



## Academic Course Specification Form

استمارة توصيف المقرر الأكاديمي

### القسم الخاص بالطالب Section Concerning the Student

|                                                    |                                |                                                              |
|----------------------------------------------------|--------------------------------|--------------------------------------------------------------|
| 1. Course Code:                                    | BIOLS 352                      | 1. رمز المقرر:                                               |
| 2. Course Title                                    | Applied Microbiology           | 2. اسم المقرر:                                               |
| 3. College:                                        | COLLEGE OF SCIENCE             | 3. الكلية:                                                   |
| 4. Department:                                     | DEPARTMENT OF BIOLOGY          | 4. القسم:                                                    |
| 5. Academic Program:                               | Bachelor of Science in biology | 5. البرنامج الأكاديمي:                                       |
| 6. Course Credits:                                 | 2-2-3                          | 6. عدد الساعات المعتمدة:                                     |
| 7. Course NQF Level:                               | 8                              | 7. مستوى المقرر وفقاً للإطار الوطني للمؤهلات:                |
| 8. Notional Hours:                                 | 124                            | 8. عدد الساعات الافتراضية:                                   |
| 9. NQF Credits:                                    | 12                             | 9. عدد الساعات المعتمدة للمقرر وفقاً للإطار الوطني للمؤهلات: |
| 10. European Credit Transfer System (ECTS) credits | 6                              | 10. عدد الساعات للمقرر بالنظام الأوروبي                      |
| 11. Prerequisite:                                  | BIOLS 250                      | 11. المتطلب السابق للمقرر:                                   |
| 12. Lectures Timing & Location:                    |                                | 12. وقت المحاضرة ومكانها:                                    |

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| 13. General Mode of Teaching and Learning                                                                                                                                                                                                                                                                                                                                                        | Traditional تقليدي                                                                          | 13. النمط العام للتعليم والتعلم:     |
| 14. Course Coordinator:                                                                                                                                                                                                                                                                                                                                                                          |                                                                                             | 14. منسق المقرر:                     |
| 15. Course Instructor:                                                                                                                                                                                                                                                                                                                                                                           |                                                                                             | 15. مدرّس المقرر:                    |
| 16. Office Hours and Location:                                                                                                                                                                                                                                                                                                                                                                   |                                                                                             | 16. الساعات المكتبية ومكانها:        |
| 17. Instructor's Email:                                                                                                                                                                                                                                                                                                                                                                          |                                                                                             | 17. البريد الإلكتروني لمدرّس المقرر: |
| 18. Academic Year:                                                                                                                                                                                                                                                                                                                                                                               |                                                                                             | 18. السنة الأكاديمية:                |
| 19. Semester:                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                             | 19. الفصل الدراسي:                   |
| 20. Textbook(s):                                                                                                                                                                                                                                                                                                                                                                                 | 20. الكتب الدراسية للمقرر:                                                                  |                                      |
| Ray Bibek and Bhunia Arun: Fundamental food microbiology, 6 <sup>th</sup> Edition, CRC PRESS, 2025. This textbook is intended for undergraduate students                                                                                                                                                                                                                                         |                                                                                             |                                      |
| 21. References:                                                                                                                                                                                                                                                                                                                                                                                  | 21. المراجع:                                                                                |                                      |
| Food microbiology an introduction by Montville et al., (2012) and 2- Food microbiology: a laboratory manual by Elmeleigy Y (2003)                                                                                                                                                                                                                                                                |                                                                                             |                                      |
| 22. Other Learning Resources Used (e.g. e-learning, field visits, periodicals, software, etc.):                                                                                                                                                                                                                                                                                                  | 22. مصادر التعلم الأخرى (مثال: التعلم الإلكتروني، زيارات ميدانية، دوريات، برمجيات، إلخ....) |                                      |
| 23. Course Description (as published in the College Catalogue):                                                                                                                                                                                                                                                                                                                                  | 23. توصيف المقرر (حسب ما ورد في دليل الكلية):                                               |                                      |
| Foods as substrates for microorganisms; microorganisms important in food and fermentation industries; contamination, spoilage and preservation of foods. Single cell protein production; secondary metabolite production; antibiotics, alcohols, amino acids, enzymes, microbial toxins. New approaches to improve novel metabolite production through modern microbial biotechnology techniques |                                                                                             |                                      |
| 24. Course Intended Learning Outcomes (3 to 5 CILOs):                                                                                                                                                                                                                                                                                                                                            | 24. مخرجات التعلم للمقرر (CILOs) (3 إلى 5 مخرجات تعليمية):                                  |                                      |
| 1. Analyze the relationships between food and microorganisms, as well as different food preservation techniques and their impact on microbial safety and quality.                                                                                                                                                                                                                                |                                                                                             |                                      |
| 2. Describe the use of microorganisms in the production of foods and industry.                                                                                                                                                                                                                                                                                                                   |                                                                                             |                                      |
| 3. Explain the enumeration of bacterial cells and factors influencing control of microbial growth and their effects on food safety.                                                                                                                                                                                                                                                              |                                                                                             |                                      |
| 4. Identify the classification, nomenclature, size and cultural characteristics of bacteria, yeasts and molds.                                                                                                                                                                                                                                                                                   |                                                                                             |                                      |
| 5. Illustrate the sanitation techniques applied in food processing and the importance of foodborne pathogens.                                                                                                                                                                                                                                                                                    |                                                                                             |                                      |

