كلمة السيد الأستاذ الدكتور/ عميد الكلية

أبنائي وبناتي الأعزاء .....

السلام عليكم ورحمه الله وبركاته

يطيب لي في مستهل العام الدراسي الجديد أن أقدم لكم أجمل و أطيب التمنيات بدوام التوفيق والتقدم في بداية مرحلة جديدة من حياتكم العلمية وهى فترة التعليم الجامعي بكلية العلوم والتي تحتاج منكم الكثير من الكد والاجتهاد لتحقيق ما تصبون إلية من نجاح وتفوق راجياً منكم التحلي بالأخلاق الحميدة والسلوك القويم وإبداء روح التعاون بينكم لاستغلال أقصى طاقاتكم في النشاطات المثمرة الناجحة والتي تؤهلكم لتحقيق أحلامكم وطموحاتكم وهى مبلغ ما نرمي إلية بجهدنا المتواضع في سبيل التقدم والرقى لبلدنا الحبيب.

مع أطيب تمنياتي أن يوفقكم الله

مع دعواتي بتحقيق أمالكم لما فيه خير بلدنا العزيزة

ا.د. حميلى عبد الشافى حسن

كلمة السيد الأستاذ الدكتور/ المدير التنفيذى لوحدة ضمان الجودة

أعزائى الطلبة و الطالبات...

تسعى كلية العلوم جاهدة لتحقيق مبادئ جودة العملية التعليمية، من أجل رفع مستوى خريجى الكلية، الأمر الذى يساعد فى تحقيق التنمية المستدامة لوطننا الحبيب.

و عليه و إيماناُ منا بأنه لا يمكن أن تكون هناك جودة دون مشاركة فاعلة منكم أنتم، لذا كانت هذه المطوية و التى تهدف إلى تقديم بعض المفاهيم و التعريفات بما هية عملية الجودة و الغرض منها.

متمنياً من المولى عز و جل أن يوفقنا جميعاً لنيل و تحقيق مستوى طموحاتكم.

ا.د. خالد بن الوليد عبد الفتاح

تمهيد

أعزائى الطلاب...

يسرنا نقدم لكم فى هذه المطوية بعض المصطلحات الخاصة بجودة التعليم و ذلك إيماناً منا بضرورة إلمام الطالب و لو بالقدر المعرفى المبسط بمفردات جودة التعليم المتعلقة ببرامجه الأكاديمية التى يلتحق بها و المقررات الدراسية التابعة لها. راجيين المولى عز و جل أن يوفقنا فى تقديم خدمة تعليمية متميزة تنهض بمستوى خريج صرح كلية العلوم- جامعة جنوب الوادى، ذلك ليكون فرداً فعالاً فى المجتمع و ينجح فى بناء نفسه و وطنه.

حفظ الله مصر... و الله ولى التوفيق

خالص تحيات

فريق معيار ٧. المعايير الأكاديمية و البرامج التعليمية

المصطلحات

رؤية المؤسسة

رؤية المؤسسة هى وصف مختصر لما تطمح المؤسسة لتحقيقه في المستقبل، وتهدف إلى تحفيز مجتمع المؤسسة.

رسالة المؤسسة

رسالة المؤسسة عبارة عن فقرة قصيرة تعبر عن ماهية المؤسسة وعن سبب وجودها وتحدد نطاق وكيفية عملياتها وما تقدمه للمجتمع.

رؤية كلية العلوم

التميز في تعليم العلوم الأساسية والبحث العلمي للمساهمة فى التنميه المستدامة.

Faculty of Science Vision

Excellence in basic science education and scientific research to contribute to sustainable development.

رسالة كلية العلوم

تقديم تعليم مميز في مجالات العلوم الأساسية وإنتاج بحوث علمية تطبيقية للمساهمة في التنمية المستدامة من خلال إعداد خريجين متميزين طبقا للمعايير الأكاديمية القومية، وتطوير مهارات وقدرات الموارد البشرية، وتوفير خدمات مجتمعية وبيئية تلبي طموحات مجتمع جنوب الوادي، وبناء الشراكات المجتمعية الفاعلة.

Faculty of Science Mission

To provide distinguished education in the fields of basic sciences and the production of applied scientific research to contribute to sustainable development by preparing distinguished graduates according to the national academic standards, developing skills and capabilities of human resources, and providing community and environmental services that meet the aspirations of the South Valley community, and building effective community partnerships.

ضمان جودة التعليم

يقصد بضمان جودة التعليم تلك العملية الخاصة بالتحقق من أن المعايير الأكاديمية المتوافقة مع رسالة المؤسسة التعليمية قد تم تحديدها وتعريفها وتحقيقها على النحو الذي يتوافق مع المعايير المناظرة لها سواء على المستوى القومي أو العالمي، وأن مستوى جودة فرص التعلم والبحث العلمي والمشاركة المجتمعية وتنمية البيئة تعد ملائمة وتقابل أو تفوق توقعات المستفيدين من الخدمات التي تقدمها المؤسسة التعليمية.

الاعتماد

يقصد بالاعتماد تلك العملية المنهجية التي تستهدف تمكين المؤسسات التعليمية من الحصول على صفة متميزة، وهُوية معترف بها محليًّا ودوليًّا، والتي تعكس بوضوح نجاحها في تطبيق استراتيجيات وسياسات وإجراءات فعالة لتحسين الجودة في عملياتها وأنشطتها ومخرجاتها، بما يقابل أو يفوق توقعات المستفيدين، ويحقق مستويات عالية من رضائهم.

وفى ضوء ذلك فإنه يمكن تعريف الاعتماد للمؤسسات التعليمية في مصر على النحو التالي:

إقرار الهيئة استيفاء المؤسسة التعليمية أو البرنامج التعليمي مستوى معينًا من معايير الجودة استنادًا إلى معايير الاعتماد بالهيئة ووفقًا لأحكام قانون الهيئة.

التخطيط الاستراتيجي

عملية تنطوي على التنبؤ بالمستقبل لفترة زمنية محددة (٥ سنوات فأكثر)، وتحديد رؤية ورسالة المؤسسة وغاياتها وأهدافها الاستراتيجية التي يجب أن تسعى لتحقيقها في هذه الفترة، وكذلك الوسائل اللازمة لتحقيق ذلك.

الخطة الاستراتيجية

تمثل مخرجات عملية التخطيط الاستراتيجي، ويجب أن تكون مكتوبة ومعتمدة وتحدد رؤية ورسالة المؤسسة، وغاياتها وأهدافها الاستراتيجية، والوسائل المتاحة والمستقبلية لتحقيق ذلك.

المعايير القومية الأكاديمية المرجعية (NARS)

هى الحد الأدنى من المعارف والمهارات المطلوب تحقيقها من خلال البرنامج التعليمي من أجل اعتماده من الهيئة القومية لضمان جودة التعليم والاعتماد، ويتم الرجوع إليها في صياغة أهداف ونواتج التعلم المستهدفة عند توصيف البرنامج التعليمي.

المعايير الأكاديمية المرجعية (ARS)

المعايير التي تحددها المؤسسة التعليمية للبرامج التعليمية المختلفة بها بشرط أن يكون مستوى المعارف والمهارات بها أعلى من الحد الأدنى للمعايير القومية الأكاديمية المرجعية.

مواصفات الخريج

مجموعة من المواصفات التي تحددها المؤسسة التعليمية من خلال تبني المعايير الأكاديمية ويحققها البرنامج التعليمي في الخريج وفق ما يقدمه للطلاب من معارف ومهارات وذلك في ضوء الاحتياجات المهنية ومتطلبات وتوقعات المجتمع وسوق العمل.

مخرجات التعلم المستهدفة (ILOs)

النتائج التي تسعى المؤسسة إلى تحقيقها في الطلاب من خلال برامجها المختلفة والمرتبطة بالمعايير الأكاديمية، وتعكس رسالتها، وتكون قابلة للقياس، وترتبط بشكل واضح بالمحتوى العلمي والطرق المختلفة للتدريس وتقويم الطلاب، وتؤدي إلى تحقيق مواصفات الخريج. وتصنف إلى المعرفة والفهم، والمهارات الذهنية، والمهارات المهنية والعملية، والمهارات العامة والمنقولة.

البرنامج التعليمي

المناهج والمقررات الدراسية والأنشطة التي تكسب الدارس المعرفة والمهارات والقيم اللازمة لتحقيق هدف تعليمي أو تخصص دراسي محدد والذي يتم بنهايته منح الدارس درجة علمية أو شهادة اجتياز عند استيفاء مكوناته ومتطلباته.

تقويم الطلاب

مجموعة من الطرق من بينها الامتحانات، التي تقرها المؤسسة لقياس مدى إنجاز وتحقيق نتائج التعلم المستهدفة من قدرات الطلاب المعرفية والذهنية والمهنية من خلال برنامج تعليمي أو مقرر دراسي معين.

توصيف المقرر

هو الوصف الدقيق للبنود الاتية:

- موضوعات المقرر.
- ساعات التدريس النظرية والعملية الخاصة بكل منها.
- المخرجات المستهدفة من دراسة هذا المقرر: المعارف والمهارات التي يكتسبها الطالب حين يتم دراسة المنهج.
- طرق التدريس المستخدمة.
- الوسائل والاماكن اللازمة للتدريس.
- المراجع العلمية والمواقع الالكترونية التي يرجع اليها الطالب لتحصيل المعلومة .
- طرق التقييم المستخدمة وتوزيع الدرجات عليها.
- عمل مصفوفة المقرر (Matrix).

تقرير المقرر

هو الوصف الدقيق للبنود الاتية:

- نتيجة الطالب.
- عدد ساعات التدريس النظرية والعملية التي تم تدريسها فعليا.
- أسباب عدم التدريس في حالة نقص الساعات عن المحدد ● .أعضاء هيئة التدريس الذين قاموا بالتدريس .
- طرق التقييم التي تم استخدامها.
- إسم وتقرير الممتحن الخارجي(ان وجد).
- رأي الممتحن الخارجي في الطالب والورقة الامتحانية.

مفتاح الاختصارات

المعايير القومية الأكاديمية المرجعية National Academic References Standards (NARS)
المعايير الأكاديمية المرجعية Academic References Standards (ARS)
مخرجات التعلم المستهدفة Intended Learning outcomes (ILOs)

المراجع:

- دليل الهيئة القومية لضمان جودة التعليم و الاعتماد (٢٠١٥).

