



**Welcome dear fresh student to the department of creativity and excellence.**

### **The department of Chemistry**

**Congratulations from the heart for acceptance in the department and wish you success in every step in your new college. A hiss from your congratulators; They wish that you work hard, strive, feature and go beyond the ordinary. At the same time, they never forget to strongly advise you to abide to the Book of Allah and the Sunnah of His Messenger, peace be upon him, to be always a good role-model.**

**This guide aims first to congratulate you and help you to recognise all of your rights and duties towards your colleagues, teachers, and your department. All students must have a clear idea about the expected differences in joining university. The most important amongst these differences are: being self-reliance in the study by taking notes, which are given in the lecture and seeking more through books and references. In addition, this guide aims at accelerating your recognition to the department and orienting you to university life, rules and regulations and how to cope with them without discomfort.**

**So, whatever you need, don't hesitate. We are so glad to help you.**





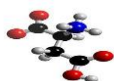
### **The coordinator's message:**

**Praise be to God, whose grace and blessings are the good deeds and peace be upon who was sent from God as the mercy and a guide to the wholes and those who followed him to the Day of Judgment.**

**Chemistry contributes in the development of science through the ages and we do not exaggerate if we consider it as the father of all applied sciences. It was known to the ancient Arab Muslims as *The Profession*, and Muslim scholars have contributed and continue to develop the building blocks and foundations of this great science starting from Jabir Bin Hayan to Ahmed Zewail. Evolution in the science of chemistry continued until it has become a part of and develop everything you see and touch. The department is also considered a great place of women's preparation and rehabilitation to do their role in nation-building. As one of the non-controversial facts, chemistry has become an integral part of our daily lives and is growing incursion in it, as our dependence on it is increasing every day.**

**And since the researchers were able to decode the science, it is progressing at a rapid pace and achieving unprecedented achievements as it enters synonymous or assistant for all disciplines, and for all fields of science in its personal (materialistic) capacity or through its products and all that is being used for the benefit of improving the quality of human life.**

**Despite what surrounds some chemical products and applications of misuse and cons such as toxins, polluting the environment and making chemical weapons, that are classified as weapons of mass destruction which are internationally banned and that is to work on the disposal of the world. However, these pitfalls form only minor scratches on the great face of Chemistry.**



The world has witnessed a major revolution in the field of chemistry proved by substantiated numbers and massive investments in both research and development . This has become the most important present-day features a positive partnership between the agents working in the field of academics and industrialists in order to formalize their will to work together to find solutions to face the global challenges of compromising the energy and climate change, water scarcity, nutrition and development, resource conservation and environmental solutions. They also signed cooperation agreements that make them complementary. The most important future trends focuses on the production of chemicals clean and environment-friendly, coupled with examining the impact of the material produced on both health and environment, depending on the point that chemistry works are sustained to decode the material that surrounds us and make up our structure symbols therefore become a symbol progress due to entering all areas of life and various types of industry. This is because it is a future key that represent a key driver in the economic development in all industries. Based on these trends, the orientation profession practitioners has been increased in order to improve healthy environment, safety during conducting their research and innovation in many areas; including toxins, nanomaterials, nuclear materials, biotechnology, united resources and motivation, energy sources, alternative energy, in addition to the attention to water and food safety for the population of the globe, which more than six billion people. According to these terms, scientists call to persuade public opinion that chemistry is a science of life and future. Meanwhile, it is a useful source of innovation and significant economic engine. The world realized that chemistry is a power that serves human and tends to provide more facilities in various life areas and fields. Therefore, its practitioners are the anonymous soldiers who stayed up to improve the quality of life by monitoring air, water and soil quality. They also work to prevent its contamination and seek to find solutions to its pollution.

Chemistry services have expanded to all areas of life and sciences, hence it provides services to museums and benefited historians and archaeologists. In addition to its services in forensic areas, judiciary, detection and control of crime and fraud.



Moreover, it has been known that it is a kind of impossible for any science can stand without the use of chemicals.

**A student in the department of Chemistry comes across many courses in organic, physical, analytical, inorganic and biological chemistry.**

### **Physical chemistry**

Is a science that studies the properties and construction of various materials and particles that make up them, depending on their chemical composition and construction and the conditions where they exist . It also studies chemical reactions and natural circumstances in which this happen. Physical Chemistry was launched in the mid-eighteenth century by the Russian scientist Mikhail Lomonosov who compose the first university book of physical chemistry. The most important branches of physical chemistry are: thermodynamics - kinetic Chemistry - electro-Chemistry - Surface Chemistry - and nuclear Chemistry.

### **Biochemistry:**

It is one of the branches of the natural sciences that studies the chemical composition of the parts of the cell in different organisms, whether micro-organisms (bacteria, algae, fungi) or upscale as humans, animals and plants. The term biochemistry was firstly emerged by the German chemist Carl Neuberg in 1903 and it studies the bio-composition of carbohydrates, proteins, nucleic acids, enzymes, lipids, hormones, vitamins, minerals, and biological fluids.