| 25. Course Assessment Percentages (as per Regulations of Study and Examination at the University of Bahrain): |                    | 25. أساليب التقييم ونسبها المئوية (بحسب نظام الدراسة والامتحانات في جامعة البحرين):                                                                                                                                                                                                                                                                                                                                                        |                                  |
|---------------------------------------------------------------------------------------------------------------|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|
| Assessment<br>التقييم                                                                                         | Type<br>النوع      | Percentage<br>النسبة                                                                                                                                                                                                                                                                                                                                                                                                                       | Assessment Date<br>تاريخ التقييم |
| Theory quiz                                                                                                   | Individual<br>فردى | 5%                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                  |
| Midterm Exam                                                                                                  | Individual<br>فردى | 15%                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                  |
| Assignment: Field trip                                                                                        | Individual<br>فردى | 10%                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                  |
| Laboratory: Assignments, reports                                                                              | Individual<br>فردى | 15%                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                  |
| Lab-exam                                                                                                      | Individual<br>فردى | 15%                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                  |
| Final Exam                                                                                                    | Individual<br>فردى | 40%                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                  |
| <b>Total</b>                                                                                                  | <b>100%</b>        |                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                  |
| 26. Description of Topics Covered                                                                             |                    | 26. وصف الموضوعات التي ينبغي تناولها:                                                                                                                                                                                                                                                                                                                                                                                                      |                                  |
| Topic Title<br>(e.g. chapter/experiment title)<br>الموضوع                                                     |                    | Description<br>التفصيل                                                                                                                                                                                                                                                                                                                                                                                                                     |                                  |
| Factors that influence microbes in foods                                                                      |                    | Microbial growth in food is influenced by intrinsic factors like pH, water activity, and nutrient content, as well as extrinsic factors such as temperature, humidity, and the gaseous environment. These factors interact to determine the types of microbes that can survive and grow in a particular food.                                                                                                                              |                                  |
| Microbial physiology and metabolism                                                                           |                    | Microbial physiology encompasses the study of how microorganisms' function, grow, and reproduce, including their structure, genetics, and biochemistry. Microbial metabolism focuses on the biochemical processes by which microbes obtain energy and nutrients to fuel their life processes, involving a wide range of metabolic pathways.                                                                                                |                                  |
| Spores and their significance                                                                                 |                    | Spores are dormant, highly resistant structures produced by certain bacteria and fungi that allow them to survive harsh environmental conditions like extreme temperatures, desiccation, and radiation. Their significance lies in their ability to ensure the survival and propagation of these microorganisms, enabling them to persist in unfavorable environments and cause spoilage or disease when conditions become suitable again. |                                  |