هيكل البرامج التعليمية بالكلية (14 برنامج)	ثنائية (5 برامج)	كيمياء و علم الحيوان
		كيمياء و حشرات
		كيمياء و نيات
		كيمياء و ميكروبيولوجى
		جيولوجيا و كيمياء
	أحادية (9 برامج)	علم الحيوان
		الحشرات
		نبات
		فيزياء
		كيمياء
		رياضيات
		حاسب آلى
		جيولوجيا
		جيوفيزياء

المعايير الأكاديمية المتبناة للبرامج		
	NARS-PROGRAMS	PHYSICS
		CHEMISTRY
		GEOLOGY
		MATHIMATICS
		CHEMISTRY/BOTANY
		CHEMISTRY/ZOOLOGY
		CHEMISTRY/ENTOMOLOGY
		GEOLOGY/CHEMISTRY
	ARS-PROGRAMS	GEOPHYSICS
		BOTANY
		ZOOLOGY
		ENTOMOLOGY
		COMPUTER SCIENCES
		CHEMISTRY/MICROBIOLOGY

LIST OF ARS- Programs

المعايير الاكاديمية المرجعية لبرنامج جيوفيزياء

Academic Reference Standards (ARS) for **Geophysics Program**

١,١. The attributes of a Geophysicist:

In addition to the general attributes of Basic Sciences graduates, the geophysicist must be able to:

١,١,١. Recognize the role of Basic Sciences in the development of society.

١,١,٢. Utilize scientific facts and theories to analyze and interpret practical data.

١,١,٣. Participate effectively in a multidisciplinary teamwork and be flexible for adaptation, decision making and working under contradictory conditions as well as exhibiting the sense of beauty and neatness.

١,١,٤. Adopt self and long life-learning and participate effectively in research activities.

١,١,٥. Design and undertake geophysical experiments (field geophysical instruments, using maps, aerial photographs, satellite images) and assess their results.

١,١,٦. Estimate, consult and assess the visibility of the applied geological environment and economical projects.

١,٢ Knowledge and Understanding:

In addition to the general knowledge acquired by basic science graduates, the geophysics graduates must be able to know and understand the:

١,٢,١. Theoretical bases, procedures and techniques used for geophysical field studies and related laboratory analysis.

١,٢,٢. The processes and mechanisms supporting the structure and function of the specific topics.

١,٢,٣. The relation between the studied topics and the environment.

١,٢,٤. The theories and methods applied for interpreting and analyzing data related to discipline.

١,٢,٥. Physical features and history of the earth.

١,٢,٦. Tectonic events, stratigraphical and structural phenomena.

١,٢,٧. Rock types forming the earth crust.

١,٢,٨. Types and distribution of economical raw materials (rocks, minerals, oil and gas).

١,٣. Professional and Practical skills:

The Geophysics graduates must be able to:

١,٣,١. Plan, design, process and report on the investigated data, using appropriate techniques and considering scientific guidance.

١,٣,٢. Use laboratory and field equipments safely for collecting and analyzing geophysical data.
١,٣,٣. Apply scientific ethics for geophysical data acquisition and analysis and accuracy during reporting.
١,٣,٤. Identify and criticize the different methods used in addressing subject related issues.
١,٤ Intellectual skills:
In addition to the general skills acquired by the basic science graduates, the Geophysics graduates must be able to:
١,٤,١. Recognize and use the subject-related theories, concepts and principles for discussion and interpretation of geological phenomena.
١,٤,٢. Analyze, synthesize, assess and interpret qualitatively and quantitatively geophysics and geology relevant data.
١,٤,٣. Postulate and deduce mechanisms and procedures to handle scientific problems.
١,٤,٤. Hypothesize a range of ideas to solve different geological problems.
١,٥. General and Transferable Skills:
The Geophysics graduates must be able to:
١,٥,١. Use information and communication technology effectively.
١,٥,٢. Identify roles and responsibilities, and their performing manner.
١,٥,٣. Work in groups effectively; manage time, collaborate and communicate with others positively.
١,٥,٤. Consider community linked problems, ethics and traditions.
١,٥,٥. Acquire self- and long life–learning.
١,٥,٦. Apply scientific models, systems, and tools effectively.

المعايير الاكاديمية المرجعية لبرنامج الحشرات

٣. Academic Reference Standards for Graduates of **Entomology**
٣,١. National General Attributes of the Graduates of Basic Sciences
The graduates must be able to:
٣,١,١. Recognize the role of Basic Sciences in the development of society.
٣,١,٢. Develop scientific approaches that meet community needs considering economic, environmental, social, ethical, and safety requirements.
٣,١,٣. Utilize scientific facts and theories to analyze and interpret practical data.
٣,١,٤. Collect, analyze, and present data using appropriate formats and techniques.
٣,١,٥. Postulate concepts and choose appropriate solutions to solve problems on scientific basis.
٣,١,٦. Apply effectively information technology relevant to the field.

٣,١,٧. Participate effectively in a multidisciplinary teamwork and be flexible for adaptation, decision making and working under contradictory conditions as well as exhibiting the sense of beauty and neatness.
٣,١,٨. Adopt self and long life-learning and participate effectively in research activities.
٣,١,٩. Deal with scientific data in Arabic, English or other languages. ٣,١,١٠ Understand the life's basic processes in relation to organisms and ecosystems.
٣,١,١١. Recognize, understand and assess different levels of organization in biological systems.
٣,١,١٢. Identify and characterize different communities and ecosystems supporting the biological organism.
٣,١,١٣. Be acquainted with the modern subjects and bio-techniques.
٣,١,١٤. Recognize the information in various fields of basic sciences and their role in the development of society in the economic, social and health aspects, considering the requirements of security and safety.
٣,١,١٥. Apply scientific facts and theories related to entomology in explaining some environmental problems.
٣,١,١٦. Effective application of information technology in entomology study
٣,١,١٧. Collect and analyze laboratory data using appropriate formats and techniques related to search on insect species.
٣,١,١٨. Choose appropriate solutions to solve problems related to insects on scientific grounds.
٣,١,١٩. Active participating in research and professional activities, making appropriate decisions, and adapting to work in contradictory circumstances.
٣,١,٢٠. Utilize scientific data in Arabic and English in various fields of entomology. ٣,١,٢١. Recognize biological and physiological processes related to living organisms and ecosystems.
٣,١,٢٢. Recognize the different orders of insects, their environments, and the relationships between them and their different environments.
٣,١,٢٣. Be acquainted with the modern subjects and bio-techniques in the field of biological studies and entomology.
٣,٢. Knowledge and Understanding
Graduates must acquire knowledge and understanding of:
٣,٢,١. The related basic scientific facts, concepts, principles and techniques.
٣,٢,٢. The relevant theories and their applications.
٣,٢,٣. The processes and mechanisms supporting the structure and function of the specific topics.
٣,٣,٤ The related terminology, nomenclature and classification systems.
٣,٢,٥. The theories and methods applied for interpreting and analyzing data related to discipline.
٣,٢,٦. The developmental progress of the program-related knowledge.

٣,٢,٧. The relation between the studied topics and the environment.
٣,٢,٨. Life of representative Taxa in different disciplines from cellular to organism.
٣,٢,٩. Physiological aspects of organisms.
٣,٢,١٠. Taxa limit and the characteristic habitat features of representative organisms.
٣,٢,١١. Theories applied for interpreting and analyzing biological information.
٣,٢,١٢. Complexity and diversity of organisms through the study of genetics and developmental stages.
٣,٢,١٣. Theories related to entomology and their applications.
٣,٢,١٤. The processes and mechanisms that support the structure and function of the different animal classes, especially class insect, its internal structures from cellular to Organism.
٣,٢,١٥. Facts and concepts related to the life processes, behavior, and life cycles of insects.
٣,٢,١٦. Recent topics and techniques related to entomology.
٣,٢,١٧. The relationship between different insect classes and their environments, as well as the relationship between insects, humans, animals, and plants and
٣,٢,١٨. Distinguishing characteristics of the different insect orders and the characteristics and classification systems of the animal kingdom, including the insect class.
٣,٢,١٩. Non-biological subjects that support entomology, such as basic science courses and computers
٣,٢,٢٠. The complexity and diversity of living organisms through the study of genetics and embryology
٣,٢,٢١. Explains the applied methods for interpreting and analyzing information Biological.
٣,٣. Intellectual Skills
The graduates must be able to:
٣.٣,١. Differentiate between subject-related theories and assess their concepts and principles.
٣,٣,٢. Analyze, synthesize, assess, and interpret qualitatively and quantitatively science relevant data.
٣,٣,٣. Develop lines of argument and appropriate judgments in accordance with scientific theories and concepts.
٣,٣,٤. Postulate and deduce mechanisms and procedures to handle scientific problems.
٣,٣,٥. Construct several related and integrated information to confirm, make evidence and test hypotheses.

٣,٣,٦. Interpret biological data and respond to a variety of information sources.
٣,٣,٧. Formulate data and select the proper mechanism for their setting within a theoretical framework.
٣,٣,٨. Assess the interrelationships and the impact of a specific organism on its ecosystem.
٣,٣,٩. Postulate mechanisms and procedures for dealing with or solving problems that insects cause to humans, animals, and plants.
٣,٣,١٠ Interpret the biological and physiological processes of living organisms including the different insect species.
٣,٣,١١. Evaluating the interrelationships between insects and other organisms and their effect on their ecosystem

٣,٤. Practical and Professional Skills

The graduates must be able to:

٣,٤,١. Plan, design, process, and report on the investigated data, using appropriate techniques and considering scientific guidance.
٣,٤,٢. Apply techniques and tools considering scientific ethics.
٣,٤,٣. Solve problems using a range of formats and approaches.
٣,٤,٤. Identify and criticize the different methods used in addressing subject related issues.
٣,٤,٥. Solve Biological problems by a variety of methods including computers and other recent tools.
٣,٤,٦. Collect, record and analyze biological data using appropriate techniques in the field and laboratory.
٣,٤,٧. Apply field and laboratory investigations of living systems in an ethical and responsible manner.
٣,٤,٨. Select a representative sample considering its validity, accuracy, and reliability during collection.
٣,٤,٩. Uses appropriate equipment, tools, and techniques to conduct scientific research related to entomology.
٣,٤,١٠. Apply techniques and tools considering scientific ethics.
٣,٤,١١. Solve the problems caused by some species of insects using a combination of a set of appropriate scientific methods.
٣,٤,١٢. Solve Biological problems by a variety of methods including computers and other recent tools.
٣,٤,١٣. Collect, record, and analyze biological and entomological data using appropriate techniques in the field and laboratory.
٣,٤,١٤. Apply field and laboratory investigations of living insects in an ethical and responsible manner.
٣,٤,١٥. Apply different methods for collecting samples of species Various insects and insect's preservation, infusion, and loading.

