Course Description of Biosafety - Second Year Class, First Semester

Biosafety introduces the principles and practices used to prevent accidental exposure to biological hazards and to protect students, staff, patients, and the environment. The course covers risk assessment, containment, personal protective equipment, safe handling of biological materials, decontamination, waste management, and emergency response. It prepares pharmacy students to apply safe laboratory practices and responsible biosafety behavior in academic, clinical, and pharmaceutical settings.

1. Educational Institution	Al-Zahrawi University - Ministry of Higher Education and Scientific Research
2. University Department / Center	College of Pharmacy
3. Course Name / Code	Biosafety
4. Programs in which it is included	Bachelor of Pharmacy
5. Available Forms of Attendance	Classroom attendance
6. Semester / Year	First Semester / Second Year
7. Total Number of Study Hours	30 Hours (2 hours/week × 15 weeks)
8. Date of preparing this description	2024

Course Objectives: This course aims to enable students to:
• Understand the fundamental principles, terminology, and scope of biosafety and biosecurity.
• Recognize common biological hazards and routes of occupational exposure in laboratories and healthcare settings.
• Apply basic biological risk assessment and select appropriate containment measures and biosafety levels.
• Demonstrate correct use of personal protective equipment, safe laboratory practices, and exposure-prevention procedures.
• Understand principles of decontamination, disinfection, sterilization, spill management, and biomedical waste disposal.
• Apply safe procedures for handling, storage, labeling, and transport of biological specimens and materials.
• Develop appropriate responses to accidents, sharps injuries, spills, and other biosafety incidents, including reporting and follow-up.

Learning Outcomes, Teaching and Learning Methods, and Evaluation
Upon successful completion of this course, the student will be able to:
• Define biosafety, biohazard, containment, biosecurity, and risk assessment.
• Classify biological hazards and explain Biosafety Levels 1–4.
• Select suitable PPE and apply standard laboratory safety procedures.
• Describe safe specimen handling, decontamination, sterilization, and waste management.
• Explain the safe use of biosafety cabinets and other containment measures.
• Apply biosafety principles in pharmacy and pharmaceutical laboratory activities.

Knowledge and Understanding

• Explain biosafety, risk assessment, containment, and biosecurity principles.
• Describe biological hazards, exposure routes, and prevention of laboratory-acquired infection.
• Understand Biosafety Levels 1–4 and the role of primary and secondary containment.
• Recognize principles of decontamination, waste management, incident response, and safety regulations.

Subject-Specific Skills

• Perform a basic biological risk assessment for routine laboratory work.
• Select and correctly use PPE and appropriate containment measures.
• Handle, label, store, and transport biological specimens safely.
• Apply correct procedures for decontamination, spills, sharps, and biomedical waste.
• Document and report biosafety incidents and immediate corrective actions.

Teaching and Learning Methods

Lectures, PowerPoint presentations, demonstrations, safety scenarios, case-based learning, group discussions, videos, and practical exercises.

A. Evaluation Methods

Written examinations, quizzes, assignments, practical demonstrations, case discussions, reports, and class participation.

Thinking Skills

• Analyze laboratory activities to identify biological hazards, exposure routes, and risk.
• Select suitable controls using containment principles, standard precautions, and the hierarchy of controls.
• Evaluate biosafety incidents and recommend prevention, response, reporting, and follow-up measures.

Teaching and Learning Methods

Case-based learning, risk-assessment exercises, laboratory scenarios, group discussions, demonstrations, and problem solving.

Evaluation Methods

Risk-assessment cases, written examinations, quizzes, assignments, practical demonstrations, presentations, and discussion.

e. General and Transferable Skills

• Communicate safety instructions and incident information clearly and responsibly.
• Work collaboratively and safely within laboratory and healthcare teams.
• Develop professionalism, responsibility, documentation, preparedness, and a strong safety culture.

11. Course Structure

Weeks	Hours	Required Learning Outcomes	Unit Name / Course or Topic	Learning Methods	Evaluation Method
1	3 HOURS	Knowledge and practical application	Introduction to Biosafety and Biological Hazards Definitions and scope of biosafety; safety culture; common biological hazards; responsibilities of laboratory personnel.	PowerPoint presentations, demonstrations, risk-assessment exercises, discussion, case-based learning and practical safety scenarios	Quizzes, assignments, practical safety exercises, case discussion, oral questions and written assessment
2	3 HOURS	Knowledge and practical application	Biological Risk Assessment Hazard identification; likelihood and consequence; exposure pathways; risk characterization; hierarchy of risk-control measures.	PowerPoint presentations, demonstrations, risk-assessment exercises, discussion, case-based learning and practical safety scenarios	Quizzes, assignments, practical safety exercises, case discussion, oral questions and written assessment
3	3 HOURS	Knowledge and practical application	Biosafety Levels and Laboratory Containment Principles and requirements of BSL-1, BSL-2, BSL-3 and BSL-4; primary and secondary containment; laboratory access control.	PowerPoint presentations, demonstrations, risk-assessment exercises, discussion, case-based learning and practical safety scenarios	Quizzes, assignments, practical safety exercises, case discussion, oral questions and written assessment
4	3 HOURS	Knowledge and practical application	Personal Protective Equipment and Safe Laboratory Practice Selection and correct use of gloves, coats, masks, eye and face protection; hand hygiene; good microbiological practices.	PowerPoint presentations, demonstrations, risk-assessment exercises, discussion, case-based learning and practical safety scenarios	Quizzes, assignments, practical safety exercises, case discussion, oral questions and written assessment
5	3 HOURS	Knowledge and practical application	Biological Agents and Routes of Exposure Bacteria, viruses, fungi, parasites and biological toxins; inhalation, ingestion, inoculation and mucous-membrane exposure.	PowerPoint presentations, demonstrations, risk-assessment exercises, discussion, case-based learning and practical safety scenarios	Quizzes, assignments, practical safety exercises, case discussion, oral questions and written assessment
6	3 HOURS	Knowledge and practical application	Safe Specimen Handling and Aseptic Techniques Collection, handling and processing of specimens; minimizing aerosols; aseptic technique; safe pipetting and centrifugation.	PowerPoint presentations, demonstrations, risk-assessment exercises, discussion, case-based learning and practical safety scenarios	Quizzes, assignments, practical safety exercises, case discussion, oral questions and written assessment
7	3 HOURS	Knowledge and practical application	Decontamination, Disinfection and Sterilization Principles and selection of disinfectants; autoclaving; sterilization; surface and equipment decontamination; validation concepts.	PowerPoint presentations, demonstrations, risk-assessment exercises, discussion, case-based learning and practical safety scenarios	Quizzes, assignments, practical safety exercises, case discussion, oral questions and written assessment
8	3 HOURS	Knowledge and practical application	Biomedical Waste Management Classification, segregation, collection, treatment and disposal of infectious waste; contaminated materials; environmental	PowerPoint presentations, demonstrations, risk-assessment exercises, discussion, case-based learning and practical safety scenarios	Quizzes, assignments, practical safety exercises, case discussion, oral questions and written assessment

