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| **1** | **Course title** | Pharmaceutical Instrumental Analysis – Practical |
| **2** | **Course number** | 1201316 |
| **3** | **Credit hours (theory, practical)** | 1 |
| **Contact hours (theory, practical)** | 3hr/w |
| **4** | **Prerequisites/corequisites** | Pharmaceutical Instrumental Analysis 1201315 |
| **5** | **Program title** | Pharmacy / Pharm D |
| **6** | **Program code** |  |
| **7** | **Awarding institution**  | The University Of Jordan |
| **8** | **School** | Pharmacy |
| **9** | **Department** | Pharmaceutical Sciences  |
| **10** | **Level of course**  | Third Year/ intermediate |
| **11** | **Year of study and semester (s)** | 2021 /2022 First semester |
| **12** | **Final Qualification** | Pharmacy/Pharm D |
| **13** | **Other department (s) involved in teaching the course** | -------- |
| **14** | **Language of Instruction** | English |
| **15** | **Date of production/revision** | 25/10/2021  |

**16. Course Coordinator:**

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| Name: MSc. Isra’ Tayseer IbrahimOffice number: 303Phone number: 0780669080Email: isra.ibrahim@ju.edu.jo  |

**17. Other instructors:**

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| Name: MSc. Haneen MohammadOffice number: 303Phone number: 0798022932Email: Haneen.mohammad@ju.edu.jo  |

**18. Course Description:**

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| This lab trains students on methods of instrumental analysis. The lab includes spectral methods of analysis including UV-Visible, Infra-Red (IR) and Nuclear Magnetic Resonance (NMR). The lab also introduces the students to chromatographic techniques such as t High Pressure Liquid Chromatography (HPLC) and Gas Chromatography (GC). These methods are used in lab along with other analytical procedures in applications for analysis of pharmaceutical preparations. This course implements blended learning method, a video for each experiment was prepared and published online for the students, and students should watch the video and answer an online quiz related to the experiment before applying the experiment in the laboratory.  |

**19. Course aims and outcomes:**

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| **A- Aims:**To trains students on methods of instrumental analysis including spectroscopic and chromatographic techniques; training including:- Technical application of the method- Understanding importance of practical details of method e.g accuracy in preparation of solution and instrumental settings- Selection of proper method for a particular case.**B- Intended Learning Outcomes (ILOs):** Upon successful completion of this course, students will be able to:1- Recall good percentage of background information of different methods of analysis especially those related to pharmaceutical analysis, and to develop, integrate, and apply knowledge. (learner)2- Explain and outline goals of practical instrumental pharmaceutical Analysis within the context of pharmaceutical quality control over commercial products.3- Identifying problems related to practical analytical determination of the various drugs, 4- Examine and inspect parameters related to practical applications of pharmaceutical drug analysis /quality control; and recommend appropriate modifications.5- Demonstrate integrity by not cheating and not committing plagiarism6- Demonstrate respect to professors and classmates by observing active listening inside the classroom |

**20. Topic Outline and Schedule:**

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| **Week** | **Topic** | **Resources**  | Assignments (Done by every week BEFORE class) |
| 1 | 1. Effect of Solvent ,pH and Structure on UV spectroscopy
 | - Lab manual | Report form https://elearning.ju.edu.jo/moodle10/mod/resource/view.php?id=172123 |
| 2 | 1. Assay of Paracetamol Raw Material
 | - Lab manual-https://elearning.ju.edu.jo/moodle10/mod/resource/view.php?id=172124 | https://elearning.ju.edu.jo/moodle10/mod/resource/view.php?id=172120 |
| 3 | 1. Assay of Paracetamol in a Dosage Form (BP)
 | - Lab manual- https://www.youtube.com/watch?v=WtHt5y-2qxA&feature=youtu.be | = |
| 4 | 1. Determination of Aspirin and Caffeine mixture using UV-Visible Spectroscopy
 | - Lab manual- https://elearning.ju.edu.jo/moodle10/mod/resource/view.php?id=172130 | = |
| 5 | 1. Colorimetric Determination of Iron using UV Spectroscopy
 | - Lab manual |  |
| 6 | 1. Demonstration on HPLC and GC
 | - Lab manual- <https://www.youtube.com/watch?v=ZN7euA1fS4Y>https://www.youtube.com/watch?v=kz\_egMtdnL4https://www.youtube.com/watch?v=UycPljfrnWo | https://elearning.ju.edu.jo/moodle10/mod/assign/view.php?id=172140 |
| 7 | 1. HPLC and GC Charts
 | -Lab manual- |  |
| 8 | 1. Infra Red Spectroscopy (IR) and Nuclear Magnetic Resonance (NMR)
 | - Lab manual- https://www.khanacademy.org/science/organic-chemistry/spectroscopy-jay/proton-nmr/v/introduction-to-proton-nmr | https://elearning.ju.edu.jo/moodle10/mod/assign/view.php?id=172154 |
| 9 | 1. Interpretation of IR and NMR Spectra
 | - Lab manual- |  |
| 10 | 1. Final Exam
 | - Lab manual |  |