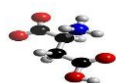
**Analytical Chemistry:** analyzes samples of the material to determine its chemical composition and how to build it.

**Organic Chemistry:** it is very important in many areas that directly or indirectly affect human life and happiness, particularly, in the clothes we wear and the fuel we use in factories and to move cars, planes and ships. It also contribute in the industry of paper, rubber, plastic, drugs, pesticides, fertilizer, and explosives.

**Inorganic Chemistry:** studies the compounds that do not have carbon in their composition and nothing of its combustion includes acids, bases, and metals.



- **Dept. objectives**
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- The Department of Chemistry aims at qualifying students in the field of chemistry, so that they can be able to do their national duty of serving the community in education, health, industry, and agriculture. In addition, it prepares students to pursue higher studies and scientific research in the fields of chemistry and its applications.
- Assessment system
- Theoretical courses with practical part.

Final Exam: 40 Marks

Course Work :60 Marks

Course work includes two exams, namely, midterm exam and final exam as well as other evaluation means such as research, presentation and a final practical test.

Students' skills that will be improved through joining the Department of Chemistry:

Scientific communication.

Collaborative work

Technical techniques and supporting the scientific side

Dealing with various types of technical devices

• Level One						
prerequisites				Credits	Course title	Course code and number
	trainin g	practical	theoretical			
university requirement			٢	٢	Introduction	Salm 101



					to Islamic education	
university requirement			٢	٢	Language skills	Arab 101
university requirement			٢	٢	elective university requirement	
educational course			٢	٢	Learning techniques and communication skills	Edu 112
educational course			٢	٢	Regulation of Islamic education	Edu 111
educational course			٢	٢	The system and the policy of the education system in Saudi Arabia	Edu 113
		٢	١	٢	Chemistry 1	Chem 111
		٢	١	٢	Calculus 1	Math 101
		٢	١	٢	physics 1	Phys 111
١٨ credits	Total					

• level Two						
prerequisites				Credits	Course title	Course code and number
	trainin g	practical	theoretical			
				٢	university requirement	



				٢	<b>Development psychology</b>	<b>Edu 121</b>
				٢	<b>Biostatistics</b>	<b>STAT101</b>
	-	٢	٣	٤	<b>Organic chemistry 1</b>	<b>Chem 121</b>
	-	-	٢	٢	<b>( Inorganic chemistry( basic elements)</b>	<b>Chem 122</b>
	-	٢	٢	٣	<b>Introduction to Differential Equations</b>	<b>Chem 123</b>
		٢	٢	٣	<b>Introduction to computer science</b>	<b>Chem 124</b>
<b>١٨</b>	<b>Total</b>					

<b>• level Three</b>						
<b>prerequisites</b>				<b>Credits</b>	<b>Course title</b>	<b>Course code and number</b>
	<b>trainin g</b>	<b>practical</b>	<b>theoretical</b>			
				٢	<b>university requirement</b>	
				٢	<b>Mental health</b>	<b><u>Edu 211</u></b>
				٢	<b>Principles of</b>	<b><u>Edu 212</u></b>



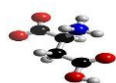
					<b>Educational Research</b>	
<b>Chem 121</b>		٢	٣	٤	<b>Organic chemistry 2</b>	<b><u>Chem 211</u></b>
		٢	١	٢	<b>Physical chemistry (phase rule )</b>	<b><u>Chem 212</u></b>
<b>Phys 111</b>		٢	٢	٣	<b>Physics 2</b>	<b><u>PHYS 123</u></b>
<b>Chem 111</b>		٢	٢	٣	<b>Chemistry 2</b>	<b><u>Chem 213</u></b>
١٨	<b>Total</b>					

• **level Four**

prerequisites				Credits	Course title	Course code and number
	trainin g	practical	theoretical			
			٢	٢	<b>university requirement</b>	
<b>educational course</b>			٢	٢	<b>Educational psychology</b>	<b>Edu 221</b>
<b>Chem 121· Chem 211</b>		٤	٢	٤	<b>Heterocyclic Compounds chemistry</b>	<b>Chem 221</b>
		-	٢	٢	<b>Quantum chemistry 1</b>	<b>Chem 222</b>
<b>Chem 121 ·Chem 211</b>		-	٢	٢	<b>Physical organic chemistry</b>	<b>Chem 223</b>
		٢	٢	٣	<b>Analytical chemistry (descriptive)</b>	<b>Chem 224</b>
		٢	٢	٣	<b>Electro-Reversible Chemistry 1</b>	<b>Chem 225</b>
١٨	<b>Total</b>					

