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| **1** | **Course title** | Pharmaceutical Microbiology-Practical |
| **2** | **Course number** | 1202442 |
| **3** | **Credit hours** | 1 |
| **Contact hours (theory, practical)** | 3 (practical) |
| **4** | **Prerequisites/corequisites** | 1202441 (Pharmaceutical Microbiology II) |
| **5** | **Program title** | BSc in Pharmacy and PharmD |
| **6** | **Program code** | N/A |
| **7** | **Awarding institution** | The University of Jordan |
| **8** | **School** | School of Pharmacy |
| **9** | **Department** | Pharmaceutics and Pharmaceutical Technology |
| **10** | **Level of course** | Undergraduate |
| **11** | **Year of study and semester (s)** | First semester of the 4th year |
| **12** | **Final Qualification** | BSc in Pharmacy or PharmD |
| **13** | **Other department (s) involved in teaching the course** | N/A |
| **14** | **Language of Instruction** | English |
| **15** | **Teaching methodology** | Blended Online |
| **16** | **Electronic platform(s)** | Moodle Microsoft Teams Skype Zoom  Others………… |
| **17** | **Date of production/revision** | 8/10/2020 |

**18 Course Coordinator:**

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| Name: **Dr. Randa Haddadin**  Office number: 214  Phone number: +962-6-5355000 (Ext. 23314)  Email: [r\_haddadin@ju.edu.jo](mailto:r_haddadin@ju.edu.jo) |

**19 Course Instructors:**

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| |  |  | | --- | --- | | Name: **Prof. Amal Al-Bakri** Office number: 215A Phone number: +962-6-5355000 (Ext. 23330) Email: [agbakri@ju.edu.jo](mailto:agbakri@ju.edu.jo) | Name: **Prof Rula Darwish** Office number: 214 Phone number: +962-6-5355000 (Ext. 23327) Email: [rulad@ju.edu.jo](mailto:rulad@ju.edu.jo) | | Name: **Dr. Mahmoud Alkawareek** Office number: 224 Phone number: +962-6-5355000 (Ext. 23342) Email: [m.alkawareek@ju.edu.jo](mailto:m.alkawareek@ju.edu.jo) | Name: **Dr. Randa Haddadin** Office number: 215B Phone number: +962-6-5355000 (Ext. 23314) Email: [r\_haddadin@ju.edu.jo](mailto:r_haddadin@ju.edu.jo) | |

**20 Course Description:**

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| |  | | --- | | In this course the students will apply some of the knowledge they gained in pharmaceutical microbiology I & pharmaceutical microbiology II. The students will perform tests used to monitor the environment (air, personnel, water, etc) & test sterile products. Also the students will perform microbial identification through gram staining. The students will perform various in vitro tests for evaluating antimicrobial agents & will perform some microbial quality tests for sterile and non-sterile products. | |

**21 Course aims and outcomes:**

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| **A- Aims:**  - To develop the skills to work aseptically and under aseptic conditions  - To develop the skills to identify microorganisms  - To develop the skills to measure and determine the efficacy and potency of different antimicrobial agents  - To develop the skills to monitor microbiological quality of the environment, water, personnel and for both sterile and non-sterile dosage forms using different sterilization methods.  - To develop the skills of reporting experimental findings in a scientific way  -To develop the skills to make verbal presentation to the experimental findings  **B-** **Intended Learning Outcomes (ILOs):**  Upon successful completion of this course, students will be able to:  **• Develop, integrate, and apply knowledge from the foundational sciences (learner)**  1. Recognize the general safety procedures required when working in microbiology laboratory  2. Apply the general principles of aseptic technique  3. Recognize the different methods used to culture microorganisms and the different types of growth media  4. Recognize the different methods used to identify microorganisms  5. Apply different qualitative and quantitative tests that are used to evaluate microbial susceptibility towards antimicrobial agents  6. Identify the different methods used to control microbial contamination of pharmaceutical products   * **Implement quality control measures and tests (quality manager)**   7. Apply different tests that are used to monitor microbial quality of pharmaceutical preparations and the environment   * **Proactively investigates new knowledge, approaches or behavior and takes steps to evaluate and improve performance (self-learner)**   8. Seek actively new knowledge related to the course by referring to the relevant scientific resources   * **Exhibit behaviors and values that are consistent with the trust given to the profession by patients, other healthcare providers, and society (professional)**   9. Communicate effectively and respectfully with tutors and classmates  10. Show responsibility, accountability and commitment by complying with tutor’s instructions and relevant university regulations  11. Demonstrate integrity by not cheating and not committing plagiarism |