			protection.		
9	**3 HOURS**	Knowledge and practical application	Sharps Safety and Occupational Exposure Response Needle-stick and sharps prevention; immediate first aid; exposure reporting; post-exposure evaluation and follow-up.pharmacist recommendations	PowerPoint presentations, demonstrations, risk-assessment exercises, discussion, case-based learning and practical safety scenarios	Quizzes, assignments, practical safety exercises, case discussion, oral questions and written assessment
10	**3 HOURS**	Knowledge and practical application	Biosafety Cabinets and Safety Equipment Classes of biological safety cabinets; correct use and limitations; centrifuge safety; airflow and containment; equipment maintenance.	PowerPoint presentations, demonstrations, risk-assessment exercises, discussion, case-based learning and practical safety scenarios	Quizzes, assignments, practical safety exercises, case discussion, oral questions and written assessment
11	**3 HOURS**	Knowledge and practical application	Blood-Borne Pathogens and Infection Prevention Standard precautions; blood and body-fluid exposure; prevention of laboratory-acquired infection; vaccination and occupational health principles.	PowerPoint presentations, demonstrations, risk-assessment exercises, discussion, case-based learning and practical safety scenarios	Quizzes, assignments, practical safety exercises, case discussion, oral questions and written assessment
12	**3 HOURS**	Knowledge and practical application	Storage, Labeling and Transport of Biological Materials Safe storage; labeling and inventory control; leak-proof packaging; internal and external transport; cold-chain and documentation principles.	PowerPoint presentations, demonstrations, risk-assessment exercises, discussion, case-based learning and practical safety scenarios	Quizzes, assignments, practical safety exercises, case discussion, oral questions and written assessment
13	**3 HOURS**	Knowledge and practical application	Biosafety in Pharmacy and Pharmaceutical Laboratories Biosafety applications in pharmacy, microbiology, quality-control and pharmaceutical laboratories; contamination control and safe handling of cultures and specimens.	PowerPoint presentations, demonstrations, risk-assessment exercises, discussion, case-based learning and practical safety scenarios	Quizzes, assignments, practical safety exercises, case discussion, oral questions and written assessment
14	**3 HOURS**	Knowledge and practical application	Biosecurity, Dual-Use Awareness, Ethics and Regulations Biosecurity principles; controlled access and accountability; dual-use concerns; responsible conduct; institutional and international biosafety guidance.	PowerPoint presentations, demonstrations, risk-assessment exercises, discussion, case-based learning and practical safety scenarios	Quizzes, assignments, practical safety exercises, case discussion, oral questions and written assessment
15	**3 HOURS**	Knowledge and practical application	Emergency Response, Incident Reporting and Integrated Review Management of spills and accidents; emergency procedures; incident investigation; corrective and preventive actions; integrated biosafety case review.	PowerPoint presentations, demonstrations, risk-assessment exercises, discussion, case-based learning and practical safety scenarios	Quizzes, assignments, practical safety exercises, case discussion, oral questions and written assessment

12. Infrastructure	
Required Readings:	Required references: WHO Laboratory Biosafety Manual, CDC/NIH Biosafety in Microbiological and Biomedical Laboratories (BMBL), standard biosafety textbooks, institutional safety manuals, and approved laboratory guidelines.
Special Requirements (Workshops, Journals, Software, Websites):	Biosafety manuals and guidelines, laboratory safety videos, risk-assessment forms, safety data sheets, PPE demonstrations, biosafety signage, and institutional incident-reporting resources.
Social Services (Guest Lectures, Professional Training, Field Studies, Others)	Guest lectures, biosafety workshops, PPE and spill-response demonstrations, laboratory safety drills, professional training, and field visits where applicable.

13.	
Prerequisites	Admission according to the central academic plan
Minimum Number of Students	Not specified
Maximum Number of Students	According to the approved admission capacity

Name of the Instructor: Dr. Ali Reshan