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| Spore biology                                                                          |                        | Spore biology is the study of the formation, structure, and function of spores, which are dormant, reproductive cells produced by a wide range of organisms, including bacteria, fungi, algae, and plants.                                                                                                                            |                                                 |                                                                              |
| Detection and enumeration of microbes in food material                                 |                        | Detection and enumeration of microbes in food material involves a range of techniques to identify and quantify the microorganisms present. Traditional methods often involve culturing samples on specific media to encourage growth and then counting colonies or using statistical estimations like the Most Probable Number (MPN). |                                                 |                                                                              |
| Rapid and automated microbial methods                                                  |                        | Modern techniques like PCR and ELISA can rapidly detect specific microbial DNA or proteins, providing faster and more sensitive results.                                                                                                                                                                                              |                                                 |                                                                              |
| Indicator microorganisms and microbiological criteria<br><br>Indicators of food toxins |                        | Indicator microorganisms are specific microbes whose presence in food suggests potential contamination or poor hygiene, while microbiological criteria are standards that define acceptable levels of these microbes in food products to ensure safety and quality.                                                                   |                                                 |                                                                              |
| Gram-negative foodborne pathogenic bacteria                                            |                        | Gram-negative foodborne pathogenic bacteria are a group of microorganisms that can cause illness when ingested through contaminated food. They possess a unique cell wall structure that makes them more resistant to some antibiotics and environmental stresses.                                                                    |                                                 |                                                                              |
| Enterohemorrhagic Escherichia coli                                                     |                        | Enterohemorrhagic Escherichia coli (EHEC) is a specific type of E. coli bacteria that produces a potent toxin called Shiga toxin.                                                                                                                                                                                                     |                                                 |                                                                              |
| Gram-positive foodborne pathogenic bacteria                                            |                        | Gram-positive foodborne pathogenic bacteria are a group of microorganisms that can cause illness when ingested through contaminated food. <sup>1</sup> They have a thick cell wall that retains a specific stain in the Gram staining technique.                                                                                      |                                                 |                                                                              |
| Clostridium botulinum                                                                  |                        | Clostridium botulinum is a bacterium that produces a potent neurotoxin, one of the most poisonous substances known.                                                                                                                                                                                                                   |                                                 |                                                                              |
| <b>27. Weekly Schedule</b>                                                             |                        | <b>27. الجدول الأسبوعي</b>                                                                                                                                                                                                                                                                                                            |                                                 |                                                                              |
| <b>Week</b><br>الأسبوع                                                                 | <b>Date</b><br>التاريخ | <b>Topics Covered</b><br>الموضوعات المتناولة                                                                                                                                                                                                                                                                                          | <b>CILOs</b><br>مخرجات التعلم للمقرر<br>(CILOs) | <b>Teaching/Assessment Mode and Method</b><br>منهجية ونمط<br>التدريس/التقييم |

|   |  |                                                                                                                                                             |         |                    |
|---|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|--------------------|
| 1 |  | Factors that influence microbes in foods<br>No-Lab                                                                                                          | 1, 3    | Traditional تقليدي |
| 2 |  | Microbial physiology and metabolism<br>LAB: Physical and chemical agents for the control of microbial growth                                                | 1, 2    | Traditional تقليدي |
| 3 |  | Spores and their significance<br>LAB: Physical and chemical agents for the control of microbial growth                                                      | 1, 5    | Traditional تقليدي |
| 4 |  | Spores in food<br>LAB: Cultivation and morphology of fungi                                                                                                  | 1, 4, 5 | Traditional تقليدي |
| 5 |  | Spore biology<br>LAB: Cultivation and morphology of fungi                                                                                                   | 1, 4, 5 | Traditional تقليدي |
| 6 |  | Detection and enumeration of microbes in food material<br><br>LAB: Bacterial count in vegetables and fruits & Bacteriological analyses of meats and poultry | 3, 4    | Traditional تقليدي |
| 7 |  | Sample collection and data analysis<br><br>LAB: Bacterial count in vegetables and fruits & Bacteriological analyses of meats and poultry                    | 3, 4    | Traditional تقليدي |
| 8 |  | Rapid and automated microbial methods                                                                                                                       | 3       | Traditional تقليدي |