**22. Topic Outline and Schedule:**

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| |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | | **Week** | **Session** | **Topic** | **Teaching Method (Platform)** | **Evaluation Methods** | **Reference** | | 1 | 1.1  Group 1 | \* Aseptic techniques and subculturing of bacterial cultures  \* Quality assurance –microbial monitoring of environment  \* Streaking a MacConkey agar plate  \* Gram staining | Online videos (Moodle) and experimental work in the lab | Pre-Lab Quiz, Experimental Work/Report/ Exams | Pharmaceutical microbiology Laboratory Manual | | 1.2  Group 1 | | 2 | 2.1  Group 2 | \* Aseptic techniques and subculturing of bacterial cultures  \* Quality assurance –microbial monitoring of environment  \* Streaking a MacConkey agar plate  \* Gram staining | Same as above | | 2.2  Group 2 | | 3 | 3.1  Group 1 | \* Qualitative methods used for the evaluation of bacteriostatic activity of different antimicrobial agents  (Disc and strip method).  \* Determination of the minimal inhibitor concentration (MIC) of a bacteriostatic substance by agar diffusion and broth dilution method | Same as above | | 3.2  Group 1 | | 4 | 4.1  Group 2 | \* Qualitative methods used for the evaluation of bacteriostatic activity of different antimicrobial agents  (Disc and strip method).  \* Determination of the minimal inhibitor concentration (MIC) of a bacteriostatic substance by agar diffusion and broth dilution method | Same as above | | 4.2  Group 2 | | 5 | Group 1 and Group 2 | \* Determination of the potency of an antibiotic solution by the cup plate method | **Midterm exam** | **Theoretical and practical exams** | | 6 | 6.1  Group 1 | \* Capacity use dilution test (Kelsey-Sykes test)  \* Sterilization methods.  (most online)  \* Effect of Sterilization by dry heat method | Online videos (Moodle) and experimental work in the lab | Pre-Lab Quiz, Experimental Work/Report/ Exams | | 6.2  Group 1 | | 7 | 7.1  Group 2 | \* Capacity use dilution test (Kelsey-Sykes test)  \* Sterilization methods.  (most online)  \* Effect of Sterilization by dry heat method | Same as above | | 7.2  Group 2 | | 8 | 8.1  Group 1 | \* Quality control tests:  a) Sterility test  b) LAL test  c) Microbial count of nonsterile products.  \* Tutorial: D, Z and F values | Online videos (Moodle) and experimental work in the lab | | 8.2  Group 1 | Calculations and drawing graphs | | 9 | 9.1  Group 2 | Quality control tests:  a) Sterility test  b) LAL test  c) Microbial count of nonsterile products.  -Tutorial: D,Z, F value | Online videos (Moodle) and experimental work in the lab | | 9.2  Group 2 | Calculations and drawing graphs | | 10 and 11 | 10.1  Group 1 | **Gram staining, Sterility test, MIC by broth dilution** | **Final Exam** | **Theoretical and practical exams** | | 10.2  Group 2 | **Final Exam** | |

**23 Course Requirements:**

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| Students should have:   * Computer * Internet connection * Webcam * Active university account on Moodle (e-learning) website |

**24 Evaluation Methods:**

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| Opportunities to demonstrate achievement of the ILOs are provided through the following assessment methods and requirements:   |  |  |  |  |  | | --- | --- | --- | --- | --- | | **Evaluation Activity** | **Mark** | **Topic(s)** | **Period (Week)** | **Platform** | | Pre-Lab quizzes (online) | 5 | * All sessions | All weeks except midterm and final exam weeks | Moodle | | Experimental work evaluation | 10 | * All sessions | All weeks except midterm and final exam weeks | In the Lab | | Writing reports | 10 | * All sessions | All weeks except midterm and final exam weeks | Moodle | | Oral presentation to the results and experimental work | 5 | * Selected topic from one of the sessions | Each group of students will be assigned in a week | In the Lab | | Mid Exam | 30 | * Determination of the potency of an antibiotic solution by the cup plate method | Week 5 | In the Lab | | Final Exam | 40 | Gram staining, Sterility test, MIC by broth dilution | Week 10 and 11 | In the Lab | |

**25 Course Policies:**

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| A- Attendance policies:  As per the applicable university regulations  B- Absences from exams and submitting assignments on time:  As per the applicable university regulations  C- Health and safety procedures:  Health and safety procedures are detailed in the laboratory manual and will be discussed in the first practical session D- Honesty policy regarding cheating, plagiarism, misbehavior:  As per the applicable university regulations  E- Grading policy:  As described above  F- Available university services that support achievement in the course:  School laboratories  Moodle (e-learning) website |

**26 References:**

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| |  | | --- | | A- Required book (s), assigned reading and audio-visuals:  - Pharmaceutical Microbiology Laboratory Manual, School of Pharmacy, The University of Jordan  B- Recommended books, materials, and media:  - Denyer, S. P., N. A. Hodges, S. P. Gorman, and B. F. Gilmore. *Hugo and Russell's Pharmaceutical Microbiology*. Wiley-Blackwell, UK; 8th Edition. (2011).  - Adam Fraise, Jean-Yves Maillard & Syed Sattar. Princ*iples and Practice of Disinfection, Preservation & Sterilization*. Wiley-Blackwell, UK; 5th Edition (2013)  - Michael J. Akers. *Sterile Drug Products: Formulation, Packaging, Manufacturing and Quality*. CRC Press; 1st Edition (2010)  - Richard Schwalbe, Lynn Steele-Moore & Avery C. Goodwin. *Antimicrobial Susceptibility Testing Protocols*. CRC Press; 1st edition (2007) | |

**27 Additional information:**

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Name of Course Coordinator: **Randa Haddadin** Signature: ------------------ Date: **10/10/2020**

Head of Curriculum Committee/Department: ---------------------------- Signature: --------------------------

Head of Department: ------------------------------------------------------------ Signature: -----------------------

Head of Curriculum Committee/Faculty: ---------------------------------------- Signature: -------------------

Dean: ---------------------------------------------------------- Signature: ------------------------------------------