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**21. Teaching Methods and Assignments:**

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| Development of ILOs is promoted through the following teaching and learning methods:* Blended Learning
* Teaching methods include: Synchronous lecturing/meeting; Asynchronous lecturing/meeting
* Evaluation methods include: Homework, Quiz, Exam, pre-lab quiz…etc
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**22. Evaluation Methods and Course Requirements:**

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| **Evaluation Activity** | **Mark** | **Topic(s)** | **Period (Week)** | **Platform** |
|  Reports  |  10  |  1-9 | Week  1-9 |  Moodle |
|  Quizzes  |  10 | 1+26+7 |  Week 3+8 |  In Class |
|  Pre-lab quizzes  |  5 |  2-5 |  Week 3-5 |  Moodle  |
| Midterm exam  | 30 | 1-5 | Week 5 | In Class  |
|  Final exam  |  40 | 1-10  | Week 10 | In Class |
| Evaluation (Lab Work)  |  5 |  1-10 |  Weeks 1-10 |  In Class |

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**23. Course Policies:**

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| **A- Attendance policies:**Attendance: Mandatory.First warning – after first absencesLast warning – with 2 absencesFailing in the subject – with 3 absences**B- Absences from exams and submitting assignments on time:**Will result in zero achievement unless health report or other significant excuse is documented.**C- Health and safety procedures:****N/A****D- Honesty policy regarding cheating, plagiarism, misbehaviour:**The participation, the commitment of cheating will lead to applying all following penalties together1) Failing the subject he/she cheated at2) Failing the other subjects taken in the same course3) Not allowed to register for the next semester. The summer semester is not considered as a semester**E- Grading policy:**Mid Exam 30 points (practical and theoretical)In class Quizzes 10 points Online Quizzes 5 pointsReports 10 pointsEvaluation 5 points Final Exam 40 pointsTotal 100 points |

**24. Required equipment: (**Facilities, Tools, Labs, Training….)

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**25. References:**

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| 1. **Required book (s), assigned reading and audio-visuals:**

Lab Manual authored by staff member:Dr. Imad Hamdan, Dr. M. Zwairi, Dr. M. Khanfar, Ms. Ruba Al Tarawneh 1. **Recommended books, materials, and media:**

**Principles of instrumental analysis 5th edition by Skoog, Holier and Nieman** |

**26. Additional information:**

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| **Course Assessment:** * **Online Assessment (15)**
* **In-Class Assessment (85)**

**Grievance Policy**According to the general policies applied at the University of Jordan for grievance, when there is a complaint or conflict between a student and an academic/staff member or another student, the following procedures must be followed:1. The student writes a formal complaint describing the situation of conflict to the Dean of the School or the President of the University.
2. Dean or President will first try to resolve the controversy by meeting/listening to both parties.
3. If agreement was not possible, Dean or president forms an investigation committee which will follow, within a specified timeline, the general policies for relevant circumstances. The following points are considered:

a.       The committee will meet/talk to both parties and witnesses (if applicable) within two weeks of conflict.b.      All meetings and discussions are documented according to the university policies.c.       Results/ recommendations will be sent to the Dean or President who is responsible for their implementation |

Name of Course Coordinator: Isra’ Tayseer Ibrahim Signature: ------------------ Date: 25/10/2021

Head of curriculum committee/Department: ----------------------------- Signature: ---------------------------

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

Head of curriculum committee/Faculty: ----------------------------------------- Signature: --------------------

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