٣,٤,١٦. Uses slicing tools and methods to identify parts the different insects according to scientific ethics.

٣,٥. General and Transferable Skills

The graduates must be able to:

٣,٥,١. Use information and communication technology effectively.

٣,٥,٢. Identify roles and responsibilities, and their performing manner.

٣,٥,٣. Think independently, set tasks, and solve problems on scientific basis.

٣,٥,٤. Work in groups effectively; manage time, collaborate, and communicate with others positively.

٣,٥,٥. Consider community linked problems, ethics, and traditions.

٣,٥,٦. Acquire self- and long life–learning.

٣,٥,٧. Apply scientific models, systems, and tools effectively.

٣,٥,٨. Deal with scientific patents considering property right.

٣,٥,٩. Exhibit the sense of beauty and neatness.

٣,٥,١٠. Keep to order at work.

المعايير الاكاديمية المرجعية لبرنامج علم الحيوان

Academic Reference Standards (ARS) For Zoology Program

The graduate of the zoology program should be able to:

١,١. Recognize the role of Basic Sciences in the development of society.

١,٢. Develop scientific approaches that meet community needs considering economic, environmental, social, ethical, and safety requirements.

١,٣. Utilize scientific facts and theories to analyze and interpret practical data.

١,٤. Collect, analyze, and present data using appropriate formats and techniques.

١,٥. Postulate concepts and choose appropriate solutions to solve problems on scientific basis.

١,٦. Apply effectively information technology relevant to the field.

١,٧. Participate effectively in a multidisciplinary teamwork and be flexible for adaptation, decision making and working under contradictory conditions as well as exhibiting the sense of beauty and neatness.

١,٨. Adopt self and long life-learning and participate effectively in research activities.

١,٩. Deal with scientific data in Arabic, English, or other languages.

١,١٠. Demonstrate wide integrated knowledge related to different branches of zoology.

١,١١. Develop knowledge and experience of working with contemporary laboratory techniques relevant to different disciplines in zoology.

١,١٢. Plan and conduct experimental work using appropriate instruments, review safety regulations and quality control processes, assess and manage risks, report on practice, and critically evaluate the outcomes.

١,١٣. Apply concepts and theories to interpret life's basic processes from cell to organism to ecosystems.

١.١٤. Utilize facts and biological information to analyze and interpret practical data related to zoology majors.

١,١٥. Employ theories and concepts in mathematics and statistics to interpret the underlying mechanisms of the essential processes in zoology.
١,١٦. Abide by the legislations and ethics related to the environment preservation and human health and welfare.
١,١٧. Recognize the classification of the animal kingdom, the morphological and anatomical characteristics, and life cycles of the invertebrate and the phylum of vertebrates.
١,١٨. Explain the structure and function of cells, tissues, and body systems of single and multicellular animal organisms and link them to heredity.
١,١٩. Explain the life's basic processes of biological and physiological mechanisms and vital relationships and interactions in relation to animal organisms and its ecosystems.

٢,١. Knowledge and Understanding

Graduates must acquire knowledge and understanding of:

٢,١,١ The related basic scientific facts, concepts, principles and techniques.
٢,١,٢ The relevant theories and their applications.
٢,١,٣ The processes and mechanisms supporting the structure and function of the specific topics.
٢,١,٤. The theories and methods applied for interpreting and analyzing data related to discipline.
٢,١,٥. The developmental progress of the program-related knowledge.
٢,١,٦. The relation between the studied topics and the environment.
٢,١,٧. Demonstrate wide knowledge and comprehension of the theories, facts, concepts, fundamentals, and techniques related to the fields of zoology.
٢,١,٨. Acquire the essential knowledge in mathematics, physics, biology, and other collateral subjects in order to understand the recent advances in zoology.
٢,١,٩. Demonstrate familiarity and comprehension of terminology, nomenclature and contemporary tools used for the classification systems of animals.
٢,١,١٠. Acquire knowledge an understanding of the structure and function of various types of animal cells and cell organelles in unicellular and multicellular organisms.
٢,١,١١. Demonstrate knowledge of the structure and functions of animal cell organelles and bases of cell differentiation.
٢,١,١٢. Demonstrate a profound understanding of how the chemistry of biological molecules determines their biological functions with a special consideration to the major metabolic pathways and their interactions in living organisms.
٢,١,١٣. Demonstrate familiarity with the major metabolic pathways and their interactions in living organisms.
٢,١,١٤. Appreciate the concepts of biodiversity and maintaining of natural resources.
٢,١,١٥. The related terminology, nomenclature, and classification systems.

٣,١. Intellectual Skills

The graduates must be able to:

٣,١,١. Test, evaluate and criticize an existing piece of information in the light of the evidence provided by recent advances in zoology.
٣,١,٢. Analyze, evaluate, and interpret qualitative and quantitative scientific data relevant to various subjects of zoology.
٣,١,٣. Construct several lines of related information to confirm, make evidence and test.
hypotheses related to recent progress in research such as stem cell and applications of

Nanotechnology in biology.
٣,١,٤. Breakdown, synthesizes, reconstruct, and reformulate a bulk of information such as pathways for biosynthesis of biologically active compounds or macromolecules.
٣,١,٥. Analyze and interpret quantitative data in graphs, figures, tables and other sources of information.
٣,١,٦. Postulate, deduce mechanisms and procedures to deal with scientific problems relevant to advanced approaches in zoology.
٣,١,٧. Link and integrate subject-specific theories, concepts, and principles such as the relationship between genes and their products, interactions and modulation of the actions of different types of physiological regulators in animals.
٣,١,٨. Combine knowledge gained from different sources to postulate the role of various cell signaling mechanisms in regulating cellular functions and growth.
٣,١,٩. Differentiate between subject-related theories and assess their concepts and principles.
٣,١,١٠. Analyze, synthesize, assess, and interpret qualitatively and quantitatively science relevant.
٣,١,١١. Develop lines of argument and appropriate judgments in accordance with scientific theories and concepts.
٣,١,١٢. Postulate and deduce mechanisms and procedures to handle scientific problems.
٣,١,١٣. Construct several related and integrated information to confirm, make evidence and test hypotheses.

٤,١. Practical and Professional Skills

The graduates must be able to:

٤,١,١. Plan, and conduct investigations using appropriate procedures and techniques. Write structural reports on the data in accordance with the standard scientific guidelines.
٤,١,٢. Use contemporary laboratory equipment, instruments, and tools efficiently in a safe, ethical, and responsible manner to investigate living organisms and biological systems.
٤,١,٣. Solve problems using a range of formats and approaches.
٤,١,٤. Handle chemical materials and biological samples safely taking into consideration their physical and chemical properties to avoid hazards associated with their use.
٤,١,٥. Employ appropriate statistical and computational tools to analyze and interpret experimental data in terms of theories relevant to zoology.
٤,١,٦. Search and evaluate the validity, credibility, and relevance of literature in a critical thinking approach.
٤,١,٧. Consider variations inherent in dealing with biological materials such as sample size, accuracy, precision, and calibration.
٤,١,٨. Employ contemporary information retrieval, modeling approaches, taxonomic keys, bioassays, and tools of molecular biology.
٤,١,٩. Collect and preserve animal samples and prepare sections for microscopic examination and identification of different types of cells and tissues.
٤,١,١٠. Apply techniques and tools considering scientific ethics.
٤,١,١١. Identify and criticize the different methods used in addressing subject related issues.

٥,١. General and Transferable Skills

The graduates must be able to:

٥,١,١. Use information and communication technology effectively.
٥,١,٢. Identify roles and responsibilities, and their performing manner.
٥,١,٣. Think independently, set tasks, and solve problems on scientific basis.
٥,١,٤. Work in groups effectively; manage time, collaborate, and communicate with others positively.
٥,١,٥. Consider community linked problems, ethics, and traditions.
٥,١,٦. Acquire self- and long life–learning.
٥,١,٧. Apply scientific models, systems, and tools effectively.
٥,١,٨. Deal with scientific patents considering property right.
٥,١,٩. Exhibit the sense of beauty and neatness.

المعايير الاكاديمية المرجعية لبرنامج كيمياء و ميكروبيولوجى

Academic Reference Standards (ARS) of Chemistry and Microbiology Program

١. Academic Reference Standards

١,١. Attributes of microbiologist:

The graduates must be able to:

١,١,١. Recognize the role of basic sciences in the development of society.
١,١,٢. Develop scientific approaches that meet community needs considering economic, environmental, social, ethical, and safety requirements.
١,١,٣. Utilize scientific facts and theories to analyze and interpret practical data.
١,١,٤. Collect, analyze and present data using appropriate formats and techniques.
١,١,٥. Postulate concepts and choose appropriate solutions to solve problems on scientific basic.
١,١,٦. Apply effectively information technology relevant to the field.
١,١.٧. Participate effectively in a multidisciplinary teamwork and be flexible for adaptation, decision making and working under contradictory conditions as well as exhibiting the sense of beauty and neatness.
١,١,٨. Adopt self and long life-learning and participate effectively in research activities.
١,١,٩. Deal with scientific data in Arabic, English or other languages.
١,١,١٠. Understand the life's basic processes in relation to organisms and ecosystems.
١,١,١١. Recognize, understand and assess different levels of organization in biological systems.
١,١. ١٢. Distinguish the different ecosystems that regulate the communities of living organisms.
١,١,١٣. Be acquainted with the modern subjects and bio-techniques in related to different branches of chemistry and biology.
١,١,١٤. Acquires extensive knowledge during training programs to raise the skills of graduates in the fields of chemistry and microbiology.
١,١,١٥. Develops students' skills to match the job market in the fields related to chemistry and microbiology.

١,١,١٦. Establishes effectively mechanisms for quality control processes, risks management and time organization to finish jobs in different branches of chemistry and microbiology.

١,٢. Knowledge and Understanding

Graduates of chemistry and microbiology must acquire knowledge and understanding of:

١,٢,١. Recognize the related basic scientific facts, concepts, principles and techniques in different branches of chemistry and microbiology.

١,٢,٢. Clarify the relevant theories of chemistry and microbiology, and their applications.

١,٢,٣. Describe the processes and mechanisms supporting the structure and function of the different microorganisms' organelles.

١,٢,٤. Recognize the related terminology, nomenclature and classification systems of organisms.

١,٢,٥. Apply the theories and methods applied for interpreting and analyzing data related to chemistry and microbiology sciences.

١,٢,٦. Clarify the developmental progress of organisms through studying morphological, genetic properties and environmental factors.

١,٢,٧. Explain the relation between the physiological and metabolic processes, and microorganisms' environment.

