The University of Jordan

Accreditation & Quality Assurance Center

Course Syllabus

Course Name:

1	Course title	INSTRUMENTAL ANALYSIS LABORATORY
2	Course number	0303316
3	Credit hours (theory, practical)	1
	Contact hours (theory, practical)	Theory, ½ hour; practical, 2½ hours
4	Prerequisites/corequisites	0303216+0303311
5	Program title	Bachelor in chemistry
6	Program code	03
7	Awarding institution	The university of Jordan
8	Faculty	Faculty of Science
9	Department	Chemistry
10	Level of course	Third year
11	Year of study and semester (s)	Second summer semester 2016/2017
12	Final Qualification	Bachelor
13	Other department (s) involved in teaching the course	N/A
14	Language of Instruction	English
15	Date of production/revision	

16. Course Coordinator:

Office numbers, office hours, phone numbers, and email addresses should be listed.
109, Sat. Sun. Mon. Tue. Wed. Thur., 10-11 noon, +962 6 5355000 Ext:22176, a.makahleh@ju.edu.jo.

17. Other instructors:

18. Course Description:

Instrumental analysis laboratory is an undergraduate course that covers different methods of analysis using the following instruments: UV-Vis spectroscopy, atomic absorption spectroscopy, flame emission spectroscopy, gas chromatography, high performance liquid chromatography, and refractometry.

19. Course aims and outcomes:

A- Aims:

The aim of this course is to provide the students with good experience on handling an advanced instruments in chemical analysis including UV-Visible spectrophotometer, refractometer, atomic absorption spectrometer (AAS), atomic emission spectrometer (AES), high performance liquid chromatograph (HPLC), and gas chromatograph (GC). The understanding and differentiation between different chromatographic mechanisms such as partitioning, ion exchange and adsorption chromatography are other objectives of this course. In addition to those, students will develop skills like being a team player through working in groups and technical writing skills through report writing with criteria that meets this stage.

B- Intended Learning Outcomes (ILOs): Upon successful completion of this course students will be able to …

B1. Laboratory safety and regulations.
B2. Understanding the theory of spectroscopy and differentiating between spectroscopy techniques.
B3. Handling spectrophotometric instrument and its application for the determination of ferrous ion concentration.
B4. The use of excel and least square method for plotting calibration curve and calculating the concentration of unknown.
B5. Understanding the overlapping of the absorbance peaks and overcome this problem by using chemical additives.
B6. Handling and understanding refractometer and use it for the determination of unknown substances.
B7. Understanding and handling of AAS instrument, differentiating between standard calibration curve and standard addition methods, and understanding how to overcome the interferences problems in AAS analysis.
B8. Understanding and handling FES instrument, and perform some applications.
B9. Understanding the theory of chromatography and differentiating between different chromatographic mechanisms and techniques.
B10. Handling the GC instrument and understand the difference between the GC separation under isothermal and temperature program conditions.
B11. Understand the use of internal standard method in GC analysis.
B12. Handling the HPLC instrument, understanding the separation mechanisms in HPLC and evaluate the efficiency of the column.
B13. Understanding and performing the adsorption chromatography technique.
B14. Understanding the ion exchange chromatography and differentiating between anion and cation exchange resins.

20. Topic Outline and Schedule:

Topic	Week	Instructor	Achieved ILOs	Evaluation Methods	Reference
Safety and general introduction to spectroscopy.	1st week	Ahmad Makahleh	B1 + B2	Quizzes, mid and final exams	Exp. 1-5
Spectrophotometric determination of ferrous ion concentration	1nd week	Ahmad Makahleh	B3+B4	Quizzes, mid and final exams	Exp. 1
Spectrophotometric determination of tin(IV) with catechol-Violet and cetyltrimethylammonium bromide	1rd week	Ahmad Makahleh	B5	Quizzes, mid and final exams	Exp. 2
Refractometry	2th week	Ahmad Makahleh	B6	Quizzes, mid and final exams	Exp. 3
Atomic absroption spectroscopy (AAS)	2th week	Ahmad Makahleh	B7	Quizzes, mid and final exams	Exp. 4
Flame emission spectroscopy (FES)	3th week	Ahmad Makahleh	B8	Quizzes, mid and final exams	Exp. 5
Introduction to chromatography	3th week	Ahmad Makahleh	B9	Quizzes, mid and final exams	Exp. 6-10
Separation of benzene, xylene and toluene using isothermal and temperature program.	4th week	Ahmad Makahleh	B10	Quizzes, mid and final exams	Exp. 6
Analysis of alcohol's mixture using GC/FID	4th week	Ahmad Makahleh	B11	Quizzes, mid and final exams	Exp. 7
Column efficiency / HPLC	4th week	Ahmad Makahleh	B12	Quizzes, mid and final exams	Exp. 8
Adsorption chromatography	5th week	Ahmad Makahleh	B13	Quizzes, mid and final exams	Exp. 9
Ion exchange chromatography	5th week	Ahmad Makahleh	B14	Quizzes, mid and final exams	Exp. 10

21. Teaching Methods and Assignments:

Development of ILOs is promoted through the following teaching and learning methods:
Chalk and talk, hand out, data show slides, demonstration and performing experiments.

22. Evaluation Methods and Course Requirements:

Opportunities to demonstrate achievement of the ILOs are provided through the following

assessment methods and requirements:
Lab reports, quizzes, midterm and final exams.

23. Course Policies:

A- Attendance policies: All students are expected to follow the rules at The University of Jordan. Unexcused absences exceeding 2 absences will result in "F" grade.

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

C- Health and safety procedures: Laboratory safety and regulations.

D- Honesty policy regarding cheating, plagiarism, misbehavior: University regulation.

E- Grading policy: University regulation.

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

24. Required equipment:

Some experiments were conducted in the traditional form, thus the need of some instruments such as ion chromatography is highly recommended.

25. References:

A- Required book (s), assigned reading and audio-visuals:
Mahmoud Alawi and Eihab Shamayleh, Instrumental methods of analysis (laboratory manual), 1994.

B- Recommended books, materials, and media:

Skoog Hooler and Niemen, Principles of instrumental analysis, 5th edition.

26. Additional information:

Name of Course Coordinator: Ahmad Makahleh--Signature: ---------- Date: -23/07/2017--------

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

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

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

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

Copy to:
Head of Department
Assistant Dean for Quality Assurance
Course File