



PHY 131

**HAZARDS IN LABORATORY AND
LABORATORY SAFETY**

Course Guide

COURSE GUIDE

PHY 131**HAZARDS IN LABORATORY AND LABORATORY SAFETY**

Adapted From

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Introduction

In PHY 130, you learnt the basic aspect of design, organization and management of science laboratory, the procedures related to material purchase and stock control, record keeping, means of communication, information dissemination, and scientific reporting.

Working in a laboratory involves a lot of attention and nothing should be taken for granted. A laboratory could be the one of the easiest places to have an accident, and it is also easy to set fire to flammable material. A loose piece of wire lying on the floor of the laboratory could make an individual fall down, or drag an object or an apparatus off the table. The present course addresses such hazards and also emphasizes on safety.

The Course

This is a 2-Credit unit course, divided into six units. The first Section of the course deals with a very important aspect associated with all types of laboratories. This is about the likely hazards in a laboratory. It is important to learn about these hazards and the precautions to be taken to prevent any accidents in the laboratory. There are four units in this section. Unit 1, the first unit of this course, deals with hazards due to electricity and gas and therefore is titled as 'Electricity and Gas Hazards'. These hazards have been given prime treatment, as they are common to all laboratories. Electricity, though very useful to mankind may be a major hazard as it can give severe shock or lead to a fire, if used carelessly. This unit discusses the possible electricity dangers, precautions to be taken to prevent hazards, current calculation for different electrical appliances and the ways to choose a right fuse, flex or cable. This unit also deals with the gas hazards and the safety measures to be taken for the commonly used gas cylinders in the laboratory.

Fire arising out of a number of reasons is another very common hazard observed in laboratories and has been dealt with in Unit 2, 'Fire Hazards'. It discusses different causes of fires, classification of fires, types of fire extinguishers and their usage.

Chemical substances are used in chemistry, life sciences and physics laboratories. The hazards due to chemical substances have been dealt with in Unit 3 named, 'Radiation and Chemical Hazards'. The United Nations classification of hazardous chemicals is given along with the symbol chart. The storage and handling of hazardous chemicals have been discussed in the unit. This unit also discusses some of the very common radiation hazards which could occur in laboratories where radioactive materials are used.

Unit 4, 'Hazards in Biology Laboratory', the last unit on hazards in laboratories, deals with the micro-biological and other hazards which are specific to a biology laboratory. It discusses the supply, handling and disposal of biological materials.

The second Section of this course, Laboratory Safety, focuses on the safety aspects concerning laboratories. There are two units in this section. In Unit 5 on 'Personal Safety', we discuss various features concerning safety laboratory work. The obligations of the teachers and the Head of the Institution towards maintaining laboratory safety are stressed. The code of practice in a laboratory and, personal protective devices are explained. A brief discussion is given on the disposal of waste materials. The sequence of actions to be followed during check-in and shut-down of laboratories is also listed.

Unit 6 on 'Accidents and First Aid' is devoted to first aid treatment that is to be provided to the victims of laboratory accidents. The need and the method for reporting an accident are discussed. The contents and the placement of the first aid box are stated.

Course Aims

The aim of this course is to highlight the possible hazards in the laboratory, as well as the safety practices to prevent such hazards.

Course Objectives

After studying this course, you should be able to:

- describe the hazards caused by electrical fittings and the appliances in a laboratory, and the precautions to be taken there of,
- explain the possible causes of a fire hazard in a laboratory and different ways of managing it,
- state the hazards associated with different compressed gases and the first aid treatment in case of a gas hazard,
- describe the hazards caused by radiations,
- discuss the nature of different chemicals, the possible hazards caused by them and the precautions to be taken there of,
- explain the hazards associated with a biology laboratory,
- appreciate the need for observing safe laboratory practice,
- state the features concerning code of practice in a laboratory,
- identify the contents of a first aid box, and
- explain the methods of administering first aid for specific situation like electric shock, unconsciousness, chemical accidents, bleeding, burns and eye injuries.

Working through this Course

The importance of safety in the laboratory cannot be overemphasized. Thus, this course is of primary importance, not only in identifying the possible causes of hazard, or in making you work in more relaxed manner, having taken the necessary precautions. You should, therefore, get yourself familiar with every aspect of this course. In other words, the contents of this course should be on your mind at all times.

Course Materials

You will be provided with the following materials.

Study Materials containing study units

Study Units

The following study units are contained in this course:

Unit 1	Electricity and Gas Hazards
Unit 2	Fire Hazards
Unit 3	Radiation and Chemical Hazard
Unit 4	Hazard in Biology Laboratory
Unit 5	Personal Safety
Unit 6	Accidents and First Aid

Assessment

There are two components of assessment for this course. The Tutor Marked Assignment (TMA), and the end of course examination.

Tutor Marked Assignment

The TMA is the continuous assessment component of your course. It accounts for 30% of the total score. You will be given TMAs to answer. Three of these must be answered before you are allowed to sit for end of course examination. The TMAs would be given to you by your facilitator and returned after they have graded.

Final Examination and Grading

This examination concludes the assessment for the course. It constitutes 70% of the whole course. You will be informed of the time for the examination. It may or may not coincide with the university semester examination.

Summary

This course is intended to equip you with the knowledge of possible laboratory hazards and ways of preventing accidents in the laboratory, and what to do once an accident has happened. At the end of this course, you will be able to answer the following type of questions:

- a) What are the possible causes of electrical accident in the laboratory?
- b) What do you understand by the term 'earthing'?
- c) What are the sources of gas hazards in the laboratory?
- d) What are the causes of fire in the laboratory?
- e) What are the different classifications of fire?
- f) What are the precautions for fire prevention?
- g) What are the recommended procedures for operating the different types of fire extinguishers?
- h) What is the symbol for ionising radiation?
- i) What are non-ionising radiations, and the corresponding precautions?
- j) What is the safe way to view an eclipse of the sun?
- k) What are the different classes of hazardous chemicals?
- l) What are the possible hazards involved in the supply of animals?
- m) What are sharps and what is the best way of storing them?

We wish you success.