• **level Five**

prerequisites				Credits	Course title	Course code and number
	training	practical	theoretical			

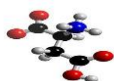




				٢	<b>Educational Administration and Planning</b>	<b>Edu 311</b>
				٢	<b>Production and e-learning resources</b>	<b>Edu 312</b>
<b>Chem 222</b>		-	٢	٢	<b>Quantum chemistry 2</b>	<b>Chem 311</b>
		٢	٢	٣	<b>Thermodynamic chemistry</b>	<b>Chem 312</b>
		٢	٢	٣	<b>physical chemistry (Surfaces, colloids and Catalysis)</b>	<b>Chem 316</b>
<b>Chem 121 •Chem 211</b>		٢	٢	٣	<b>Organic chemistry (polymers and petrol)</b>	<b>Chem 314</b>
<b>Chem 224</b>		٢	٢	٣	<b>Analytical chemistry (quantity)</b>	<b>Chem 315</b>
<b>١٨</b>	<b>Total</b>					

**• Level Six**

prerequisites				Credits	Course title	Course code and number
	training	practical	theoretical			
				٢	<b>Teaching strategies</b>	<b>Edu 321</b>
				٢	<b>Curricula</b>	<b>Edu 322</b>
			٢	٢	<b>Biochemistry 1</b>	<b>Chem 321</b>
<b>Chem 122</b>		-	٤	٤	<b>Inorganic chemistry</b>	<b>Chem 322</b>



					(Transition elements)	
Chem 225		٢	٣	٤	Electro-Reversible Chemistry 2	Chem 323
Chem 122		٢	٢	٣	Coordination chemistry	Chem 324
١٨						

• level Seven

prerequisites				Credits	Course title	Course code and number
	training	practical	theoretical			
				٢	Modern trends in teaching strategies	Edu 411
				٢	Educational assessment	Edu 412
		٢	٣	٤	Instrumental analysis chemistry	Chem 411
Chem 312		٢	٢	٣	Kinetic Chemistry	Chem 412
Chem 221		٢	٣	٤	Dyes chemistry	Chem 413
Chem 321		٢	٢	٣	Biochemistry 2	Chem 414
١٨	<b>Total</b>					

• Level Eight

prereq uisites				Credits	Course title	Course code and number
	training	practical	theoretical			



passing 121 credits	١٢			٦	practicum	Edu 421
Chem 221		٢	٢	٣	Organic chemistry (natural products)	Chem 421
Chem 121 'Chem 211		-	٢	٢	Chemistry of organic reactions mechanisms	Chem 422
Chem 411		٢	٣	٤	Organic chemistry (Organic Compounds Spectra(	Chem 423
		-	٣	٣	Nuclear and Radiation Chemistry	Chem 424
١٨	<b>Total</b>					

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- **General elective requirements : -**
- Contemporary societal issues
- Basics of health and fitness
- Entrepreneurship
- Systems and human rights
- - Family and Children
- Voluntary work
- - English language



## **Course objectives in the Chemistry department**

### **General Physical Chemistry (1)**

- 1. Providing the students with the basics of Physical Chemistry**
- 2. Studying different forms of material (gas- liquid - solid) and its rules.**
- 3. Introducing thermal chemistry and chemical and Ionian equilibrium**
- 4. Studying solutions**
- 5. Linking scientific theoretical courses with practice through training student to use the lab to conduct laboratory experiments.**

### **Organic chemistry 1**

**Introducing students to the types of links of organic compounds and methods of preparation, properties, and interactions of selected groups of organic chemistry and applications.**

### **Organic Chemistry (2)**

**Providing students with a general idea about aromatic chemistry where they understand their properties, interactions and methods of preparation. It also aims at studying specific models and some of their useful applications.**

### **Physical Organic Chemistry**

**Providing students with the basis of stereochemistry. It also aims at establishing the rules and mechanics of the various methods of organic reactions, and drawing the relationship between stereochemistry and the mechanism of interaction as well as training on some applications.**

### **Organic Chemistry ( Heterocyclic Compounds)**

**It aims at introducing students to the definition of heterocyclic compounds, their importance and methods of naming. In addition to their most important natural and chemical properties.**



### **Physical Chemistry phase rule**

1. States of materials and comparing among them
2. Study the basics of the phase rule
3. Study the single component system
4. Study the bilateral component system
5. Study multi-component system

### **Physical Chemistry electrical counterproductive**

1. Identification of electrolytic solutions
2. Methods of measuring conductivity
3. Electrochemical processes
4. Types of electrodes
5. Absolute and relative voltage of the poles
6. Electrochemical chains
7. Types of electrochemical cells

### **Analytical chemistry automated analysis**

Guiding students to the best way to take advantage of the instrumental analysis devices.  
Recognizing the theoretical foundations that operate  
Electrolysis devices (voltage- electrolytic-weighted-kilometric- voltammetry methods)  
Introduction to methods of spectroscopy and Chromatographic analysis.

