Course Description

Advanced understanding of toxicology in the occupational environment. Analysis of target organs, adverse health effects, and the systems/organisms that are the targets of toxicants. Includes assessments of safety and risk of carcinogenic and non-carcinogenic chemicals.

Prerequisites

BIO 1030, BIO 1040 or BIO 1100, and CHM 1030

Course Textbook


Course Learning Objectives

Upon completion of this course, students should be able to:

1. Compare and discriminate between the major sub-disciplines of toxicology and their roles in occupational safety and health.
2. Illustrate the mechanisms by which a toxicant passes through the cell membrane: routes of absorption, the distribution process, and routes of excretion of a toxicant.
3. Summarize and compare three types of Phase I reactions and the most common types of Phase II reactions.
4. Classify sub-cellular sites of action, types of molecular targets, and types of receptors that are responsible for being mediators of effects of toxins.
5. Compare and discriminate the different mechanisms of action that a toxin can use and the effects of chemical interactions among toxins.
6. Compare and discriminate the differences and similarities between chemical carcinogenesis, mutagenesis, and teratogenesis.
7. Summarize toxicants in human breast milk and adverse infant effects.
8. Discriminate common examples of toxins that affect the following systems or target organs in the human body: immune, respiratory, liver, kidney, skin, eye, nervous system, reproductive, and cardiovascular.
9. Describe the major toxicological concern of food additives, food contaminants, insecticides, metals, and over-the-counter drugs on human health.
10. Summarize the toxic effects of common organic solvents, air pollutants, and water and soil pollutants.
11. Discriminate the toxic substances at workplaces and their toxic effects.
12. Explain the risk assessment procedures for non-carcinogenic and carcinogenic chemicals.

Credits

Upon completion of this course, the students will earn three (3) hours of college credit.
Course Structure

1. **Unit Learning Objectives:** Each unit contains learning objectives that specify the measurable skills and knowledge students should gain upon completion of the unit.
2. **Unit Summaries:** Each unit contains an overview, or summary, of the information to be covered.
3. **Reading Assignments:** Each unit contains reading assignments from one or more chapters from the textbook.
4. **Key Terms:** Key terms are intended to guide students in their course of study. Students should pay particular attention to key terms as they represent important concepts within the unit material and reading.
5. **Learning Activities:** Include using the CSU Online Library to access and review recent articles from a peer reviewed professional journal.
6. **Discussion Boards:** Discussion Boards are a part of all CSU term courses. Information and specifications regarding these assignments are provided in the Academic Policies listed in the Course Menu bar.
7. **Assessments:** This course contains six unit assessments – to be completed at the end of Units I-III and V-VII.
8. **Unit Assignments:** Information and specifications regarding these assignments are provided in the syllabus below, and in the Unit Study Guides.
9. **Ask the Professor:** This communication forum provides you with an opportunity to ask your professor general or course content related questions.
10. **Student Break Room:** This communication forum allows for casual conversation with your classmates.

Unit Assignments

In Unit VIII you will be submitting a Course Project. Details on the Course Project are provided in the Syllabus below. By the end of Unit IV you should e-mail your proposed outline and approach to the topic for review and approval prior to beginning work. This will assure that you are on the right track for the paper and can make the most efficient use of your time. Do not delay submitting the outline/approach until you get to Unit VIII or you might not have enough time to receive feedback from your professor. Completed papers are to be submitted online.

**Article Review (Unit IV)**

For the Article Review assignment, students are required to find an article that supports their answer to the question of safety presented by the use of Bisphenol-A (BPA). Discuss your thoughts on the safety of this chemical. Do you think it’s safe at our current exposure levels? Be sure to support your answer with information from the article you select for this assignment.

The following websites contain examples of articles that provide information on both sides of this debate:


http://www.marylandpirg.org/reports/mdp/babys-toxic-bottle

You may also search for peer reviewed journals via the CSU Online Library search and a publication search engine such as “Academic onefile” by selecting “to peer reviewed publications” as part of your search. You are encouraged to utilize the Research Database found in the CSU Online Library by selecting the My Library button in the Course Menu. This database will allow you to quickly search through thousands of journal articles. The selected article should not be more than two years old.

Please include the following topics in your Article Review:

- A brief introduction of BPA, its uses, and its toxicology.
- A statement of the debate surrounding the safety of BPA.
- A description of each side of the debate.
- Analysis of the data and information you collected.
- Your opinion on whether or not the chemical should be banned for use in consumer products.