١,٢,٨. Describe life of representative Taxa in different disciplines from cellular to organism with explanation their functions.

١,٢.٩. Recognize physiological aspects of organisms.

١,٢,١٠. Explain taxa limit and the characteristic habitat features of representative organisms.

١,٢,١١. Clarify processes and mechanisms in different ecosystems.

١,٢,١٢. Recognize theories applied for interpreting and analyzing biological information.

١,٢,١٣. Clarify complexity and diversity of organisms through the study of genetics, developmental stages and evolution.

١,٢,١٤. Clarify the types of chemical reactions and their mechanisms, as well as their kinetics, including catalysts.

١,٢,١٥. Recognize the principles, steps, and techniques used in the chemical analysis, diagnosis and determination of the synthetic formulas of different chemical compounds.

١,٢,١٦. Recognize naming compounds, their composition, and the units of measurement used .The mechanics of chemical reactions.

١,٢,١٧. Explain the distinctive properties of the elements and their components, which include stereochemistry and their position in the periodic table.

١,٢,١٨. Recognize the basics of chemistry, mathematics, physics, statistics, biological sciences and other secondary sciences to understand the evolutionary processes in the fields of chemistry and microbiology.

١,٣. Intellectual Skills

The graduates of chemistry and microbiology must be able to:

١,٣,١. Differentiate between subject-related theories and assess their concepts and principles like as the relationship between the effect of genes on morphological and physiological processes, and their functions in organisms.

١,٣,٢. Analyze, synthesize, assess and interpret quantitatively science relevant data and analyze different sources of organisms and their effect on the human.
١,٣.٣. Postulate and deduce mechanisms and procedures to handle scientific problems in related to chemistry and microbiology.
١,٣.٤. Construct several related and integrated information to confirm, make evidence and test hypotheses that were acquired from physics, maths, statistical, chemistry and biology sciences.
١,٣.٥. Evaluate the ecosystem, its conservation, economics and sustainability.
١,٣,٦. Interpret the subject-related knowledge to solve problems, which related to cells, tissues, secondary metabolites, toxins and environmental problems.
١,٣,٧. Formulate data and select the proper mechanism (charts, figures and tables) for their setting within a theoretical framework.
١,٣,٨. Assess the interrelationships and the impact of a specific organism (especially microorganisms) on its ecosystem.
١,٣.٩. Interpret biological data as presence of microorganisms and respond to a variety of information sources like type of survive, host range and surrounding environment.

١,٤. Practical and Professional Skills

The graduates of chemistry and microbiology must be able to:

١,٤.١. Plan, design, process and report on the investigated data, using appropriate techniques and considering scientific guidance.
١,٤.٢. Apply techniques and tools considering scientific ethics during laboratory investigations of living systems.
١,٤.٣. Solve problems related to basic science, chemistry and microbiology using a range of formats and approaches including computers and other recent tools.
١,٤,٤. Identify and criticize the different methods used in addressing subject related to chemistry and microbiology.
١,٤.٥. Collect, record and analyze chemistry and biological data using appropriate techniques in the field and laboratory.
١,٤,٦. Select a representative sample considering its validity, accuracy and reliability during collection.
١,٤,٧. Deal with chemicals safely and take into account the physical and chemical properties to avoid the risks associated with their use.
١,٤,٨. Apply scientific terms, taxonomic principles to match with modern scientific papers by using advanced tools in the field of chemistry and microbiology.

١,٥. General and Transferable Skills

The graduates of chemistry and microbiology must be able to:

١,٥,١. Use information and communication technology effectively.
١,٥,٢. Identify roles and responsibilities, and their performing manner.
١,٥,٣. Think independently, set tasks and solve problems on scientific basis.
١,٥,٤. Work in groups effectively; manage time, collaborate and communicate with others positively.
١,٥,٥. Consider community linked problems, ethics and traditions.
١,٥,٦. Acquire self- and long life–learning.
١,٥,٧. Apply scientific models, systems, and tools effectively.

١,٥,٨. Deal with scientific patents considering property right.
١,٥,٩. Exhibit the sense of beauty and neatness.

المعايير الاكاديمية المرجعية لبرنامج النبات

Academic Reference Standards (ARS) for Botany program

١,١ Attributes of the graduates of botany program:

The graduates must be Able to:

١,١,١- Recognize the role of basic sciences and their different applications in the development of society.

١,١,٢- Demonstrate wide knowledge and technologies related to various botany disciplines and be acquaint about modern biotechnologies and topics.

١,١,٣- Apply biological knowledge and concepts and information technology.
relevant to the field of botany in solving economic, considering safety and health requirements.

١,١,٤- Utilize facts and biological information to analyze and interpret practical data related to botany majors.

١,١,٥- Conducting laboratory experiments using appropriate equipment, tools and techniques in the scientific research or Professional practices in relevant to botany majors.

١,١,٦- Apply information, concepts, and design laboratory experiments to solve problems related to biological problems such as the spread of viruses and damage to bacteria and other microorganisms.

١,١,٧- Participate effectively in a multidisciplinary teamwork in relevant to branches of botany and be flexible for adaptation, decision making and working under contradictory conditions.

١,١,٨- Adopt self and continuous learning and participate effectively in research and professional activities.

١,١,٩-Drafting terms and data and writing scientific reports in Arabic and English.

١,١,١٠-Explain the plant basic processes and physiological mechanisms and vital relationships and interactions in relation to plant organisms and its ecosystems.

١,١,١١- Developing knowledge and experience skills in dealing with laboratory experiments using appropriate equipment, tools, and technologies Contemporary related to scientific research and Professional practices disciplines in botany.

١,١,١٢- Recognize the classification of the plant kingdom, the morphological and anatomical characteristics, of the higher plant and microorganisms.

١,١,١٣- Identify and characterize different communities and ecosystems supporting the different plants.

١,١,١٤- Be acquainted with the modern subjects and bio-techniques.
Related to the branch of botany.

١,١,١٥- Develop knowledge and experience of working with contemporary laboratory techniques relevant to different disciplines in botany.

١,١,١٦- Plan and conduct experimental work using appropriate instruments, review safety regulations and quality control processes, assess and manage risks.

١,١,١٧- Apply concepts, facts, theories of chemistry and physics to interpret plant life's basic processes and its ecosystems.

١,١,١٨- Apply concepts, facts, theories in mechanisms and biostatistics to interpret the biological data.

١,١.١٩- Recognize the problems related to the environment and society in the villages and cities of Qena Governorate, for example pollution in the waters of the Nile River, pests that attack crops and try to find appropriate scientific solutions for them.

١,٢ - Knowledge and Understanding:

Graduates must acquire knowledge and understanding of:

١,٢,١- Demonstrate wide knowledge and comprehension of the theories ،facts, concepts, fundamentals and resent techniques and their applications related to the different fields of botany.

١,٢,٢-Explain physiological processes and mechanisms that take place within the different tissues of plants.

١,٢,٣- Be aware terminology, nomenclature, and classification system of phylum and classes of the plant kingdom.

١,٢,٤-Recognize the recent scientific development in the fields of botany.

١,٢,٥- Clarify the relationships and interactions between species and their Environments.

١,٢,٦- describe the Morphological and anatomical compositions of plant.

from the lower plants to higher plants

١,٢,٧- Describe the characteristics and composition of all classes of the plant kingdom.

١,٢,٨- Recognize the processes and mechanisms in different ecosystems related to plant.

١,٢,٩-Clarify the biological information and concepts that effect on economic problems related to plant crops.

١,٢,١٠- Clarify complexity and diversity of organisms and biodiversity through the study of genetics and evolution and the importance of preserving the environment and natural resources.

١,٢,١١-Clarify wide knowledge of the structure and function of various types of plant tissues and cell and organelles in plant unicellular and multicellular.

١,٢,١٢-Clarify the societal problems in his village or city relevant to plants and how to find appropriate solutions to them.

١,٣ Intellectual Skills

The Graduates of botany program must be Able to:

١,٣,١- Analyze, assess, and interpret qualitatively and quantitatively biological data relevant to botany research in graphs, figures ،tables using information technology and a variety of sources.

١,٣,٢- Discusses and evaluates biological issues according to scientific theories, concepts and facts.

١,٣,٣-Postulate and deduce mechanisms and procedures to handle biological Problems relevant to plants.

١,٣,٤- Chooses the appropriate mechanism for formulating and presenting the results of laboratory experiments to put them in a clear theoretical framework.

١,٣,٥- Evaluate and maintain the ecosystem and its economic resources.

١,٣,٧- Discusses societal problems surrounding environment and suggests appropriate solutions to them on scientific and studied basis.

١,٣,٨- Proposes plans to develop the national economy by doubling.

agricultural production for national crops, considered security,

safety, and health precautions.

١,٤. Professional and Practical Skills

The Graduates of botany program must be Able to:

١,٤,١ -Plans and designs research experiments, using appropriate devices, tools and techniques for research, considering scientific and ethical guidelines.

١,٤,٢- Solve problems using a range of formats and approaches.

١,٤,٣-Solve Biological problems by a variety of methods including computers and other recent tools.

١,٤,٤- Collect, record, and analyze biological data using appropriate techniques in the field and laboratory.

١,٤,٦- Write structural reports on the data in accordance with the standard scientific guidelines.

١,٤,٧- Use contemporary laboratory equipment, and tools efficiently in a safe, ethical, and responsible manner to investigate different plant tissues.

١,٤,٨- Handle chemical materials and plant samples safely to avoid hazards associated with their use.

١,٤,٩- Apply appropriate statistical and computational tools to analyze and interpret experimental data relevant to different disciplines in botany.

١,٤,١٠- Collect and preserve plant samples and prepare sections for microscopic examination and identification of different types of tissues.

١,٤,١١-Conducting laboratory research to solve problems facing plants, such as the spread of pests that affect plant crops.

١,٤,١٢- Carrying out laboratory research to combat many environmental problems, such as pollution of all kinds, especially Nile water pollution.

١,٥. General and Transferable Skills

The Graduates of basic science must be Able to

١,٥,١-Use information and communication technology effectively.

١,٥,٢-Identify roles and responsibilities, and their performing manner.

١,٥,٣-Think independently, set tasks, and solve problems on scientific basis with Consider ethics, and traditions.

١,٥,٤-Work in groups effectively; manage time, collaborate, and communicate with others positively with exhibit the sense of beauty and neatness.

١,٥.٥- Acquire self- and long life–learning.

١,٥.٦- Apply scientific models, systems, and tools effectively.

١,٥.٧-Deal with scientific patents considering property right.

١,٥.٨- Apply laboratory guidelines while performing his work in research and professional laboratories.