|                                  |  |                                                                                                                                                              |                             |                    |
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|                                  |  | LAB: Bacteriological analysis of seafood<br>Bacteriological examination of milk and quality control                                                          |                             |                    |
| 9                                |  | Indicator microorganisms and microbiological criteria<br>LAB: Bacteriological analysis of seafood<br>Bacteriological examination of milk and quality control | 1, 3, 5                     | تقليدي Traditional |
| 10                               |  | Indicators of food toxins<br>LAB: Standard qualitative analysis of water                                                                                     | 1, 3, 5                     | تقليدي Traditional |
| 11                               |  | Gram-negative foodborne pathogenic bacteria<br>LAB: Standard qualitative analysis of water                                                                   | 5                           | تقليدي Traditional |
| 12                               |  | Gram-negative foodborne pathogenic bacteria<br>Field trip                                                                                                    | 3, 5                        | تقليدي Traditional |
| 13                               |  | Enterohemorrhagic Escherichia coli                                                                                                                           | 3, 5                        | تقليدي Traditional |
| 14                               |  | Gram-positive foodborne pathogenic bacteria<br>LAB:                                                                                                          | 3, 5                        | تقليدي Traditional |
| 15                               |  | Clostridium botulinum                                                                                                                                        | 3, 4, 5                     | تقليدي Traditional |
| 16                               |  |                                                                                                                                                              |                             |                    |
| 28. Academic Integrity Statement |  |                                                                                                                                                              | 28. بيان النزاهة الأكاديمية |                    |

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| <p>Students are to observe the highest level of honesty and academic ethics in pursuit of their academic goals as per UOB Regulations of Student Conduct and Academic Integrity, <a href="#">Anti-plagiarism Policies</a>, and <a href="#">Students' Rights and Responsibilities Handbook</a>. The consequences for cheating, plagiarism, unauthorized collaboration, and other forms of academic dishonesty can be very serious and will be dealt with as per the aforementioned policies and regulations.</p> | <p>يتعين على الطلبة الالتزام بأعلى مستويات الصدق والأمانة والأخلاق الأكاديمية في سعيهم لتحقيق أهدافهم الأكاديمية وفقاً للوائح سلوك الطلاب والنزاهة الأكاديمية، <a href="#">سياسات مكافحة الانتحال</a>، <a href="#">ودليل حقوق الطلبة وواجباتهم</a>، المعمول بها في جامعة البحرين. يمكن لعواقب الغش والسرقة الأدبية والتعاون غير المصرح به وغيرها من أشكال عدم الأمانة الأكاديمية أن تكون خطيرة للغاية وسيتم التعامل معها وفقاً للسياسات واللوائح المذكورة آنفاً.</p> |
| <p><b>29. Attendance and Absence Regulations</b></p> <p>Students are required to adhere to regular attendance for class lectures and practical sessions, as determined by the nature of the course, as per Article (33) of Regulations of <a href="#">Study and Examination at the University of Bahrain</a>.</p>                                                                                                                                                                                               | <p><b>29. نظام الحضور والغياب</b></p> <p>يجب على الطلبة الالتزام بالحضور المنتظم للمحاضرات الصفية والعملية، حسبما تحدده طبيعة المقرر الدراسي، ووفقاً للمادة (33) من <a href="#">نظام الدراسة والامتحانات في جامعة البحرين</a>.</p>                                                                                                                                                                                                                                   |