Your completed review should be 4-5 pages in length (12 point font, double-spaced). The title page and reference page are not included in the required paper length. The Article Review must contain at least three references, and may include Internet sources, books, and professional journals or resources related to the profession.
CSU requires that students use the APA format in writing course papers. Therefore, the APA rules for formatting, quoting, paraphrasing, citing, and listing of sources are to be followed.

Submit your completed Article Review by uploading it using the "View/Complete" link located in Unit IV. Do not e-mail your paper directly to your professor. By uploading your Article Review and Course Project assignments using SafeAssign, your university record will automatically be updated to indicate you have submitted your papers and they will be provided to your professor for grading.

Course Project (Unit VIII)

The assessment for Unit VIII is the preparation and submittal of a Course Project. By the end of Unit IV you should e-mail your proposed outline and approach to the topic for review and approval prior to beginning work.

You have been called to a hazardous waste site to assess the toxicological issues involved at the site. You are given the following information regarding the conditions at the site:

- The site is an abandoned industrial site. It has been used by two now-defunct companies in the past 60 years.
- One stream, which is a popular fishing stream, runs through the site.
- There are 100 unmarked drums buried on the site. Many of the drums are rusting and showing signs of cracking. There is a general strong smell of pungent chemicals in the air near the drums.
- The site is located approximately one mile upstream of a residential area and a surface water withdrawal point for the local water supply.
- Water is also withdrawn downstream from the site for irrigation purposes.
- Although the drums are unmarked, it is known that wastes from the previous industrial activities included:
  - PCBs
  - Chromium waste
  - Acrylamide
  - Toluene diisocyanate (TDI)

You are asked to write a report on the toxicological issues at the site. Your report should include the following sections:

1. An overview of site conditions as described to you.
2. An analysis of each of the known wastes at the site. The analysis should include:
   - A description of the issue and state the purpose for the report
   - A description of the toxicants common routes of exposure
   - Mechanisms of toxicity
   - Exposure limits for the toxicants
3. A brief overall risk assessment of the site based on the four steps of risk assessment outlined in Chapter 25.
4. A recommendation of what actions should be taken at the site based on your toxicological assessment.

Your report (paper) should be 5-7 pages in length. The title page and reference page are not included in the required paper length. Your paper must contain at least five references, and may include Internet sources, books, and professional journals or resources related to the profession.

CSU requires that students use the APA format in writing course papers. Therefore, the APA rules for formatting, quoting, paraphrasing, citing, and listing of sources are to be followed.

Submit your completed Course Project by uploading it using the "View/Complete" link located in Unit VIII. Do not e-mail your paper directly to your professor. By uploading your Article Review and Course Project assignments using SafeAssign, your university record will automatically be updated to indicate you have submitted your papers and they will be provided to your professor for grading.

APA Guidelines

CSU requires that students use the APA style for papers and projects. Therefore, the APA rules for formatting, quoting, paraphrasing, citing, and listing of sources are to be followed. A document titled “APA Guidelines Summary” is available for you to download from the APA Guide Link, found in the Learning Resources area of the myCSU Student Portal. It may also be accessed from the Student Resources link on the Course Menu. This document provides links to several internet sites that provide comprehensive information on APA formatting, including examples and sample papers.
CSU Grading Rubric for Papers/Projects

The course papers will be graded based on the CSU Grading Rubric for all types of papers. In addition, all papers will be submitted for electronic evaluation to rule out plagiarism. Course projects will contain project specific grading criteria defined in the project directions. To view the rubric, click the Academic Policies link on the Course Menu, or by accessing the CSU Grading Rubric link, found in the Learning Resources area of the myCSU Student Portal.

Communication Forums

These are non-graded discussion forums that allow you to communicate with your professor and other students. Participation in these discussion forums is encouraged, but not required. You can access these forums with the buttons in the Course Menu. Instructions for subscribing/unsubscribing to these forums are provided below.

Click here for instructions on how to subscribe/unsubscribe and post to the Communication Forums.

Ask the Professor

This communication forum provides you with an opportunity to ask your professor general or course content questions. Questions may focus on Blackboard locations of online course components, textbook or course content elaboration, additional guidance on assessment requirements, or general advice from other students.

Questions that are specific in nature, such as inquiries regarding assessment/assignment grades or personal accommodation requests, are NOT to be posted on this forum. If you have questions, comments, or concerns of a non-public nature, please feel free to email your professor. Responses to your post will be addressed or emailed by the professor within 48 hours.