١,٥.٩- Deals with laboratory equipment's, tools, and samples efficiently and accurately considering the preservation of their safety as well as the preservation of his personal safety.

المعايير الاكاديمية المرجعية لبرنامج الحاسب الآلى

Academic Reference Standards (ARS) for Computer Science

The graduates should be able to:

١. Recognize the role of Basic Sciences in the development of society.
٢. Develop scientific approaches that meet community needs considering economic, environmental, social, ethical, and safety requirements.
٣. Utilize scientific facts and theories to analyze and interpret practical data.
٤. Collect, analyze, and present data using appropriate formats and techniques.
٥. Postulate concepts and choose appropriate solutions to solve problems on scientific basis.
٦. Apply effectively information technology relevant to the field.
٧. Participate effectively in a multidisciplinary teamwork and be flexible for adaptation, decision making and working under contradictory conditions as well as exhibiting the sense of beauty and neatness.
٨. Adopt self and long life-learning and participate effectively in research activities.
٩. Deal with scientific data in Arabic, English, or other languages.
١٠. Demonstrate knowledge and competence in fundamental areas of computer science such as: algorithms, design and analysis, computer architecture and software-based systems.
١١. Apply mathematical foundations, algorithmic principles, and computer science theory in the modeling and design, implementation, evaluation and evolution of computer-based systems.
١٢. Have a solid understanding of used concepts in computer science to be able to pursue further learning, whether as graduate students or on their own.
١٣. Demonstrate and understanding of algorithms and data structures, computer organization and architecture, programming language concepts, compilers, networks, artificial intelligence, graphics, human computer interfaces, and databases, and identify and define the computing requirements for its solution.

١. Knowledge and Understanding

The graduates should be able to:

١,١. The related basic scientific facts, concepts, principles and techniques.
١,٢. The relevant theories and their applications.
١,٣. The processes and mechanisms supporting the structure and function of the specific topics.
١,٤. The related terminology, nomenclature, and classification systems.
١,٥. The theories and methods applied for interpreting and analyzing data related to discipline.

١,٦. The developmental progress of the program-related knowledge.
١,٧. The relation between the studied topics and the environment.
١,٨. Understand the essential mathematics relevant to computer science.
١,٩. Use high-level programming languages.
١,١٠. Demonstrate basic knowledge and understanding of a core of analysis, algebra, applied mathematics, and statistics.
١,١١. Show a critical understanding of the principles of artificial intelligence, database, and operating systems.
١,١٢. Understand the fundamental topics in Computer Science, including hardware and software architectures, software engineering principles and methodologies, operating systems, compilers, parallel and distributed computing, systems, and software tools.

٢. Intellectual Skills

The graduates should be able to:

٢,١. Differentiate between subject-related theories and assess their concepts and principles.
٢,٢. Analyze, synthesize, assess and interpret qualitatively and quantitatively science relevant data.
٢,٣. Develop lines of argument and appropriate judgments in accordance with scientific theories and concepts.
٢,٤. Postulate and deduce mechanisms and procedures to handle scientific problems.
٢,٥. Construct several related and integrated information to confirm, make evidence and test hypotheses.
٢,٦. Define traditional and nontraditional problems, set goals towards solving them, and. observes results.
٢,٧. Perform comparisons between (algorithms, methods, techniques...etc).
٢,٨. Perform classifications of (data, results, methods, techniques, algorithms…etc.).
٢,٩. Summarize the proposed solutions and their results.
٢,١٠. Establish criteria and verify solutions.
٢,١١. Identify a range of solutions and critically evaluate and justify proposed design solutions.
٢,١٢. Solve computer science problems with pressing commercial or industrial constraints.

٣. Practical and Professional Skills

The graduates should be able to:

٣,١. Plan, design, process, and report on the investigated data, using appropriate techniques and considering scientific guidance.
٣,٢. Apply techniques and tools considering scientific ethics.
٣,٣. Solve problems using a range of formats and approaches.
٣,٤. Identify and criticize the different methods used in addressing subject related issues.

٣,٥. Use appropriate programming languages, design methodologies, and knowledge and database systems.
٣,٦. Communicate effectively by oral, written and visual means.
٣,٧. Perform independent information acquisition and management, using the scientific literature and Web sources.
٣,٨. Evaluate the technical performance of various networks.
٣,٩. Identify any risks or safety aspects that may be involved in the operation of computing equipment within a given context.
٣,١٠. Deploy effectively the tools used for the construction and documentation of software, with particular emphasis on understanding the whole process involved in using computers to solve practical problems.

٤. General and Transferable Skills

The graduates should be able to:

٤,١. Use information and communication technology effectively.
٤,٢. Identify roles and responsibilities, and their performing manner.
٤,٣. Think independently, set tasks, and solve problems on scientific basis.
٤,٤. Work in groups effectively; manage time, collaborate, and communicate with others positively.
٤,٥. Consider community linked problems, ethics, and traditions.
٤,٦. Acquire self- and long life–learning.
٤,٧. Apply scientific models, systems, and tools effectively.
٤,٨. Deal with scientific patents considering property right.
٤,٩. Exhibit the sense of beauty and neatness.
٤,١٠. Prepare technical reports, and a dissertation, to a professional standard.
٤,١١. Use IT skills and display mature computer literacy.
٤,١٢. Prepare and present seminars to a professional standard.

List of NARS

المعايير الأكاديمية القومية المرجعية

National Academic Reference Standards for Chemistry (NARS)

١ - برنامج الكيمياء

١- National Academic Reference Standards

١,١- General attributes of the graduates of chemistry, the graduates must be able to:

١,١,١- Recognize the role of basic sciences in the development of society.

١,١,٢- Develop scientific approaches that meet community needs considering economic, environmental, social, ethical, and safety requirements.

١,١,٣- Utilize scientific facts and theories to analyze and interpret practical data.

١,١,٤- Collect, analyze, and present data using appropriate formats and techniques.

١,١,٥- Postulate concepts and choose appropriate solutions to solve problems on scientific basis.

١,١,٦- Apply effectively information technology relevant to the field.

١,١,٧- Participate effectively in a multidisciplinary teamwork and be flexible for adaptation, decision making under contradictory conditions as well as exhibiting the sense of beauty and neatness.

١,١,٨- Adopt self and long life-learning and participate effectively in research activities.

١,١,٩- Deal with scientific data in Arabic, English or other languages.

٤,١,١- Design and conduct experimental work, critically evaluate the outcomes, review and report on practice in chemistry.

٤,١,٢- Have knowledge and experience of working with relevant advanced laboratory techniques in chemistry.

٤,١,٣- Participate in and review quality control processes, manage risks and organize time to finish jobs in chemistry.

٤,١,٤- Demonstrate wide background knowledge related to the different branches of chemistry.

١,٢- Knowledge and Understanding:

Graduates must acquire knowledge and understanding of:

١,٢,١- The related basic scientific facts, concepts, principles and techniques.

١,٢,٢- The relevant theories and their applications.

١,٢,٣- The processes and mechanisms supporting the structure and function of the specific topics.

١,٢,٤- The related terminology, nomenclature and classification systems.

١,٢,٥- The theories and methods applied for interpreting and analyzing data related to discipline.

١,٢,٦- The developmental progress of the program-related knowledge.

١,٢,٧- The relation between the studied topics and the environment.

١.٢.٨- Chemical concepts, nomenclature, formulae and units in chemistry.

١.٢.٩- Characteristics of the different states of the matter and elements including trends within the periodic table and the related theories in chemistry.

١.٢.١٠- The principles, procedures and techniques used in chemical analysis, characterization, and structural investigations of different chemical compounds.
١.٢.١١- The major types of chemical reactions, their characteristics and mechanisms as well as their kinetics including catalysis.
١.٢.١٢- The principles of thermodynamics and quantum mechanics including their applications in chemistry.
١.٢.١٣- The constitution and properties of the different chemical compounds, including the main synthetic pathways and the relation between the properties of individual atoms and molecules.
١.٢.١٤- The current issues of chemical research and technological development.

١,٣- Practical and Professional skills:

The graduates of the chemistry program must be able to:
١,٣,١- Plan, design, process and report on the investigated data, using appropriate techniques and considering scientific guidance.
١,٣,٢- Apply techniques and tools considering scientific ethics.
١,٣,٣- Solve problems using a range of formats and approaches.
١,٣,٤- Identify and criticize the different methods used in addressing subject related issues.
١.٣.٥- Assess risk in laboratory work taking into consideration the specific hazards associated with the use of chemical materials as well as the safe and proper operation of the laboratory techniques.
١.٣.٦- Conduct standard laboratory procedures involved in analytical and synthetic work.
١.٣.٧- Monitor by observation and measurements the chemical properties or changes, including systematic recording and technical reporting in chemistry.
١.٣.٨- Use computational packages and tools in chemical investigations in chemistry.

١,٤- Intellectual skills:

The graduates of the chemistry program must be able to:
١,٤,١- Differentiate between subject-related theories and assess their concepts and principles.
١,٤,٢- Analyze, synthesize, assess, and interpret qualitatively and quantitatively science relevant data.
١,٤,٣- Develop lines of argument and appropriate judgments in accordance with scientific theories and concepts.
١,٤,٤- Postulate and deduce mechanisms and procedures to handle scientific problems.
١,٤,٥- Construct several related and integrated information to confirm, make evidence and test hypotheses.
١.٤.٦- Differentiate between the different states of the matter, elements and compounds based on the recognition and quantification of the properties in chemistry.
١.٤.٧- Employ computational software's and data-processing skills in handling of chemical information and analysis of chemical data in chemistry.
١.٤.٨- Explain concepts and determine the efficiency of chemical systems by applying mathematical expressions in chemistry.
١.٤.٩- Analyze chemical data to identify and confirm chemical structures as well as determine chemical composition in chemistry.

١.٤.١٠- Propose and conclude mechanisms for physical and chemical processes in chemistry.

١,٥- General and Transferable Skills:

The graduates of the chemistry program must be able to:

١,٥,١- Use information and communication technology effectively.

١,٥,٢- Identify roles and responsibilities and their performing manner.

١,٥,٣- Think independently, set tasks, and solve problems on scientific basis.

١,٥,٤- Work in groups effectively; manage time, collaborate, and communicate with others positively.

١,٥,٥- Consider community with linked problems, ethics, and traditions.

١,٥,٦- Acquire self- and long life-learning.

١,٥,٧- Apply scientific models, systems, and tools effectively.

١,٥,٨- Deal with scientific patents considering property right.

١,٥,٩- Exhibit the sense of beauty and neatness.

