



The Hashemite University  
Faculty of Science  
Course Outline

<b>Department:</b> Chemistry.	
<b>Year :</b> 2018/2019	<b>Semester :</b> <i>Summer Semester</i>

<b>Course Information</b>	
Course Title	<b>Instrumental Analysis 1</b>
Course Number	110103311.
Pre-requisite	110103211
Course Credits	3.
Designation	Compulsory.
Course Time	9.10 – 10.10
Instructor	<b><i>Dr. Ayman A. Issa.</i></b>
Office Location	Chem. 208.
Office Hours	10.20 – 11.00 Daily
E-mail	<a href="mailto:aymani@hu.edu.jo">aymani@hu.edu.jo</a>
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**Course Description (Catalog):**

This course covers basic principles of instrumentation such as: instrument components, calibration methods, and signal-to-noise ratio. It covers the theoretical principles, detailed instrument components, and analytical applications of the following spectral methods of analysis: atomic absorption, atomic emission, uv-visible molecular absorption, infrared absorption, as well as molecular luminescence.

<b>Text Book and References</b>	
Text Book	Skoog, Holler, and Nieman; Principles of Instrumental Analysis, Thomson Brooks, 2007, 6 <sup>th</sup> Edition. (5 <sup>th</sup> or 7 <sup>th</sup> Editions can also be used).
References	Any library book related to Instrumental Analysis or one of the discussed topics in this course; including Atomic Spectroscopy and UV-Vis spectroscopy.

<b>Grading Plan</b>		
<b>Assessment Type</b>	<b>Expected Date</b>	<b>Weight</b>
1 <sup>st</sup> Hour Exam	July 4, 2019	25%
2 <sup>nd</sup> Hour Exam	August 1, 2019	25%
Homeworks and Quizzes	Every Lecture	10%
Final Exam	August 4 - 9, 2018	40%

**Notes:**

- All **homeworks** ***MUST*** be submitted via ***e-mail*** within a maximum of ***FOUR DAYS*** after finishing the concerned chapter/topic, ***unless you have been told otherwise.***
- ***Absence from mid-term exam must be followed by an acceptable excuse; where a **Make-up exam** will be held. Otherwise, the grade of **ZERO** will be given.***



### Teaching and Learning Methods

**Lectures** using an LCD projector (data show).

**Discussion** lectures will be given after each chapter/topic.

**Quizzes** (oral and written) will be given during lectures and after each chapter.

**Homeworks** are required from each student and will be submitted and graded via *e-mail*, unless told otherwise. Subject in email should contain student's name, number, and homework number.

**All material and references will be available on Moodle Website** <http://mlms.hu.edu.jo>

Course Contents	
Topics	Text-Book Homework questions from 6 <sup>th</sup> Ed.
<i>Introduction</i>	
<b><u>Chapters 1 and 5:</u></b> Introduction to instrumental methods, calibration techniques, and signals and noise.	→ Solve: chapter 1: 1-11. → <i>Submit the following:</i> <b><u>HW 1:</u></b> Chapter 1: 9, 11 a,b,d (Excel) <b><u>HW 2:</u></b> Chapter 5: 8, 11
<b><u>Chapter 6:</u></b> Introduction to spectrometric methods, and electromagnetic radiation.	<b><u>HW 3</u></b> 4, 5, 14b, 15b, 19.
<i>Atomic Spectroscopy</i>	
<b><u>Chapter 7:</u></b> Components and types of optical instruments.	<b><u>HW 4</u></b> 10, 12, 18
<b><u>Chapters 8:</u></b> An Introduction to optical atomic emission and absorption spectroscopic techniques.	<b><u>HW 5</u></b> 9a, 11
<b><u>Chapters 9:</u></b> Atomic absorption spectroscopy based upon flame and electrothermal atomization.	<b><u>HW 6</u></b> 6, 12, 20, 21 A (Excel)
<i>Molecular Spectroscopy</i>	
<b><u>Chapter 13:</u></b> An introduction to molecular UV/Vis absorption spectroscopy.	<b><u>HW 7</u></b> 8, 9, 24 (Excel)
<b><u>Chapter 14:</u></b> Applications of molecular UV/Vis absorption spectroscopy.	<b><u>HW 8 (optional)</u></b> 7, 8, 10 (Excel)
<b><u>Chapter 15:</u></b> An introduction to molecular luminescence spectrometric techniques.	<b><u>HW 7 (optional)</u></b> 9, 12, 13

#### ❖ **Course Objectives:**

This course aims at studying basic principles of instrumentation such as: instrument components, calibration methods, and signal-to-noise ratio. It aims to understand the theoretical principles, detailed instrument components, and analytical applications of some atomic and molecular spectroscopic methods.



❖ **Specific Outcomes of Instruction (Course Learning Outcomes):**

After completing this course, the students will be able to:

	<b>Course Learning Outcomes (CLO)</b>	<b>(SO*)</b>
<b>CLO1</b>	Discuss general ideas about analytical methods and their figures of merits.	a
<b>CLO2</b>	Discuss general ideas about calibration techniques and their applications.	a
<b>CLO3</b>	Discuss ideas about signal and noise.	a
<b>CLO4</b>	Learn about the basic instrumental methods based on optical spectrometry.	a, b
<b>CLO5</b>	Learn about the different components of optical instruments.	a, b
<b>CLO6</b>	Discuss basic ideas about atomic absorption and emission spectrometric techniques	a, b, e
<b>CLO7</b>	Discuss basic ideas about molecular absorption spectrometric techniques	a, b, e
<b>CLO8</b>	Discuss the applications of atomic and molecular spectroscopy.	a, b, e
<b>CLO9</b>	Perform and discuss home-works, questions, and assignments on various topics during the semester.	a, b, d, f

\*(SO) = Student Outcomes Addressed by the Course.

❖ **Student Outcomes (SO) Addressed by the Program:**

#	Outcomes Description	Contribution
	Chemistry Student Outcomes	
(a)	An ability to identify, formulate, and solve broadly defined technical or scientific problems by applying knowledge of mathematics and science and/or technical topics to areas relevant to the discipline.	H
(b)	An ability to formulate or design a system, process, procedure or program to meet desired needs.	H
(c)	An ability to develop and conduct experiments or test hypotheses, analyze and interpret data and use scientific judgment to draw conclusions.	--
(d)	An ability to communicate effectively with a range of audiences.	L
(e)	An ability to understand ethical and professional responsibilities and the impact of technical and/or scientific solutions in global, economic, environmental, and societal contexts.	M
(f)	An ability to function effectively on teams that establish goals, plan tasks, meet deadlines, and analyze risk and uncertainty.	L
H = High, M = Medium, L = Low		

**General Notes: (Attendance Policy)** students are expected to attend every class and arrive on time in compliance with HU regulations. In case you find yourself in a situation that prevents you from attending class or exam, you have to inform your instructor. If you miss more than 5 classes, you cannot pass the course. Makeup excuses will be accepted only for very limited justified cases, such as illness and emergencies. Missing a quiz or an exam without an acceptable excuse will result in a grade of zero. Changing your section without informing your instructor is not accepted at all.

*Good Luck!*

*Dr. Ayman Issa*