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San Bernardino Valley College
Course Outline for ENV 007
TOXICOLOGY

I. CATALOG DESCRIPTION:

ENV 007: Toxicology
3 hours/week lecture = 3 units

Catalog Description: Students will examine the routes of entry of hazardous substances and the effects on the human body. Distribution and elimination of toxins, coupled with dose-effect and time-effect will provide the students an understanding on how our bodies react to hazardous substances. Toxins, mutagens and carcinogens and how they effect the reproductive system will also be examined. Industrial hygiene and occupational health hazards along with monitoring of hazardous agents will be discussed in detail. Exposure control methods, medical monitoring, treatment and management will give the students knowledge in preventing exposure to hazardous substances.

Schedule Description: This course covers the routes of entry of hazardous substances and the effects on the human body, distribution and elimination of toxins, mutagens, carcinogens, industrial hygiene, occupational health hazards, monitoring of hazardous agents, exposure control methods, medical monitoring, treatment and management.

Prerequisite/corequisite: None

II. NUMBER OF TIMES COURSE MAY BE TAKEN FOR CREDIT: One

III. EXPECTED OUTCOMES FOR STUDENTS:

Upon completion of the course, the student will be able to:

- A. Identify the routes of entry of hazardous substances and how they effect the body.
- B. Explain dose-effect and time-effect relationships.
- C. Determine exposure limits and personal protective equipment required.
- D. Identify occupational and health hazards in the working environment.

IV. CONTENT:

- A. Introduction to Industrial Toxicology
 1. History
 2. Understanding the hazards
- B. Exposure and Entry Routes
 1. Exposure and absorption
 2. Local and systemic effects
 3. Pharmacokinetics
 4. Membranes
 5. Gastrointestinal system
 6. Integument system
 7. Respiratory system
- C. Distribution, Localization, Biotransformation and Elimination of Toxins
 1. Distribution

2. Localization
3. Biotransformation
4. Excretion
- D. Dose–Effect and Time-Effect Relationships
 1. Dose response
 2. Margin of safety
- E. Classification, Types and Limits Of Exposure
 1. Absorption
 2. Exposure classes
 3. Asphyxiant
 4. Exposure limits
- F. Action of Toxic Substances
 1. Pharmacodynamics
 2. Types of action
 3. Interference with the general cellular function
 4. Direct chemical irritation of tissues
 5. Tissue toxicity
 6. Electrolyte imbalances
 7. Chemical interaction
- G. Target Organ Effects
 1. Nervous system
 2. Blood
 3. Liver
 4. Heart
 5. Kidneys
 6. Immune system
- H. Reproductive Toxins, Mutagens and Carcinogens
 1. Mutagens
 2. Functional groups
 3. Carcinogens
 4. Threshold and addictive effects
 5. Cancer treatment
 6. Reproductive system
- I. Survey of Common Hazardous Agents I: Toxic Substances
 1. Chemical hazards
 2. Metals
 3. Gases
 4. Corrosives
 5. Solvents and organic compounds
- J. Survey of Common Hazardous Agents II: Physical and Biological Hazards
 1. Physical and biological hazards
 2. Indoor air pollution
 3. Medical wastes
 4. Medical and infectious wastes management
 5. Radioactive medical waste
 6. California biohazard regulations

- K. Industrial Hygiene and Occupational Health Hazards
 - 1. Industrial hygiene
 - 2. Healthful working conditions
 - 3. Regulations and standards
- L. Monitoring of Hazardous Agents
 - 1. Air monitoring
 - 2. Sampling
- M. Exposure Limits and Personal Protective Equipment
 - 1. Personal protective equipment
 - 2. Respirators
 - 3. Respirator classification: methods and operation
 - 4. Written respirator program
- N. Exposure Control Methods
 - 1. Classifications
 - 2. Hazard control
 - 3. Types of ventilation
 - 4. Hazard control strategies
- O. Medical Monitoring, Treatment and Management
 - 1. Medical program
 - 2. Ability to work while wearing personal protective equipment
 - 3. Toxic substances, testing and screening
 - 4. First aid and specific response
- P. Risk Assessment
 - 1. Risk
 - 2. Components of risk assessment
 - 3. Acceptable daily intakes

V. METHODS OF INSTRUCTION:

- A. Lecture
- B. Reading

VI. TYPICAL ASSIGNMENTS:

- A. Read lessons and complete weekly homework assignments.
Typical Questions:
 - 1. Explain the difference between a mutagen and a carcinogen.
 - 2. What are the routes of entry for hazardous substances?
- B. Term Paper – Research and analysis of a specific hazardous substance, explaining the effects this substance has on certain parts of the body.

VII. EVALUATION:

- A. Methods of Evaluation:
 - 1. Graded assignments
 - 2. Midterm/final exam/term project
 Typical Questions:
 - a. Explain the difference between acute and chronic.
 - b. Name the routes of entry for toxic substances.

- B. Frequency of Evaluation:
1. Ten (10) exercises
 2. Two (2) written assignments
 3. One (1) midterm
 4. One (1) final and term project

VIII. TYPICAL TEXTS:

Malachowski, M. J. Health Effects Of Toxic Substances. Government Institutes, Inc., Rockville, Maryland, 1997.

Hughes, W. W. Essentials of Environmental Toxicology. Taylor and Francis, 1996.

IX. OTHER SUPPLIES REQUIRED OF STUDENTS:

None