National Academic Reference Standards for Geology

٢ - برنامج الجيولوجيا

١,١. The General Attributes:

The general attributes of a Geologist, the graduates of Geology must be able to:

١,١,١. Recognize the role of Basic Sciences in the development of society.

١,١,٢. Develop scientific approaches that meet community needs considering economic, environmental, social, ethical, and safety requirements.

١,١,٣. Utilize scientific facts and theories to analyze and interpret practical data.

١,١,٤. Collect, analyze, and present data using appropriate formats and techniques.

١,١,٥. Postulate concepts and choose appropriate solutions to solve problems on scientific basis.

١,١,٦. Apply effectively information technology relevant to the field.

١,١,٧. Participate effectively in a multidisciplinary teamwork and be flexible for adaptation, decision making and working under contradictory conditions as well as exhibiting the sense of beauty and neatness.

١,١,٨. Adopt self and long life-learning and participate effectively in research activities.

١,١,٩. Deal with scientific data in Arabic, English or other languages.

١,١,١. Learn advanced subjects and think clearly about earth science related topics.

١,١,٢. Design and undertake geological experimental analysis (using maps, aerial photographs, satellite images, field instruments) and assess their results.

١,١,٣. Estimate, consult and assess the visibility of the applied geological environment and economical projects.

١,٢. Knowledge and Understanding

Graduates must acquire knowledge and understanding of:

١,٢,١. The related basic scientific facts, concepts, principles, and techniques.

١,٢,٢. The relevant theories and their applications.

١,٢,٣. The processes and mechanisms supporting the structure and function of the specific topics.

١.٢.٣. The related terminology, nomenclature, and classification systems.
١,٢,٤. The theories and methods applied for interpreting and analyzing data related to discipline.
١,٢,٥. The developmental progress of the program-related knowledge.
١,٢,٦. The relation between the studied topics and the environment.
١.٢.٧. Theoretical bases, procedures and techniques used for geological field studies and related laboratory analysis.
١.٢.٨. Physical features and history of the earth.
١,٢,٩. Tectonic events, stratigraphical and structural phenomena.
١,٢.١٠. Rock types forming the earth crust.
١,٢.١١. Types and distribution of economical raw materials (rocks, minerals, oil and gas).

١,٣. Practical and Professional Skills

The Geology graduates must be able to:

١,٣,١. Investigate prior work and references.
١,٣,٢. Use laboratory and field equipment's safely for collecting and analyzing samples.
١,٣,٣. Apply scientific ethics for geological sample selection and accuracy during reporting.
١,٣,٤. Apply the geographical information system (GIS) in interpreting the different geological phenomena.

١,٤. Intellectual Skills

The graduates must be able to:

١,٤,١. Differentiate between subject-related theories and assess their concepts and principles.
١,٤,٢. Analyze, synthesize, assess, and interpret qualitatively and quantitatively science relevant data.
١,٤,٣. Develop lines of argument and appropriate judgments in accordance with scientific theories and concepts.
١,٤,٤. Postulate and deduce mechanisms and procedures to handle scientific problems.
١,٤,٥. Construct several related and integrated information to confirm, make evidence and test hypotheses.
١,٤.٦. Recognize and use the subject-related theories, concepts and principles for discussion and interpretation of geological phenomena.
١,٤.٧. Hypothesize a range of ideas to solve different geological problems.
١,٤.٨. Criticize the techniques and theories to recognize the proper applicable techniques or theories.
١,٤.٩. Identify and differentiate between the published geological data.

١,٥. General and Transferable Skills

The graduates must be able to:

١,٥,١. Use information and communication technology effectively.
١,٥,٢. Identify roles and responsibilities, and their performing manner.
١,٥,٣. Think independently, set tasks, and solve problems on scientific basis.
١,٥,٤. Work in groups effectively; manage time, collaborate, and communicate with others positively.
١,٥,٥. Consider community linked problems, ethics, and traditions.
١,٥,٦. Acquire self- and long life–learning.
١,٥,٧. Apply scientific models, systems, and tools effectively.
١,٥,٨. Deal with scientific patents considering property right.

١,٥,٩. Exhibit the sense of beauty and neatness.

National Academic Reference Standards for Chemistry/Geology

٣- برنامج جيويوجيا و كيمياء

١,١. The General Attributes:

In addition to the general attributes of the graduate of faculties of sciences, graduate of the chemistry / geology program should be able to:

١. Demonstrate a wide range of integrated knowledge related to different branches of chemistry and geology.

٢. Review and evaluate quality control processes, manage risks and organize time to finish jobs.

٣. Plan and conduct experimental work, critically evaluate the outcomes, and report on practice.

٤. Employ concepts and theories of chemistry to interpret geological processes taking place in and on the Earth.

٥. Apply essential theories and concepts of mathematics and statistics to comprehend contemporary geological and chemical subjects.

٦. Employ effectively the principles, procedures and techniques used in the chemical and geological investigations in accordance with the safety regulations and good practices in the laboratory and the field.

٧. Recognize the relationship and interactions among chemistry, geology and the environment and abide by the legislations and ethics related to the environment preservation and human health and welfare.

١,٢. Knowledge and Understanding

١. Demonstrate integrated knowledge and comprehension of the theories, facts, concepts, fundamentals and techniques related to the fields of chemistry and geology.

٢. Employ mathematics, physics, and other collateral subjects in order to understand the major processes of chemistry and geology.

٣. Exhibit familiarity with the principles and procedures used in chemical
analyses as well as in characterization and structural investigation of compounds.

٤. Develop coherent knowledge of the physical, chemical and biological processes operating on and within the Earth.

٥. Enumerate the structure and composition of the Earth and other planets and the history of the Earth over geological timescales.

٦. Demonstrate familiarity and comprehension of classification systems used for animals and plants and the chemical processes causing their fossilization.

٧. Enumerate the concepts of biodiversity and maintaining of natural resources.

١,٣. Intellectual Skills

١. Discuss subject- related theories and assess their concepts and principles.

٢. Analyze, evaluate and interpret qualitative and quantitative scientific data relevant to various subjects of chemistry and geology.

٣. Develop lines of argument and appropriate judgment in accordance with scientific theories and concepts in the area of study.

٤. Develop an integrated and systematic understanding of the present and past interactions between the processes operating in the Earth's core, mantle, crust, cryosphere, hydrosphere, atmosphere and biosphere.

٥. Monitor and manage natural and human-induced environmental changes and evaluate the implications of sustainable development.
٦. Combine and construct integrated information to choose optimum solutions for geological problems based on critical thinking.
٧. Analyze and interpret quantitative data from maps, graphs, figures, tables and other sources of information.

١,٤. Practical and Professional Skills

١. Plan and conduct investigations using appropriate techniques and write structural reports on the data in accordance with the standard scientific guidelines.
٢. Handle chemical materials and geological samples safely and conduct risk assessments taking into account their physical and chemical properties to avoid hazards associated with their use.
٣. Employ recent laboratory equipment and procedures used in standard experimental applications in chemistry and geology in accordance with ethical guidelines.
٤. Monitor, by observation and measurement, chemical properties, events or changes followed by systematic and reliable recording and documentation thereof.
٥. Apply mathematical and computational tools to analyze and interpret experimental data in terms of theories relevant to chemistry and geology.
٦. Exploit the geographical information system (GIS) in interpreting the different geological phenomena.
٧. Apply exploration and exploitation strategies for natural resources such as hydrocarbons, minerals and water.

١,٥. General Skills

١. Use information and communication technology effectively.
٢. Identify roles and responsibilities, delegate tasks, and set clear guidelines and performance indicators.
٣. Think independently and solve problems on scientific basis.
٤. Work in a team effectively, manage time, collaborate and communicate with others positively.
٥. Address the community linked problems with considerable attention to the community ethics and traditions.
٦. Acquire self- and lifelong learning.
٧. Deal with property rights legally and ethically.

National Academic Reference Standards

٤- برنامج الفيزياء

١. National Academic Reference Standards

١,١. General Attributes of the Graduates of Basic Sciences

The graduates must be able to:

١,١,١. Recognize the role of Basic Sciences in the development of society.
١,١,٢. Develop scientific approaches that meet community needs considering economic, environmental, social, ethical, and safety requirements.
١,١,٣. Utilize scientific facts and theories to analyze and interpret practical data.
١,١,٤. Collect, analyze, and present data using appropriate formats and techniques.

١,١,٥. Postulate concepts and choose appropriate solutions to solve problems on scientific basis.

١,١,٦. Apply effectively information technology relevant to the field.

١,١,٧. Participate effectively in a multidisciplinary teamwork and be flexible for adaptation, decision making and working under contradictory conditions as well as exhibiting the sense of beauty and neatness.

١,١,٨. Adopt self and long life-learning and participate effectively in research activities.

١,١,٩. Deal with scientific data in Arabic, English or other languages.

١,٢. Knowledge and Understanding

Graduates must acquire knowledge and understanding of:

١,٢,١. The related basic scientific facts, concepts, principles and techniques.

١,٢,٢. The relevant theories and their applications.

١,٢,٣. The processes and mechanisms supporting the structure and function of the specific topics.

١,٢,٤. The related terminology, nomenclature and classification systems.

١,٢,٥. The theories and methods applied for interpreting and analyzing data related to discipline.

١,٢,٦. The developmental progress of the program-related knowledge.

١,٢,٧. The relation between the studied topics and the environment.

١,٣. Practical and Professional Skills The graduates must be able to:

١,٢,٨. Plan, design, process and report on the investigated data, using appropriate techniques and considering scientific guidance.

١,٢,٩. Apply techniques and tools considering scientific ethics.

١,٢,١٠. Solve problems using a range of formats and approaches.

١,٢,١١. Identify and criticize the different methods used in addressing subject related issues.

١,٣. Intellectual Skills

The graduates must be able to:

١,٣,١. Differentiate between subject-related theories and assess their concepts and principles.

١,٣,٢. Analyze, synthesize, assess and interpret qualitatively and quantitatively science relevant data.

١,٣,٣. Develop lines of argument and appropriate judgments in accordance with scientific theories and concepts.

١,٣,٤. Postulate and deduce mechanisms and procedures to handle scientific problems.

١,٣,٥. Construct several related and integrated information to confirm, make evidence and test hypotheses.

١,٤. General and Transferable Skills

The graduates must be able to:

١,٤,١. Use information and communication technology effectively.

١,٤,٢. Identify roles and responsibilities, and their performing manner.

١,٤,٣. Think independently, set tasks and solve problems on scientific basis.

١,٤,٤. Work in groups effectively; manage time, collaborate and communicate with others positively.

