



**University of Management & Technology**  
**School of Science**  
**Department of Life Sciences**

**BT-413 Cell and tissue Culture Technology**

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|--|---|----------------------------|--|
| <b>Lecture Schedule</b>                  | Tuesday & Thursday  | <b>Semester</b>            | Spring 2021  |
|  |   | <b>Credit Hours</b>        | 3  |
| <b>Instructor (s)</b>                    | Mr. Rana Muhammad Kamran Shabbir  | <b>Contact Moodle link</b> | <a href="mailto:kamran.shabbir@umt.edu.pk">kamran.shabbir@umt.edu.pk</a> |
| <b>Office</b>                            | New Faculty Halls, Main Building<br>North Block Old Smoke Area  | <b>Office Hours</b>        | See office window  |
| <b>Objectives</b>                        | <ul style="list-style-type: none"> <li>• To understand the process of tissue culture technology.</li> <li>• To study the nutritional and physical requirements of primary cell culture and established cell lines.</li> <li>• To use as viable media for the cultivation of viruses; and in diagnosis</li> <li>• To understand the cellular differentiation.</li> </ul>   |                            |  |
| <b>Expected Outcomes</b>                 | <p>This course is an introduction</p> <ul style="list-style-type: none"> <li>• To the theory, standard practices, and methodologies of animal and plant cell culture.</li> <li>• Students will receive hands-on laboratory experience including sterile technique, media preparation,</li> <li>• Students will also learn cell counting, maintenance and storage of cell lines, and scale-up. Lectures support the laboratory activities.</li> </ul>  |                            |  |
| <b>Text book &amp; Reference book(s)</b> | <ol style="list-style-type: none"> <li>1. Halford, N., 2014. Plant Biotechnology: Current and Future Applications of Genetically Modified Crops. 4th edition John Wiley and Sons Limited.</li> <li>2. Vunjak-Novakovic, G., Freshney, R.I., 2015. Culture of Cells for Tissue Engineering. 3rd Edition Wiley, John &amp; Sons</li> <li>3. Freshney, R.I., 2014. Culture of Animal Cells: A Manual of Basic Technique. 7th Edition. Wiley, John &amp; Sons.</li> <li>4. Neumann, K-H., Kumar, A., Imani, J., 2015. Plant Cell and Tissue Culture - A Tool in Biotechnology: Basics and Application .3rd Edition. Springer-Verlag New York, LLC.</li> <li>5. Invitrogen. 2017. A handbook on cell culture basics. 1st edition. Gibco by life technologies.</li> </ol> |                            |  |

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|---------------------------|------------------------|-----|
| <b>Grading<br/>Policy</b> | Assignments + Quizzes: | 20% |
|                           | Midterm:               | 30% |
|                           | Final:                 | 50% |

## Course Schedule

| Week | Lecture # | TOPICS   |
|------|-----------|--|
| 1    | 1<br>2    | <ul style="list-style-type: none"> <li>• Introduction to cell culture</li> </ul>   |
| 2    | 1<br>2    | Cell culture laboratory requirements <ul style="list-style-type: none"> <li>• Cell culture equipment</li> </ul>  |
| 3    | 1<br>2    | Cell culture laboratory requirements <ul style="list-style-type: none"> <li>• Aseptic work are</li> <li>• Cell culture hood</li> <li>• Incubator</li> <li>• Storage</li> <li>• Cryogenic storage</li> <li>• Cell counter</li> </ul>                                |
| 4    | 1<br>2    | Basics of Cell lines <ul style="list-style-type: none"> <li>• Acquiring cell lines</li> <li>• Selecting the appropriate cell lines</li> </ul>  |
| 5    | 1<br>2    | Biological Contamination <ul style="list-style-type: none"> <li>• Bacteria</li> <li>• Yeasts</li> <li>• Molds</li> <li>• Viruses</li> <li>• Mycoplasmas</li> <li>• Cross contamination</li> <li>• Use of antibiotics</li> </ul>                                    |
| 6    | 1<br>2    | Introduction to Aseptic techniques with reference to cell culture <ul style="list-style-type: none"> <li>• Introduction</li> <li>• Sterile Work Area</li> <li>• Good Personal Hygiene</li> <li>• Sterile Reagents and Media</li> <li>• Sterile Handling</li> </ul> |
| 7    | 1<br>2    | Mammalian cell culture   |
| 8    | 1<br>2    | Insect cells <ul style="list-style-type: none"> <li>• Morphology of Sf21 cells</li> <li>• Morphology of S9 cells</li> </ul>  |
| 9    | 1<br>2    | <ul style="list-style-type: none"> <li>• Plant Cell Culture</li> <li>• Callus Culture</li> </ul>   |

|    |        |  |
|----|--------|--|
|    |        | <ul style="list-style-type: none"> <li>• Midterm</li> </ul>  |
| 10 | 1<br>2 | <ul style="list-style-type: none"> <li>• Sub-culturing of suspension cells</li> <li>• Sub-culturing of adherent cells</li> </ul> |
| 11 | 1<br>2 | <ul style="list-style-type: none"> <li>• Embryo Culture</li> <li>• Protoplast Culture</li> </ul>                                 |
| 12 | 1<br>2 | <ul style="list-style-type: none"> <li>• Plant tissue culture media</li> <li>• Thawing of frozen cells</li> </ul>                |
| 13 | 1<br>2 | <ul style="list-style-type: none"> <li>• Counting cells in Hemocytometer</li> <li>• Trypan blue exclusion</li> </ul>             |
| 14 | 1<br>2 | <ul style="list-style-type: none"> <li>• Troubleshooting</li> <li>• Revision</li> </ul>  |
| 15 |        | <ul style="list-style-type: none"> <li>• Final term</li> </ul>   |