Before posting, please ensure that you have read all relevant course documentation, including the syllabus, assessment/assignment instructions, faculty feedback, and other important information.

Student Break Room

This communication forum allows for casual conversation with your classmates. Communication on this forum should always maintain a standard of appropriateness and respect for your fellow classmates. This forum should NOT be used to share assessment answers.

Grading

Discussion Board (8 @ 1%) = 8%
Unit Assessments (6 @ 10%) = 60%
Article Review (Unit IV) = 12%
Course Project (Unit VIII) = 20%
Total = 100%

Course Schedule/Checklist (PLEASE PRINT)

The following pages contain a printable Course Schedule to assist you through this course. By following this schedule, you will be assured that you will complete the course within the time allotted.
By following this schedule, you will be assured that you will complete the course within the time allotted. Please keep this schedule for reference as you progress through your course.

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<th>General Principles of Toxicology</th>
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<td><strong>Review:</strong></td>
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| **Read:** | ☐ Chapter 1: General Considerations  
☐ Chapter 2: Absorption, Distribution, and Excretion of Toxicants  
☐ Chapter 3: Biotransformation of Toxicants  
☐ Chapter 4: Toxic Effects  
☐ Chapter 5: Modifying Factors of Toxic Effects |
| **Discuss:** | ☐ Discussion Board Response: Submit your response to the Discussion Board question by Saturday, Midnight (Central Time) |
| **Submit:** | ☐ Assessment by Tuesday, Midnight (Central Time) |
| Notes/Goals: | |

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<td><strong>Review:</strong></td>
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</table>
| **Read:** | ☐ Chapter 6: Conventional Toxicity Studies  
☐ Chapter 7: Carcinogenesis  
☐ Chapter 8: Mutagenesis  
☐ Chapter 9: Developmental Toxicology  
☐ Chapter 10: Lactation |
| **Discuss:** | ☐ Discussion Board Response: Submit your response to the Discussion Board question by Saturday, Midnight (Central Time)  
☐ Discussion Board Comment: Comment on another student’s Discussion Board response by Tuesday, Midnight (Central Time) |
<p>| <strong>Submit:</strong> | ☐ Assessment by Tuesday, Midnight (Central Time) |
| Notes/Goals: | |</p>
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<th>Target Organs and Systems (Part I)</th>
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| Read:    | ☐ Chapter 11: Toxicology of the Immune System  
|          | ☐ Chapter 12: Respiratory System: Inhalation Toxicology  
|          | ☐ Chapter 13: Toxicology of the Liver  
|          | ☐ Chapter 14: Toxicology of the Kidney |
| Discuss: | ☐ Discussion Board Response: Submit your response to the Discussion Board question by Saturday, Midnight (Central Time)  
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| Discuss:| ☐ Discussion Board Response: Submit your response to the Discussion Board question by Saturday, Midnight (Central Time)  
|         | ☐ Discussion Board Comment: Comment on another student’s Discussion Board response by Tuesday, Midnight (Central Time) |
| Submit: | ☐ Article Review by Tuesday, Midnight (Central Time) |

Notes/Goals:
### Unit V  Target Organs and Systems (Part II)

**Review:**
- Box

**Read:**
- Chapter 15: Toxicology of the Skin
- Chapter 16: Toxicology of the Eye
- Chapter 17: Toxicology of the Nervous System
- Chapter 18: Toxicology of Reproductive and Cardiovascular Systems

**Discuss:**
- Discussion Board Response: Submit your response to the Discussion Board question by Saturday, Midnight (Central Time)
- Discussion Board Comment: Comment on another student’s Discussion Board response by Tuesday, Midnight (Central Time)

**Submit:**
- Assessment by Tuesday, Midnight (Central Time)

### Unit VI  Toxic Substances and Risk Assessment (Part I)

**Review:**
- Box

**Read:**
- Chapter 19: Food Additive and Contaminants
- Chapter 20: Toxicity of Pesticides
- Chapter 21: Toxicity of Metals
- Chapter 22: Over-the-Counter Preparations

**Discuss:**
- Discussion Board Response: Submit your response to the Discussion Board question by Saturday, Midnight (Central Time)
- Discussion Board Comment: Comment on another student’s Discussion Board response by Tuesday, Midnight (Central Time)

**Submit:**
- Assessment by Tuesday, Midnight (Central Time)

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<td>☐ Chapter 25: Toxicological Evaluation: Assessment of Safety/Risk</td>
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