١,٤,٥. Consider community linked problems, ethics and traditions.

١,٤,٦. Acquire self- and long life–learning.

١,٤,٧. Apply scientific models, systems, and tools effectively.

١,٤,٨. Deal with scientific patents considering property right.

١,٦,٩. Exhibit the sense of beauty and neatness

٢. National Academic Reference Standards for Physics

Physics is the study of energy and behavior of single atom and its components. Physics is the foundation upon which the other physical sciences are based such as; astronomy, chemistry and geology. The beauty of physics lies in the simplicity of the fundamental physical theories and assumptions that can alter and expand our view of the world around us. Like all sciences, physics is based on experimental observations and quantitative measurements. The main objective of physics is to use a limited number of fundamental laws that govern natural phenomena to develop theories that can predict the results of future experiment.

Physicists are expected to become investigators in industrial or research institutions. They can also have careers as air navigators and instrument manufacturers, scientific reporters, technical consultants and university staff members. They can also be employed in information technology companies, educational institutions and health care organizations.

٢,١. The Attributes of a Physicist

In addition to the general attributes of basic sciences graduates, the physics graduates must be able to:

٢,١,١. Demonstrate a good basic knowledge of structural and functional aspects of physical systems at many spatial scales, from single molecule to the whole system.

٢,١,٢. Connect fundamental ideas about the physical behavior of matter and energy to system's structure and function.

٢,٢. Knowledge and Understanding

In addition to the general knowledge acquired by Basic Sciences graduates, the physics graduates must know and understand the:

٢,٢,١. Characteristics and physical properties of matter.

٢,٢,٢. Static and dynamic properties of fluids.

٢,٢,٣. The Basics of Electricity.

٢,٢,٤. Concepts of electromagnetism.

٢,٢,٥. Principles of heat transfer and thermodynamics.

٢,٢,٦. Theoretical and practical aspects of optics, nuclear physics and other related branches.

٢,٢,٧. Application of advanced physical techniques.

٢,٢,٨. Basics and mechanisms of energy transfer.

٢,٣. Practical and Professional skills

In addition to the general skills acquired by Basic Sciences graduates, the physicist must be able to:

٢,٣,١. Apply mathematical tools and techniques to analyze and interpret experimental results.

٢,٣,٢. Implant comprehensive physical knowledge and understanding as well as intellectual skills in research tasks.

٢,٣,٣. Use the national standards for laboratory equipment which are essential for practical research work.

٢,٣,٤. Present theoretical and experimental results in understandable forms such as tables and graphs.

٢,٤. Intellectual skills

In addition to the general skills acquired by Basic Sciences graduates, the physicist must be able to:

٢,٤,١. Utilize theories of physics to interpret physical phenomena.

٢,٤,٢. Apply appropriate physical principles to create and analyze system components.

٢,٤,٣. Choose optimum solutions for physical problems based on analytical thinking.

National Academic Reference Standards

٥- برنامج الكيمياء والنبات

The general attributes:

The graduate of the chemistry / Botany program should be able to:

١. Recognize the role of Basic Sciences in the development of society.
٢. Develop scientific approaches that meet community needs considering economic, environmental, social, ethical, and safety requirements.
٣. Utilize scientific facts and theories to analyze and interpret practical data.
٤. Collect, analyze, and present data using appropriate formats and techniques.
٥. Postulate concepts and choose appropriate solutions to solve problems on scientific basis.
٦. Apply effectively information technology relevant to the field.
٧. Participate effectively in a multidisciplinary teamwork and be flexible for adaptation, decision making and working under contradictory conditions as well as exhibiting the sense of beauty and neatness.
٨. Adopt self and long life-learning and participate effectively in research activities.
٩. Deal with scientific data in Arabic, English, or other languages.
١٠. Demonstrate a wide range of knowledge related to the theories, facts, concepts and essentials of chemistry and botany.
١١. Acquire knowledge and experience of working with recent laboratory techniques relevant to different disciplines of chemistry and botany.
١٢. Plan and conduct experimental work, review safety and quality control processes, report on practice, and critically evaluate the outcomes.
١٣. Apply concepts and theories of chemistry to interpret life's basic processes at the level of the cell, organism, and the ecosystem.
١٤. Recognize the relationship and interactions among chemistry, botany and the environment.
١٥. Apply theories and concepts of mathematics and statistics to understand the underlying mechanisms related to the essential processes in chemistry and botany.
١٦. Abide by the legislations and ethics related to the environment preservation and human health and welfare.

Knowledge and Understanding:

Graduates must acquire knowledge and understanding of:

١. The related basic scientific facts, concepts, principles and techniques.
٢. The relevant theories and their applications.
٣. The processes and mechanisms supporting the structure and function of the specific topics.
٤. The related terminology, nomenclature, and classification systems.
٥. The theories and methods applied for interpreting and analyzing data related to discipline.
٦. The developmental progress of the program-related knowledge.
٧. The relation between the studied topics and the environment.
٨. Demonstrate integrated knowledge and comprehension of the theories, facts, concepts, and fundamentals related to the fields of chemistry and botany.
٩. Acquire the essential knowledge in mathematics, physics, biology and other collateral subjects in order to understand the recent advances in chemistry and botany.
١٠. Exhibit familiarity with the principles and procedures used in chemical analyses as well as in characterization and structural investigation of chemical compounds.
١١. Illustrate the nutrients and energy flow through plant organisms, populations, and ecosystems.
١٢. Acquire the necessary knowledge related to patterns of plant distribution, population processes, dynamics, and biodiversity.

١٣. Demonstrate familiarity with the major metabolic pathways and their interactions on the cellular level and in the living organisms.
١٤. Acquire knowledge an understanding of the structure and functions of various types of plant cells and cell organelles in unicellular and multicellular organisms.
١٥. Demonstrate familiarity and comprehension of terminology, nomenclature and contemporary tools used in classification systems of plants.
١٦. Appreciate concepts of biodiversity and maintaining of natural resources.

Intellectual Skills:

The graduates must be able to:
١. Differentiate between subject-related theories and assess their concepts and principles.
٢. Analyze, synthesize, assess and interpret qualitatively and quantitatively science relevant data.
٣. Develop lines of argument and appropriate judgments in accordance with scientific theories and concepts.
٤. Postulate and deduce mechanisms and procedures to handle scientific problems.
٥. Construct several related and integrated information to confirm, make evidence and test hypotheses.
٦. Test, evaluate and criticize an existing piece of information in the light of evidence provided by recent advances in botany.
٧. Analyze, evaluate and, interpret scientific data relevant to the various subjects of chemistry and botany.
٨. Breakdown, synthesizes, reconstruct, and reformulate a bulk of information such as pathways for biosynthesis of biologically active compounds or macromolecules.
٩. Construct several related and integrated information to confirm, make evidence, test hypotheses, and employ this information in problem solving.
١٠. Link and integrate subject-specific theories, concepts, and principles such as relationship between genes and their products, interactions and modulation of the actions of different types of physiological regulators in plants.
١١. Analyze and interpret quantitative data related to the fields of botany and chemistry from graphs, figures, tables, and other sources of information.

Practical and Professional:

The graduates must be able to:
١. Plan, design, process and report on the investigated data, using appropriate techniques and considering scientific guidance.
٢. Apply techniques and tools considering scientific ethics.
٣. Solve problems using a range of formats and approaches.
٤. Identify and criticize the different methods used in addressing subject related issues.
٥. Plan and conduct investigations using recent equipment and instruments. Write structural reports on the data in accordance with the standard scientific guidelines.
٦. Use appropriate and contemporary laboratory equipment and tools efficiently in a safe, ethical and responsible manner to investigate living organisms and systems.
٧. Identify and criticize the different methods used in addressing subject related issues in botany and chemistry.
٨. Handle chemical materials safely taking into account their physical and chemical properties to avoid hazards associated with their use.
٩. Employ statistical analyses and computational tools to analyze and interpret experimental data in terms of theories relevant to chemistry and botany.

١٠. Consider variations inherent in dealing with biological materials such as sample size, accuracy, precision, and calibration.
١١. Employ research techniques, information retrieval, modeling, taxonomic keys, bioassays and tools of molecular biology.
١٢. Collect and preserve plant samples and prepare sections for microscopic examination and identification of different types of cells and tissues.
١٣. Carry out experiments on plant material at a variety of levels of the biological organization; cells, tissues, up to a whole plant.

General and Transferable Skills :

The graduates must be able to:
١. Use information and communication technology effectively.
٢. Identify roles and responsibilities, and their performing manner.
٣. Think independently, set tasks and solve problems on scientific basis.
٤. Work in groups effectively; manage time, collaborate and communicate with others positively.
٥. Address the community linked problems with considerable attention to the community ethics and traditions.
٦. Acquire self- and life-long learning.
٧. Apply scientific models, systems, and tools effectively.
٨. Deal with property rights legally and ethically.
٩. Exhibit the sense of beauty and neatness.

National Academic Reference Standards (NARS) of Chemistry / Entomology Program

٦- برنامج كيمياء و حشرات

٣,١. General Attributes of the Graduates of Basic Sciences

The graduates must be able to:

٣,١,١ Recognize the role of Basic Sciences in the development of society.
٣,١,٢ Develop scientific approaches that meet community needs considering economic, environmental, social, ethical, and safety requirements.
٣,١,٣ Utilize scientific facts and theories to analyze and interpret practical data.
٣,١,٤ Collect, analyze, and present data using appropriate formats and techniques.
٣,١,٥ Postulate concepts and choose appropriate solutions to solve problems on scientific basis.
٣,١,٦ Apply effectively information technology relevant to the field.
٣,١,٧ Participate effectively in a multidisciplinary teamwork and be flexible for adaptation, decision making and working under contradictory conditions as well as exhibiting the sense of beauty and neatness.
٣,١,٨ Adopt self and long life-learning and participate effectively in research activities.
٣,١,٩ Deal with scientific data in Arabic, English, or other languages.
٣,١,١٠ Demonstrate wide background knowledge related to different branches of chemistry and entomology.
٣,١,١١ Develop the experience required to work with recent laboratory techniques relevant to different disciplines of chemistry and entomology in accordance with the quality control processes and safety regulations.
٣,١,١٢ Integrate concepts and theories of chemistry and entomology to interpret life's basic processes related to insects from the cell to the organism to the ecosystem.

٣,١,١٣ Recognize the relationship and interactions among chemistry, entomology and the environment and appreciate biodiversity and maintaining of natural resources.

٣,١,١٤ Exploit the theories and concepts of mathematics and statistics to explain the underlying mechanisms of essential chemical and biological processes relevant to insect's life, growth and evolution.

