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| Form: Course Syllabus | Form Number | EXC-01-02-02A |
| | Issue Number and Date | 2963/2022/24/3/2 5/12/2022 |
| | Number and Date of Revision or Modification | 2/(10/12/2023) |
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| | The Date of the Deans Council Approval Decision | 26/12/2023 |
| | Number of Pages | 06 |

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| 1. | Course Title | Practical Analytical Chemistry |
| 2. | Course Number | 0303216 |
| 3. | Credit Hours (Theory, Practical) | 1 (theory) + 3 practical hrs/week |
| | Contact Hours (Theory, Practical) | 1 (theory) + 3 practical hrs/week |
| 4. | Prerequisites/ Corequisites | 0303101/0303211 |
| 5. | Program Title | B.Sc. Chemistry |
| 6. | Program Code | 0303 |
| 7. | School/ Center | The University of Jordan |
| 8. | Department | Science |
| 9. | Course Level | Chemistry |
| 10. | Year of Study and Semester (s) | Second Year |
| 11. | Other Department(s) Involved in Teaching the Course | None |
| 12. | Main Learning Language | English |
| 13. | Learning Types | <input checked="" type="checkbox"/> Face to face learning <input type="checkbox"/> Blended <input type="checkbox"/> Fully online |
| 14. | Online Platforms(s) | <input checked="" type="checkbox"/> Moodle <input checked="" type="checkbox"/> Microsoft Teams |
| 15. | Issuing Date | 3-8-2024 |
| 16. | Revision Date | 3-8-2024 |

17. Course Coordinator:

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| Name: Dr. Mohammed Rasheed, Prof. Office number: Chemistry 1 st floor Email: m.rasheed@ju.edu.jo | Contact hours: 8:00-10:00 Mon. Wed. Phone number: |
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**18. Other Instructors:**

Dr. Safwan Obeidat, Room no. 108, Office hours: Sun, Tue, Thu, 11:00-12:00, phone no.:0795886652, email:s_obeidat@ju.edu.jo

Dr. Sharif Arar, Room no. 202, Office hours: Sun, Tue, Thu, 10:00-11:00, phone no.:0796142835, email:s.arar@ju.edu.jo

Dr. Mohammed Amer, Room no. 109, Sun, Tue, Thu, 11-12 noon, +962 6 5355000 Ext:22176, m.amer@ju.edu.jo

19. Course Description:

Practical analytical chemistry laboratory is an undergraduate practical course that covers the following analytical methods of analysis: calibration and statistical analysis, titration methods, gravimetric analysis, and separation science based on paper chromatography and ion-exchange chromatography.

20. Program Intended Learning Outcomes: (To be used in designing the matrix linking the intended learning outcomes of the course with the intended learning outcomes of the program)

Upon successful completion of this course, students will be able to:

SO-1. Problem Solving: Graduates will be able to apply mathematical and scientific knowledge to identify, formulate, and solve technical or scientific problems relevant to the discipline of chemistry.

SO-2. Design: Graduates will be able to use their understanding of chemistry concepts and principles to formulate and design systems, processes, procedures, or programs to meet desired goals and outcomes.

SO-3. Experimental Skills: Graduates will be able to design, conduct, and analyze experiments or test hypotheses, utilizing appropriate chemical techniques and scientific judgment to draw meaningful conclusions.

SO-4. Communication: Graduates will be able to communicate scientific information effectively and accurately to a range of audiences, including both technical and non-technical audiences.

SO-5. Ethics and Global Context: Graduates will understand and apply ethical and professional responsibilities in the context of the impact of technical and scientific solutions on global, economic, environmental, and societal issues.

SO-6. Teamwork: Graduates will be able to work effectively as part of a team, establishing goals, planning tasks, meeting deadlines, and analysing risk and uncertainty in the context of chemistry-related projects and initiatives.

SO-7. Handling Chemicals: An ability to apply the proper procedures for safe handling of chemicals.

21. Course Intended Learning Outcomes: (Upon completion of the course, the student will be able to achieve the following intended learning outcomes)



CLO1- The knowledge of different types of laboratory glassware and balances

CLO2- The skills of prepare standard solution from primary standard material to conduct standardization of different solutions

CLO3- Apply the skills and critical thinking of using different titration methods and the gravimetric method of analysis

CLO4- Using chromatographic technique (ion-exchange and paper) in separation and identifications of unknown compounds.

