**CHEMICAL AND BIOLOGICAL HEALTH HAZARDS (7445)**

CHEMICAL AND BIOLOGICAL HEALTH HAZARDS

## Supplementary Material

***Spring, 2025***

**Allama Iqbal Open University**

**Department of Environmental Design, Health & Nutritional Sciences**

**ALLAMAIQBALOPENUNIVERSITY**

**(Department of Nutritional Sciences and Environmental Design)**

**Course: Chemical and Biological Health Hazards (7445) Semester: Spring, 2025**

**Level: PGD Credits: 4(3+1)**

**CONTENT LIST**

This study material includes the following items:

1. Course Outline Units 1-9
2. Tutor Guide
3. Student Guide
4. Assignments (1 & 2)
5. Assignment Forms
6. Schedule lectures, and workshops and submit the assignment

If any of the above-mentioned material is missing from your pack, please contact us at the following address:

Course Coordinator

Environmental Design Program

Allama Iqbal Open University, Block 6

H-8 Islamabad

### OR

Program Coordinator

Environmental Design Program

Allama Iqbal Open University, Block 6

H-8 Islamabad

**Chemical and Biological Health Hazards**

**COURSE OUTLINE**

##### **REFERENCE BOOKS:**

1. Dickson, E. F. G. (2012). Personal protective equipment for chemical, biological, and radiological hazards: design, evaluation, and selection. John Wiley & Sons.

**CHEMICAL AND BIOLOGICAL HEALTH HAZARDS**

**Level: Post Graduate Diploma Credits: 4(3+1)**

**Unit – 1: Forms and Classification of Chemical Substances:**

1.1 Introduction

1.2 Forms of Chemical Agents

1.3 Classification of Chemicals Hazardous to Health

1.4 Acute and Chronic Health Effects

**Unit – 2: Forms and Classification of Biological Agents:**

2.1 Forms of Biological Agents

2.2 Classification of Biological Agents

2.3 Acute Health Effects

2.4 Chronic Health Effects

**Unit – 3: Assessment of Health Risks from Chemical Hazardous Substances:**

3.1 Routes of Entry

3.2 Defense Mechanism/The Need to Prevent or Control Exposure

3.3 Assessment of Risks/The Practice Control of Measure

3.4 Sources of Information/Control of Carcinogens, Mutagens and Asthmagens

3.5 Monitoring / Occupational Exposure Limits

**Unit – 4: Assessment of Health from Biological Substances:**

4.1 Routes of Entry

4.2 Defense Mechanism

4.3 Assessment of Health Risks

4.4 Sources of Information

4.5 Health & Environmental Surveillance

**Unit – 5: Occupational Exposure Limits:**

5.1 Occupational Exposure Limit of Chemical Substances

5.2 Occupational Exposure Limit of Biological Agents

5.3 Issues with uncontrolled exposure

5.4 Compliance

**Unit – 6: Control Measures:**

6.1 The Need to Prevent

6.2 Principles of Good Practice

6.3 The Practical Control of Exposure

6.4 Control of Carcinogens, Mutagens and Asthmagens

**Unit – 7: Safe Handling and Storage of Chemical Substances:**

7.1 Provision of Personal Protective Equipment

7.2 Manually Handling Risks

7.3 Mechanical Handling Risks

7.4 Storage Requirements

**Unit – 8: Safe Handling and Storage of Biological Substances:**

8.1 Provision of Personal Protective Equipment

8.2 Respiratory Protective Equipment

8.3 Local Exhaust Ventilation

8.4 Manually Handling Risks & Controls

8.5 Mechanical Handling Risks & Controls

**Unit – 9: Specific Agents:**

9.1 Asbestos, Solvents & Coal

9.2 Blood-Borne Viruses

9.3 Carbon Monoxide

9.4 Cement& Silica

9.5 Wood Dust

**Student Guide**

Dear student,

Assalam-o- Alaikum,

We welcome you to the PGD in Environment Health and Safety course entitled “Chemical and Biological Health Hazards”. This course is part of your PGD program. For introduction to the course please go through the guidelines provided here for successful completion.

To understand the course content, it is vital to know its aims and objectives properly. Let’s go through its aims and objectives first.

**Course Objectives**

1. To develop an understanding of biological and chemical hazards.
2. To explore the risks, exposure and contamination associated with biological and chemical hazards in workplaces.

**Details of the Course**

**Unit no. 1** Describes the Classification of Chemical Substances.

**Unit no. 2** Discuss the Classification of Biological Agents.

**Unit no. 3** Explains the Health Risk Assessment from Chemical Hazardous Substances.

**Unit no. 4** Elucidates the Health Risk Assessment from Biological Substances.

**Unit no. 5** Discusses Occupational Exposure Limit of Chemical and Biological Substances.

**Unit no. 6** Helps to Understand the Prevention and Control Measures for Health Hazards.

**Unit no. 7** Defines the Safe Handling and Storage of Chemical Substances.

**Unit no. 8** Focuses on the Safe Handling and Storage of Biological Substances.

**Unit no. 9** Demonstrates the Specific Agents Used in the Chemical and Biological Industry.

This subject addresses the concerns related to the chemical and biological hazards associated with the workplaces and how they can be mitigated through exploration and designing systems to reduce their frequency and probability to occur and causing damage to human life.

