BIOMED 4120/V\_PBIO 8401

 **Principles of Toxicology**

**COURSE PROFILE**

**Course Description** This course will provide an introduction to the general principles of toxicology, including the history and scope of the field; risk assessment and management; mechanisms of toxicity; the disposition of toxicants, non-target organ-directed toxicity; toxic responses of specific target organs; and various toxicological applications, such as environmental toxicology.

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**Major Course Objectives:**

At the end of this course, the student enrolled in BIOMED 4120 will be able to understand:

* Basic principles of toxicokinetics/toxicodynamics and dose-response relationships
* Risk assessment and management procedures
* Mechanisms of carcinogenesis, mutagenesis, and teratogenesis
* Responses of specific target organs to toxic insult
* Potential adverse effects of various classes of toxicants Various applications of toxicology

V\_PBIO 8401: Additional assignments requiring advanced learning and understanding of these topics will be provided to graduate students.

**Prerequisites** BIOMED 4120: one year each of chemistry and biology, biochemistry desirable

 V\_PBIO 8401: completion of an undergraduate degree in biochemistry, biology or equivalent

**Delivery** 100% online

**Organization** Course materials are located under the left-hand tab in the course Blackboard site under “Units”. “Sessions” are found under “Units” and “Modules” under “Sessions”. Further directions are provided in Blackboard.

**Required Materials** **BIOMED 4120**: Casarett and Doull’s Essentials of Toxicology, 2010, 2nd edition, John Watkins III and Curtis Klaassen (eds), McGraw Hill, ISBN: 0071622403 / 9780071622400

**V\_PBIO 8401**: Same as above, plus additional reading assignments for discussion

**EVALUATION OF**

**STUDENT PERFORMANCE**

**Satisfactory**

**Performance** Course performance will be evaluated based on successful completion of course assignments.

**Exams** You will have four exams and a final which will be available only under the supervision of a proctor. Fifty minutes will be allowed for each of the four exams and 90 min for the final exam.

If you take more time than the exams allows, your score will be deducted by the points of one question each minute in overtime.

You may take the exams only once. You must complete the exams once you start it. You may NOT come back to the exam later. If you are disconnected during an exam, contact the instructor immediately and then send an e-mail to blackboard@missouri.edu with your name, username, course name, title of the exam, and a description of the problem. To ensure your answers are logged, click “Save” at the bottom of the page every 2 to 3 questions. Click “Submit” after you have reviewed your answers to have the exam graded.

**Scoring of Assignments** Participation in assignment blogs to discuss responses to questions

Four multiple choice quizzes (50 minutes)

One cumulative final exam (90 minutes)

**Grading** Grading scale for BIOMED 4120 will be A to F as outlined below.

96-100% = A

91-95% = A-

88-90% = B+

84-87% = B

81-83% = B-

71-80% = C

61-70% = D

 60% or less = F

 Graduate grading (8401) **will not include +/-**

 90-100% = A

 80 – 89% = B

 70-79% = C

 65-69% = D

 64% or less = F

Course Schedule

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | Unit | Session | Module # | Topic |
|  | 1 General | Introduction I 1 | 1 | History and Scope of Toxicology |
|  | Principles |  | 2 | Principles of Toxicology |
|  |  |  | 3 | Mechanisms of Toxicity I  |
|  |  | Introduction II 2 | 4 | Mechanisms of Toxicity II  |
|  |  |  | 5 | Risk Assessment |
|  | 2 Disposition | ADME 3 | 6 | Absorption and Distribution of Toxicants |
|  | of Toxicants |  | 7 | Biotransformation (Metabolism of Toxicants) |
|  |  |  | 8 | Toxicokinetics |
|  |  | Mechanisms I 4 | 9 | **EXAM 1 (LECTURES 1-8/MODULES 1-9)** |
|  |  |  | 10 | Chemical Carcinogenesis (Cancer) |
|  |  |  | 11 | Genetic Toxicology (Mutagenesis+)  |
|  | 3 System I  | Mechanisms II &5 | 12 | Developmental Toxicology (Teratogenesis+) |
|  |  | Blood Immune | 13 | Intro to Blood & Toxic Responses of Blood |
|  |  | Systems | 14 | Intro to Immune System and Toxic Responses of Immune System |
|  |  | Vessels/Heart 6 | 15 | Intro to Cardiovascular System & Toxic Responses of Cardiovascular System |
|  |  | & Lungs | 16 | Intro to Pulmonary System &Toxic Responses of Lungs |
|  |  |  | 17 | **EXAM 2 (LECTURES 9-15/MODULES 11-17)** |
|  | 4 System II  | Liver 7 | 18 | Intro to GI Tract and Toxic Responses of GI Tract |
|  |  |  | 19 | Intro to Liver and Toxic Responses of Liver I |
|  |  |  | 20 | Toxic Responses of Liver II |
|  |  | Kidneys & 8 | 21 | Intro to Kidneys and Toxic Responses of Kidneys  |
|  |  | Nervous System | 22 | Intro to the Nervous System & Toxic Responses of Nervous System I |
|  |  |  | 23 | Toxic Responses of Nervous System II |
|  | 5 System III &  | Reproductive & 9  | 24 | Intro to Reproductive System & Toxic Responses of Reproductive System |
|  |  Pesticides | Endocrine Systems | 25 | Intro to Endocrine System and Toxic Responses of Endocrine System |
|  |  |  | 26 | Intro to Skin and Phosensitization |
|  |  | Pesticides 10 | 27 | **EXAM 3 (LECTURES 16-24/MODULES 19-27)** |
|  |  |  | 28 | Intro to Pesticides &Toxic Effects of Pesticides I |
|  |  |  | 29 | Toxic Effects of Pesticides II |
|  | 6 Metals,  | Metals & 11 | 30 | Intro to Metals & Toxic Effects of Metals I |
|  | Radiation,  | Radiation | 31 | Toxic Effects of Metals II |
|  | Solvents, & |  | 32 | Intro to Radiation & Toxic Effects of Radiation |
|  |  Natural Toxins | Vapors/Solvents 12 | 33 | Intro to Vapors and Solvents & Toxic Effects of Vapors and Solvents |
|  |  | Natural Toxins | 34 | Intro to Bacterial Toxins & Blue-green Algal Toxins (Cyanobacterial Toxins) |
|  |  |  | 35 | Intro to Fungal Toxins (Mycotoxins)  |
|  | 7 Plant & Animal | Plant and Animal 13 | 36 | Intro to Selected Plant Toxins (Phytotoxins) |
|  | Toxins and  | Toxins and | 37 | Intro to Terrestrial Animal Venoms and Poisons |
|  | Toxicological | Venoms | 38 | **EXAM 4 (LECTURES 25-34/MODULES 28-37)** |
|  | Disciplines |  |  | **THANKSGIVING BREAK** |
|  |  |  Toxicological 14  | 39 | Environmental Toxicology |
|  |  | Disciplines | 40 | Food Toxicology |
|  |  |  | 41 | Clinical and Forensic Toxicology |
|  | 8 Occupational  | Occupational 15 | 42 | Occupational Toxicology |
|  | Toxicology Unit | Toxicology Session | 43 | **USE THIS TIME TO STUDY FOR THE FINAL EXAM** |
|  |  |  | 44 | **CUMULATIVE (COMPREHENSIVE) FINAL EXAM** |
|  |  |  |  |  |