 2 |
| 6 | Lead Toxicity | 2 |
| 7 | Mercury Toxicity | 2 |
| 8 | Corrosives | 2 |
| 9 | Carcinogenicity | 2 |
| 10 | Teratogenicity | 2 |
| 11 | Digitalis Toxicity (clinical case) | 2 |
| 12 | Salicylate Toxicity (clinical case) | 2 |
| 13 | Cocaine Abuse & Toxicity | 2 |
| 14 | Heroin Abuse & Toxicity | 2 |
| 15 | Abuse of Alcohol & Barbiturates | 2 |
| **Total** | | **30** |

# D. Teaching and Assessment

## 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

| **Code** | **Course Learning Outcomes** | **Teaching Strategies** | **Assessment Methods** |
| --- | --- | --- | --- |
| **1.0** | **Knowledge and Understanding** | | |
| 1.1 | Students after the completion of this course will be able to:  Recognize the different types of toxic agents, selective toxicity, principles of treatment of toxicity and air borne poisons. | Lectures | Theoretical exams |
| 1.2 | Discuss the symptoms and treatment of venom toxicity, heavy metals (lead, mercury, arsenic, copper, and iron) and corrosives toxicities. | Lectures | Theoretical exams |
| 1.3 | Recognize the symptoms of toxicity and treatment of pesticides toxicity, drug-induced diseases, and different types of drug interactions. | Lectures  Self-directed learning | Theoretical exams |
| 1.4 | Explain the concepts of carcinogenesis, and teratogenesis and the symptoms and treatment of drug-induced toxicities in addition to principles of drug abuse. | Lectures  Self-directed learning | Theoretical exams |
| **2.0** | **Skills** | | |
| 2.1 | Summarize the general lines of treatment of toxicity, how to prevent, diagnose and treat acute and chronic toxicity of carbon monoxide, cyanide and methemoglobinemia. | Practical classes | Practical Exams |
| 2.3 | Criticize the mechanism(s), symptoms, and treatment of heavy metals and corrosive toxicities besides causes and features of chemical carcinogenesis, teratogenesis drug-induced toxicities and drug abuse. | Practical classes | Practical Exams |
| **3.0** | **Competence** | | |
| 3.1 | Work independently, professionally, and communicate clearly by verbal and written means. | Practical classes | Observation card |
| 3.2 | Professional use of IT and computer in preparing reports, assignments, and oral presentations and to be skilled in the use of electronic resources for self-directed learning. | Lectures  Self-directed learning | Assignment/  Oral presentation |

## 2. Assessment Tasks for Students

| **#** | **Assessment task\*** | **Week Due** | **Percentage of Total Assessment Score** |
| --- | --- | --- | --- |
| **1** | Midterm Exam-1 | 6th week | 15% |
| **2** | Midterm Exam-2 | 10th week | 15% |
| **3** | Practical Quizzes | Per semester | 5% |
| **4** | Student Activity/Assignment/Presentation | 12th Week | 5% |
| **5** | Observation card (Practical) | 2-12 Week | 5% |
| **6** | Final Practical Examination | 15th week | 15% |
| **7** | Final Theoretical Examination | 16-17th week | 40% |
|  | **Total** |  | 100% |

**\*Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

# E. Student Academic Counseling and Support

|  |
| --- |
| **Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice:** |
| * Office hours (2 hours per week). * Office hours are announced in the office door and course blackboard. * Students support via blackboard discussions, E-mail, and WhatsApp messages. |

# F. Learning Resources and Facilities

## 1.Learning Resources

|  |  |
| --- | --- |
| **Required Textbooks** | 1. Essentials of Toxicology. Casarett and Doull’s. Third edition. 2. B. Katzung. Basic & Clinical Pharmacology. 14th edition by B.G. Katzung. |
| **Essential References Materials** | 1. Goodman and Gilman’s: The pharmacological Basis of therapeutics. 13th edition by. Brunton, B. Knollmann, R. Hilal-Dandan. 2. PowerPoint slides of the lecture. 3. Practical log-book |
| **Electronic Materials** | 1. <https://www.toxicology.org/about/relevance.asp> 2. <https://toxedfoundation.org/resources/tox-links/> 3. **www.dlaf.nu.edu.sa** |
| **Other Learning Materials** | 1. Microsoft word software. 2. Microsoft PowerPoint software. 3. Microsoft Excel software. |

## 2. Facilities Required

| **Item** | **Resources** |
| --- | --- |
| **Accommodation**  (Classrooms, laboratories, demonstration rooms/labs, etc.) | 1. Suitable lecture room equipped with data show and internet and sufficient number of seats. 2. Suitable laboratories equipped with health and safety tools, internet, and sufficient number of seats. 3. Blackboard collaborative system for e-learning in NU. |
| **Technology Resources**  (AV, data show, Smart Board, software, etc.) | 1. Data show. 2. Computer software listed above. 3. Internet and WIFI access. |
| **Other Resources**  (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list) | 1. Drug samples lab, samples of different toxins and samples of common antidotes. |

# G. Course Quality Evaluation

| **Evaluation**  **Areas/Issues** | **Evaluators** | **Evaluation Methods** |
| --- | --- | --- |
| Effectiveness of teaching strategies | Head of departments  and students | Direct  Questionnaires (indirect) |
| Effectiveness of student assessment | Department faculty members  and Department council | Direct  Direct |
| Achievement of CLOs | Students  Department faculty members | Indirect  Direct |
| Quality of learning resources | Students | Questionnaires (Indirect) |

# H. Specification Approval Data

|  |  |
| --- | --- |
| **Council / Committee** | **Pharmacology department Council** |
| **Reference No.** | **Council No**. 7, 1441-1442 H |
| **Date** | 24/04/1442 H |