**Part-Time Tutors**

Students have been allocated a part-time tutor. The name and address of your tutor will be provided to you. The tutor will help and guide you in studying the books and conducting activities related to study units. You are expected to take full advantage of the tutor’s knowledge and experience. These tutors are also responsible for marking your assignments.

Make all efforts to complete your written assignment according to the prescribed schedule and try your level best to attend all the study sessions according to the timetable provided to you.

Schedule for lecture sessions have been arranged online on LMS on weekly basis. Try to attend these sessions regularly to get proper guidance from your tutor.

**Assignments**

The course includes two assignments, which are compulsory for successful completion of the whole course. Each assignment is of 100 marks and out of these students obtaining 40 marks will be declared pass.

**Assignments no. 1& 2** are theory-based and must reach your assigned tutor before the due date. The schedule for submitting the assignments is provided separately. Please follow the schedule and upload a soft copy of your assignments accordingly so that tutors can submit results accordingly.

**Method of Study**

Study period of 16 weeks has been allocated for studying this course through online Aaghi LMS mode whereas 17th and 18th weeks are kept for general assessment and for final examination.

|  |  |  |
| --- | --- | --- |
| **Units** | **Assignments** | **Study period** |
| 1-2 |  | 4 weeks |
| 3-5 | Assignment 1 | 4 weeks |
| 6-7 |  | 2 weeks |
| 8-9 |  | 2 weeks |
| Revision | Assignment 2 | 4 weeks |
| Preparation for examination |  | 2 weeks |

You are expected to spend four weeks on studying the first two units, this will help to improve your reading speed and get familiar with the contents of the units. The next three units 3 to 5 will become easier for you and you will be able to study them in comparatively less time. You can spend four weeks studying these four units, during the ninth week you can study unit no.6 & 7 and during the tenth week you must complete your first assignment and upload this on the Aaghi portal.

Units 8 to 9 can be studied during the 11th and 12th week respectively and you can complete your second assignment along with the revision of your book during the weeks 13-16. The last two weeks will be kept for examination and preparation.

**Final Examination**

At the end of the course there will be a final examination, all the students will be expected to take this examination in the examination halls especially established for this purpose.

For any queries, you can write to the course/program coordinator. Suggestions for improvement will also be welcomed.

We wish you all the best.

**Course Coordinator**

**Department of Environmental Design,**

**Health and Nutritional Sciences**

**Allama Iqbal Open University,**

### H-8, Islamabad

### Tutor Guide

Dear tutor,

Students enrolled in PGD Environment Health and Safety offered through the blended learning (online) system belong to a number of professions and have a variety of educational backgrounds and experience.

These students have very limited contact with their coursemates and the part-time tutors. It is therefore important to keep in mind that some of the blended-learning students have had no links with education during the past few years after completing their formal education therefore they might lack confidence. Secondly blended-learning students are involved in studying during their spare time, probably after office hours. You are therefore requested to guide and help the students while keeping these issues in mind. Some students may need help in developing professional attitudes as well as understanding the facts about environmental, health and safety.

**Assignments**

In the online Aaghi Portal LMS system, studying the course units has its importance but assignments are the major source of link between the tutor and the student. Therefore it is important to offer your comments through these assignments. Express your views in such a way that the student is not discouraged hurt or feels depressed after going through your comments. You are also expected to guide on issues like methods of solving assignments, effective methods of studying and methods to improve study habits and working hard. It is anticipated that the student will submit their assignments in time according to the prescribed schedule.

***You are therefore requested to mark the assignments and upload on Aaghi Portal LMS portal prior the last date provided by University.***

Marking guides are provided to you. You are expected to follow the instructions and make full use of these guides while marking the assignments. The students are expected to avoid giving unnecessary details and try to be brief and comprehensive. While marking the assignments the tutor has to assess whether the students have followed the instructions provided to them or not. The students are given another assignment which is based on a small field activity in which student will be representing their work in the lectures held at the end of the semester. The students are required to submit their assignment online through Aaghi Portal LMS to you before it is presented.

**Marking Guide**

It is anticipated that the tutors mark the assignments carefully and follow a similar marking standard for all the students. For the theory-based assignments you are requested to follow the marks division as indicated on the assignment, making a total of one hundred for each Assignment. The questions that are further divided into parts a, b etc. accompany a further division of marks as well. For marking assignments, the allocation of marks is indicated as under:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **S. No** | **Assignment Number** | **Component** | **Total Marks** |  |
| 01 | 01 | Theoretical Questions | 100 | 200 |
| 02 | 02 | 100 |
| 03 |  | Presentation | Presentation and 70% attendance is mandatory. | |
| Attendance |

Teachers are expected to stick to the guidelines provided to maintain standardization and uniformity.

