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|--|---|--------------------|----------------|---------------------|----------|
| <b>Programme</b>   | BS Biotechnology                            | <b>Course Code</b> | <b>BT. 104</b> | <b>Credit Hours</b> | <b>2</b> |
| <b>Course Title</b>  | <b>Biosafety, Biosecurity and Bioethics</b> |                    |                |                     |          |
| <b>Course Introduction</b>   |   |                    |                |                     |          |
| <p>This course aim is to address with some of the central issues, positions, and arguments in biomedical ethics. The course begins with an exploration of general theories and principles, and then proceeds to apply these theories and principles in relation to research in various avenues. The course also includes biosafety regulations, provide necessary information and compliance requirement in workplaces (research and diagnostic laboratories). This will help the learners to recognize hazards/threats and reduce risks (biorisk assessment and mitigation) in BSL-1/BSL-2 laboratories by applying good laboratory biorisk practices and containment principles. This course will also providean overview of the laboratory biorisk management (BRM) system and emergency response programme.</p>  |   |                    |                |                     |          |
| <b>Learning Outcomes</b>   |   |                    |                |                     |          |
| <ul style="list-style-type: none"> <li>• Understand levels, protocols and regulations of biosafety and biosecurity.</li> <li>• Evaluate biosecurity measures to prevent the misuse of biotechnological advances.</li> <li>• Understand ethical considerations in biotechnology research and applications.</li> </ul>   |   |                    |                |                     |          |
| <b>Course Content</b>  |   |                    |                |                     |          |
| <ul style="list-style-type: none"> <li>• Biosafety, Bio-risk and biohazards: Introduction to biosafety, bio-risk, biohazard, High &amp; maximum containment, risk assessment</li> <li>• General principles for the laboratory and environmental biosafety: Laboratory biosafety, Laboratory Biorisk Management System, Toxicology, allergenicity, antibiotic resistance, etc; Impact on environment: gene flow in natural and artificial ecologies; Sources of gene escape, tolerance of target organisms, creation of superweeds/superviruses, etc.</li> <li>• Biosafety &amp; Biosecurity-National &amp; International Biosafety: Relationship between biosafety and biosecurity, National &amp; International Biosafety, Guidelines &amp; Legislations to comply with Biosafety &amp; Biosecurity requirements in workplaces</li> <li>• Biosafety and Biosecurity: Definition and history- key events</li> <li>• Biosafety Levels (based on Center for Disease Control and Prevention 2020) &amp; ethical issues</li> <li>• Biosafety &amp; Biosecurity risk mitigation: Principles and practices &amp; Emergency Response Management</li> <li>• The Role of Democracy in Biosafety Oversight: Key factors, role of regulatory stake holders and challenging laws</li> <li>• Bioethics-Introduction to bioethics subject, tasks, principles, history of development, and legislative foundations</li> <li>• The principles and ethical problems of biomedical research-GMO &amp; bioethics, Stem cells, human cloning &amp; bioethics</li> <li>• Bioethical issues of new biomedical technologies</li> <li>• Medical genetics, genetic engineering and reproductive technologies</li> <li>• Social-philosophical aspects of ethical problems in medicine.</li> <li>• Bioethical aspects of transplantology and blood transfusion. Bioethical problems of HIV-infection and other socially dangerous infections</li> </ul> |   |                    |                |                     |          |

- Biotechnology & Bioethics: Nuremberg Code (1947), Regulatory bodies ensuring adherence to bioethics policies
- Analyzing Ethical Issues: Consequences, rights & responsibilities, Autonomy, virtue ethics, animal rights

### Textbooks and Reading Material

Textbooks.

- Burnette, R. N. (Ed.). (2021). *Applied Biosecurity: Global Health, Biodefense, and Developing Technologies*. Springer.
- Walsh, P. F. (2018). *Intelligence, biosecurity and bioterrorism*. Springer.
- Bowman, K., Husbands, J., & Reville, J. (Eds.). (2018). *Governance of dual use research in the life Sciences: Advancing global consensus on research oversight: Proceedings of a workshop*. National Academies Press.

### Teaching Learning Strategies

- Lectures
- Assignments / Quizzes
- Presentations

### Assignments: Types and Number with Calendar

### Assessment

| Sr. No. | Elements             | Weightage | Details  |
|---------|----------------------|-----------|--|
|         | Midterm Assessment   | 35%       | Written Assessment at the mid-point of the semester.   |
|         | Formative Assessment | 25%       | Continuous assessment includes: Classroom participation, assignments, presentations, viva voce, attitude and behavior, hands-on-activities, short tests, projects, practical, reflections, readings, quizzes etc.                                      |
|         | Final Assessment     | 40%       | Written Examination at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc. |