CLO5- Able to write a scientific report, analyze and interpret experimental data through statistics.

| CLOs | The learning levels to be achieved | | | | | |
|------|------------------------------------|---------------|----------|-----------|------------|----------|
| | Remembering | Understanding | Applying | Analysing | evaluating | Creating |
| 1 | | ✓ | | | | |
| 2 | ✓ | ✓ | | | | |
| 3 | | | ✓ | ✓ | ✓ | |
| 4 | | | ✓ | | | ✓ |
| 5 | | ✓ | | | ✓ | |

2^o. The matrix linking the intended learning outcomes of the course with the intended learning outcomes of the program:

| Program ILOs Course CLOs | CLO (1) | CLO (2) | CLO (3) | CLO (4) | CLO (5) | CLO (6) | CLO (7) |
|-----------------------------|---------|---------|---------|---------|---------|---------|---------|
| 1 | | | | | | | |
| 2 | ✓ | | | | | | |
| 3 | | | ✓ | | | | |
| 4 | | | | ✓ | | ✓ | |
| 5 | | | | | ✓ | | ✓ |



2٣. Topic Outline and Schedule:

1.

| Topic | Week | ILOs | Program SOs | ABET SOs | TLA (teaching, learning and Assessment) |
|---|----------|-------|-------------|----------|---|
| Calibration of buret | One week | 1, 5 | a,b | | Quizzes, oral evaluation and exams |
| The importance of sampling and statistical handling of data | One week | 2,3,5 | c,e,b | | Quizzes, oral evaluation and exams |
| Titration: neutralization titrations, precipitation titrations, redox titrations and complexometric titration | 6 week | 2,3,5 | c,e,b | | Quizzes, oral evaluation and exams |
| Gravimetric determination of sulfate and nickel | 2 week | 2,3,5 | c,e,b | | Quizzes, oral evaluation and exams |
| Chromatography: ion exchange and paper chromatography | 2 week | 2,4 | c,k | | Quizzes, oral evaluation and exams |

2٤. Evaluation Methods:

Opportunities to demonstrate achievement of the ILOs are provided through the following assessment methods and requirements:

| Evaluation Activity | Mark | Topic(s) | ILO/s Linked to Evaluation activity | Period (Week) | Platform |
|--------------------------|------|----------------------|-------------------------------------|--------------------------------|----------|
| Report + product quality | 10 | All experiments | 1, 2, 3, 4, 5 | At home. | In lab |
| Quizzes | 10 | Chosen 5 experiments | 1, 2, 3, 4, 5 | different | In lab |
| MID EXAM | 20 | First 6 experiments | 1, 2, 3, 4, 5 | After 6 performing experiments | In lab |



| | | | | | |
|-----------------|----|-----------------|---------------|----------------------------------|--|
| Work evaluation | 10 | All experiments | 1, 4, 5 | After performing all experiments | |
| Final (written) | 40 | All experiments | 1, 2, 3, 4, 5 | At the end of semester | |

2°. Course Requirements:

Oven, fumehood, balances, laboratory glassware.

2٦. Course Policies:

A- Attendance policies:

Regular attendance is essential for satisfactory completion of this course. Students must attend at least 10 of 12 experiments

B- Absences from exams and handing in assignments on time:

Instructors must offer reasonable assistance in making up missed work (e.g., making arrangements for attendance at labs which meet at other times; providing makeup exams or labs where feasible) in case the student has reasonable excuse

C- Health and safety procedures:

While working in the laboratory, wear personal protective equipment - eye protection, gloves, laboratory coat - as directed by your supervisor.

D- Honesty policy regarding cheating, plagiarism, misbehavior:

the policy is that the student must submit his/her own work. the student may not share his/her work with other students, unless it is allowed as group.

E- Grading policy + Weighting (i.e. weight assigned to exams as well as other student work)

F- Available university services that support achievement in the course:

G- Statement on Students with disabilities

Students with Disabilities: Students with disabilities who need special accommodations for this class are encouraged to meet with the instructor and/or their academic advisor as soon as possible. In order to receive accommodations for academic work in this course, students must inform the course instructor and/or their academic advisor, preferably in a written format, about their needs no later than the 4th week of classes.

2٧. References:

A- Required book (s), assigned reading and audio-visuals:

Practical analytical chemistry by prof. M.A. Alawi, prof. M. K. Hourani and prof M. K. Fayyad (2013)

B- Recommended books, materials, and media:

Fundamentals of analytical chemistry by Skoog, West, Holler and Crouch, 9th edition (2004)



2^ Additional information:

Project acac minibook and the updated Lab manual

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| Name of the Instructor or the Course Coordinator: Dr. Mohammed Rasheed Prof. | Signature: | Date: |
| Name of the Head of Quality Assurance Committee/ Department | Signature: | Date: |
| Name of the Head of Department | Signature: | Date: |
| Name of the Head of Quality Assurance Committee/ School or Center | Signature: | Date: |
| Name of the Dean or the Director | Signature: | Date: |
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