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**ALLAMA IQBAL OPEN UNIVERSITY**

**(Department of Nutritional Sciences and Environmental Design)**

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| **WARNING**   1. **PLAGIARISM OR HIRING OF GHOST WRITER(S) FOR SOLVING THE ASSIGNMENT(S) WILL DEBAR THE STUDENT FROM THE AWARD OF DEGREE/ CERTIFICATE IF FOUND AT ANY STAGE.** 2. **SUBMITTING ASSIGNMENT(S) BORROWED OR STOLEN FROM OTHER(S) AS ONE’S OWN WILL BE PENALIZED AS DEFINED IN “AIOU PLAGIARISM POLICY”.** |  |

**Course: Chemical and Biological Health Hazards (7445) Semester: Spring, 2025**

**Level: PGD**

## Please read the following instructions for writing your assignments. (AD, BS, B. Ed, MA/MSc, MEd) (ODL Mode).

1. All questions are compulsory and carry equal marks but within a question the marks are distributed according to its requirements.

2. Read the question carefully and then answer it according to the requirements of the questions.

3. Avoid irrelevant discussion/information and reproducing from books, study guides, or allied material.

4. Handwritten scanned assignments are not acceptable. However, the students who attempt their assignments in Urdu/Arabic may upload a scanned copy of their handwritten assignments (in PDF format) on University LMS. The size of the file should not exceed 5MB.

5. Upload your typed (in Word or PDF format) assignments on or before the due date.

6. Your own analysis and synthesis will be appreciated.

7. Late assignments can’t be uploaded at LMS.

**Total Marks: 100 Pass Marks: 40**

**Assignment No. 1**

**(Units: 1-4)**

Q.1 Compare and contrast the acute and chronic health effects of exposure to chemical substances. Elaborate your answer with examples of common industrial chemicals that may cause both types of effects. **(20)**

Q.2 Explain the various forms in which biological agents (e.g., bacteria, viruses, fungi, and parasites) can exist in the environment. Discuss how these forms influence the transmission dynamics and health risks associated with biological agents in different settings, such as healthcare and occupational environments. **(20)**

Q.3 Explain the role of monitoring in managing chemical exposure in the workplace. How are occupational exposure limits (OELs) set, and what is their significance in ensuring worker health and safety? Provide examples of commonly monitored chemicals and discuss how OELs contribute to risk management strategies. **(20)**

Q.4 What are the sources of information used to identify and classify carcinogens, mutagens, and asthmagens? How are these substances controlled in workplaces to protect employees?

In your response, include the role of safety data sheets (SDS), regulatory guidelines, and workplace exposure limits. **(20)**

Q.5 Discuss how risks associated with chemical hazardous substances are assessed in the workplace. What are the primary control measures employed to minimize exposure, and how are these control strategies evaluated for effectiveness? Explain the role of engineering controls, administrative controls, and personal protective equipment (PPE). **(20)**

**Total Marks: 100 Pass Marks: 40**

**Assignment-2**

**(Units: 5-9)**

Q.1 Analyze the issues that arise from uncontrolled exposure to chemical and biological agents in the workplace. Discuss the potential health consequences of exceeding occupational exposure limits (OEL), and devise strategies for ensuring compliance with OELs. **(20)**

Q.2 Explain why it is essential to prevent exposure to hazardous substances in the workplace. Discuss the long-term benefits of implementing control measures to reduce exposure to both workers and employers. **(20)**

Q.3 Explain the key storage requirements for chemical substances to ensure safety in the workplace. Discuss the factors that influence the proper storage of chemicals, such as temperature, ventilation, and compatibility, and the potential risks associated with improper storage. **(20)**

Q.4 Why is respiratory protective equipment important when working with biological substances? Provide examples of scenarios where respiratory protection is necessary and the types of respiratory devices typically used. **(10)**

Q.5 What health risks can healthcare workers face, particularly in hospitals and clinics where they deal with infectious diseases and hazardous chemicals? Compare these risks with those in the pharmaceutical manufacturing industry. What PPE is crucial for healthcare workers, and what additional protocols can help reduce the risk of infections and chemical exposures? Prepare at least 10 PowerPoint slides to present in the **online class on the Aaghi portal (30)**

**General Instructions**

1. Assignment 2, Q 5 is of a practical nature, you have to prepare a report and present it.
2. The presentation component is mandatory for all the students. You cannot sit in the final examination without completing this project and presenting it.
3. Your report should cover both theoretical and practical components.
4. Include the following sections in your report:
5. Introduction and objectives of your study
6. Field research strategy/ methodology
7. Review of relevant literature
8. Graphical representations
9. Analysis/Conclusion/Suggestions
10. Appendices/ Bibliography
11. You are supposed to do a presentation to the resource person and course mates, you should prepare slides or other illustrative material for effective presentation.
12. You are advised to consult with source material frequently as you undertake your design project. If you need any guidance you may contact your tutor or write to the Program / Course Coordinators.