### **Organic Chemistry (polymers an petrol)**

Introducing students to the outline of Chemistry and Polymer Technology and the basic principles of the polymerization process. It also aims at providing them with the technical conditions followed in the polymerization processes, as well as the physical, chemical and thermal properties of polymer.  
Providing students with a good idea about petroleum and petrochemical industries.



## **Spectra of organic compounds**

Students will recognize the principles of the spectrum and its uses in chemistry as well as have a training on practical means of measurements of different spectrum.

## **Natural products**

Student will study and define natural products. The emphasis will be on having knowledge of natural compounds resulting from secondary metabolic processes and methods used in their construction.

## **Biochemistry 1**

Getting student familiar with carbohydrates, protein and fat; in terms of their types, properties and vital importance.

## **Biochemistry 2**

Student will be able to identify enzymes, vitamins, minerals, hormones, and nucleic acids in terms of their types and biological importance.

Identifying some of the biological fluids (blood -urine -lactose) in terms of their composition and biological significance.

## **Timetables\* :**

Each department is responsible for everything regarding its courses; including: rooms, timetables, tests etc. So, in case of any inquiry respecting any course in your schedule, please, go directly to the department.

From the first day in the college you have to head directly to your department so that you will be able to know your academic advisor who will guide you in the process of registration and help you set your timetable matters.



**Your schedule contains a number of symbols and numbers which they are shortcuts.  
The codes are shown in the table below:**

<b>Department</b>	<b>Code</b>
<b>Chemistry</b>	<b>Chem</b>
<b>Physics</b>	<b>Phys</b>
<b>Calculus</b>	<b>Math</b>
<b>Language skills</b>	<b>Arab</b>
<b>Introduction to Islamic Education</b>	<b>Salm</b>

### **Academic advisor :**

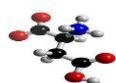
\*Each level is assigned to an "academic advisor" who is a faculty member and is responsible for following, mentoring, and observing students academically . Therefore, the student should go over the bulletin boards in the section to know her academic advisor who will accompany her through all the period of the study at the university.

\*\* The advisor is your academic mentor for the duration of your study at the department who is considered to be the reference that helps you to make your decisions.

So, don't hesitate of making use of your academic advisor to every academic problem that may stand in need.

### **Academic advisory committee duties:**

- 1- Following-up students who are at risk (academically) or expected to be so. And then set out action plans to help them get rid of their struggle.**
- 2- Following-up distinguished students and encouraging them to continue their excellence.**
- 3- Setting out a plan for **non-attendance** students ( whose absence goes beyond 15% in week 4 and 20 % in week 8)**



## **Announcements:**

The department has many ads that are related to the students according to the title of each board, where you can find timetable board, and boards of public ads where sessions held by the college members.

## **The aim of these bulletin boards are:**

Keeping students with the updates of the section and the dates of meetings with members and head of the department.

Determining the dates of the various activities, events, seminars, and workshops held by the department within the college.

## **Exams:**

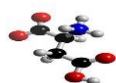
Before the final exams, a proposal is set to see how far these exams are relevant and suitable for the vast majority of students.

Make sure to refer back to "final exams table" as it is the only reference of your exams.

Kindly, be accurate and never rely on anybody as your source to the final exams in order to avoid any error in the transfer of the day, date or time of the exam.

## **Tips and guidelines for students:**

- Comply with the university systems.
- Attend lectures on time from the first day, in which most of the instructors discuss the course requirements and determine the required references as well as the dates of the midterm exams, etc.
- In case of being late or absent repeatedly, have a direct contact with the instructor to justify and provide an accepted (adopted) report before having deprivation on the portal.
- Be sure to organize time and hard work to get a high grade from the first semester.
- Cumulative average is a fundamental standard to trade-off in the nomination among students in different jobs and graduate studies.





□ You can benefit more from the experience of faculty members of the section through recognizing their office hours, which are compatible with your free time in your course schedule.

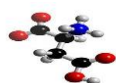
**Common mistakes:**

- Delay in attending lectures at the beginning of the semester.
- Delay in contacting the academic advisor to set out your course schedule.
- Attending in other sections of the course in which the student is unregistered.
- Addition or deletion of courses without considering prerequisites delays graduation.
- Not following the decision of deprivation with the instructor and attending the exam while the deprivation does not allow her to take the exam.



**Chemistry Department Labs**

<b>Location</b>	<b>Labs</b>
Ground floor at the main building	Lab 1 (Organic)
Ground floor at the main building	Lab 2 (biochemistry – inorganic)
Ground floor at the main building	Lab 3 (physical-analytical)





## Chemistry Department Guide – Al-Zulfi College of Education- Majmaah University