٣,١,١٥ Plan and conduct investigations that employ the standard principles and procedures in chemical and entomological investigations.

٣,٢. Knowledge and Understanding

Graduates must acquire knowledge and understanding of:

٣,٢,١ The related basic scientific facts, concepts, principles and techniques.

٣,٢,٢ The relevant theories and their applications.

٣,٢,٣ The processes and mechanisms supporting the structure and function of the specific topics.

٣,٢,٤ The related terminology, nomenclature and classification systems.

٣,٢,٥ The theories and methods applied for interpreting and analyzing data related to discipline.

٣,٢,٦ The developmental progress of the program-related knowledge.

٣,٢,٧ The relation between the studied topics and the environment.

٣,٢,٨ Develop integrated knowledge and comprehension of the theories, facts, concepts, fundamentals, and techniques related to the fields of chemistry and entomology.

٣,٢,٩ Acquire the essential knowledge in mathematics, physics, biology and other collateral subjects in order to understand the advanced topics of entomology and chemistry.

٣,٢,١٠ Characterize the chemical nature and properties of the functional groups in different types of molecules with special focus on insecticides.

٣,٢,١١ Demonstrate familiarity and comprehension of terminology, nomenclature and contemporary tools used for classification systems of animals in general and insects in particular.

٣,٢,١٢ Acquire knowledge and understanding of the structure and functions of various types of animal cells and cell organelles in unicellular and multi-cellular organisms.

٣,٢,١٣ Demonstrate understanding of how the chemistry of biological molecules determines their biological functions.

٣,٢,١٤ Demonstrate familiarity with the major metabolic pathways and their interactions on the cellular level and up to the living organisms.

٣,٢,١٥ Enumerate the economic importance of the insects and the programs of insect management and control.

٣,٢,١٦ Acquire knowledge and awareness of the medical importance of insects as vectors of diseases.

٣,٣. Intellectual Skills:

The graduates must be able to:

٣,٣,١ Differentiate between subject-related theories and assess their concepts and principles.

٣,٣,٢ Analyze, synthesize, assess and interpret qualitatively and quantitatively science relevant data.

٣,٣,٣ Develop lines of argument and appropriate judgments in accordance with scientific theories and concepts.

٣,٣,٤ Postulate and deduce mechanisms and procedures to handle scientific problems.

٣,٣,٥ Construct several related and integrated information to confirm, make evidence and test hypotheses.

٣,٣,٦ Test, evaluate and criticize an existing piece of information in the light of evidence provided by recent advances in entomology and chemistry.

٣,٣,٧ Analyze, evaluate, and interpret qualitative and quantitative scientific data relevant to the various subjects of chemistry and entomology.

٣,٣,٨ Postulate and deduce mechanisms and procedures to deal with scientific problems relevant to contemporary approaches in entomology and chemistry.

٣,٣,٩ Breakdown, synthesize, reconstruct, and reformulate a bulk of information such as pathways for biosynthesis of biologically active compounds or macromolecules in insects.

٣,٣,١٠ Choose suitable insecticides and insect control protocols based on combined knowledge gained from student's study of chemistry and entomology.

٣,٣,١١ Analyze and interpret quantitative data from graphs, figures, tables, equations and other sources of information.

٣,٤. Practical and Professional:

٣,٤,١ Plan, design, process, and report on the investigated data, using appropriate techniques and considering scientific guidance.

٣,٤,٢ Apply techniques and tools considering scientific ethics.

٣,٤,٣ Solve problems using a range of formats and approaches.

٣,٤,٤ Identify and criticize the different methods used in addressing subject related issues.

٣,٤,٥ Plan and conduct investigations using appropriate techniques. Write structural reports on the data in accordance with the standard scientific guidelines.

٣,٤,٦ Use appropriate and contemporary laboratory equipment, instruments, and tools efficiently in a safe, ethical and responsible manner to investigate living organisms and biological systems.

٣,٤,٧ Handle chemical materials safely, particularly insecticides, and conduct risk assessments taking into account their physical and chemical properties to avoid the hazards, to users and environment, associated with their use.

٣,٤,٨ Demonstrate sound familiarity with standard laboratory procedures and techniques used in experimental applications in chemistry and entomology.

٣,٤,٩ Apply statistical analyses and computational tools to analyze and interpret experimental data relevant to chemistry and entomology.

٣,٤,١٠ Search and evaluate the validity and relevance of literature in a critical thinking approach.

٣,٤,١١ Consider variations inherent in dealing with biological materials such as sample size, accuracy, precision, and calibration.

٣,٤,١٢ Employ contemporary information retrieval, insect rearing, taxonomic keys, bioassays, and tools of molecular biology.

٣,٥. General Skills:

٣,٥,١. Use information and communication technology effectively.

٣,٥,٢. Identify roles and responsibilities, and their performing manner.

٣,٥,٣. Think independently, set tasks, and solve problems on scientific basis.

٣,٥,٤. Work in groups effectively; manage time, collaborate, and communicate with others positively.

٣,٥,٥. Consider community linked problems, ethics, and traditions.

٣,٥,٦. Acquire self- and long life–learning.

٣,٥,٧. Apply scientific models, systems, and tools effectively.

٣,٥,٨. Deal with scientific patents considering property right.

٣,٥,٩. Exhibit the sense of beauty and neatness.

National Academic Reference Standards

٧- برنامج علم الحيوان و الكيمياء

The graduate of the chemistry / zoology program should be able to:

١,١. Recognize the role of Basic Sciences in the development of society.

١,٢. Develop scientific approaches that meet community needs considering economic, environmental, social, ethical, and safety requirements.

١,٣. Utilize scientific facts and theories to analyze and interpret practical data.

١,٤. Collect, analyze, and present data using appropriate formats and techniques.

١,٥. Postulate concepts and choose appropriate solutions to solve problems on scientific basis.

١,٦. Apply effectively information technology relevant to the field.

١,٧. Participate effectively in a multidisciplinary teamwork and be flexible for adaptation, decision making and working under contradictory conditions as well as exhibiting the sense of beauty and neatness.

١,٨. Adopt self and long life-learning and participate effectively in research activities.

١,٩. Deal with scientific data in Arabic, English or other languages.

In addition to the general attributes of the graduate of faculties of Sciences, the graduate of the chemistry / zoology program should be able to:

١,١٠. Demonstrate wide integrated knowledge related to different branches of chemistry and zoology.

١,١٢. Develop knowledge and experience of working with contemporary laboratory techniques relevant to different disciplines in chemistry and zoology.

١,١٣. Plan and conduct experimental work using appropriate instruments, review safety regulations and quality control processes, assess and manage risks, report on practice, and critically evaluate the outcomes.

١,١٤. Apply concepts and theories of chemistry to interpret life's basic processes from cell to organism to ecosystems.

١,١٥. Recognize the relationship and interactions among chemistry, zoology, and the environment.

١,١٦. Employ theories and concepts in mathematics and statistics to interpret the underlying mechanisms of the essential processes in chemistry and zoology.

١,١٧. Abide by the legislations and ethics related to the environment preservation and human health and welfare.

٢. Knowledge and Understanding

Graduates must acquire knowledge and understanding of:

٢,١. The related basic scientific facts, concepts, principles, and techniques.

٢,٢. The relevant theories and their applications.

٢,٣. The processes and mechanisms supporting the structure and function of the specific topics.

٣. The related terminology, nomenclature and classification systems.

٢,٤. The theories and methods applied for interpreting and analyzing data related to discipline.

٢,٥. The developmental progress of the program-related knowledge.

٢,٦. The relation between the studied topics and the environment.

In addition to the general Knowledge and Understanding of the graduate of faculties of sciences, the graduate of the chemistry / zoology program should be able to:

٢.٧. Demonstrate wide knowledge and comprehension of the theories, facts, concepts, fundamentals and techniques related to the fields of chemistry and zoology.

٢.٨. Acquire the essential knowledge in mathematics, physics, biology, and other collateral subjects in order to understand the recent advances in chemistry and zoology.

٢.٩. Exhibit knowledge of the principles and procedures used in chemical analyses as well as in characterization and structural investigation of compounds.

٢.١٠ Characterized the chemical nature and behavior of the functional groups in different types of molecules.

٢.١١ Demonstrate familiarity and comprehension of terminology, nomenclature and contemporary tools used for the classification systems of animals.

٢.١٢ Acquire knowledge an understanding of the structure and function of various types of animal cells and cell organelles in unicellular and multicellular organisms.

٢.١٣ Demonstrate knowledge of the structure and functions of animal cell organelles and bases of cell differentiation.

٢.١٤ Demonstrate a profound understanding of how the chemistry of biological molecules determines their biological functions with a special consideration to the major metabolic pathways and their interactions in living organisms.

٢.١٥ Demonstrate familiarity with the major metabolic pathways and their interactions in living organisms.

٢.١٦ Appreciate the concepts of biodiversity and maintaining of natural resources.

٣. Practical and Professional Skills

The graduates must be able to:

٣,١. Plan, design, process, and report on the investigated data, using appropriate techniques and considering scientific guidance.

٣,٢. Apply techniques and tools considering scientific ethics.

٣,٣. Solve problems using a range of formats and approaches.

٣,٤. Identify and criticize the different methods used in addressing subject related issues.

In addition to the general of Practical and Professional the graduate of faculties of sciences, the graduate of the chemistry / zoology program should be able to:

٣.٥. Plan, and conduct investigations using appropriate procedures and techniques. Write structural reports on the data in accordance with the standard scientific guidelines.

٣.٦. Use contemporary laboratory equipment, instruments, and tools efficiently in a safe, ethical and responsible manner to investigate living organisms and biological systems.

٣.٧. Solve problems using a range of formats and approaches.

٣.٨. Handle chemical materials and biological samples safely taking into consideration their physical and chemical properties to avoid hazards associated with their use.

٣.٩. Employ appropriate statistical and computational tools to analyze and interpret experimental data in terms of theories relevant to chemistry and zoology.

٣.١٠. Search and evaluate the validity, credibility, and relevance of literature in a critical thinking approach.

٣.١١. Consider variations inherent in dealing with biological materials such as sample size, accuracy, precision, and calibration.

٣.١٢. Employ contemporary information retrieval, modeling approaches, taxonomic keys, bioassays, and tools of molecular biology.

٣.١٣. Collect and preserve animal samples and prepare sections for microscopic examination and identification of different types of cells and tissues.

٤. Intellectual Skills

The graduates must be able to:

٤,١. Differentiate between subject-related theories and assess their concepts and principles.

٤,٢. Analyze, synthesize, assess, and interpret qualitatively and quantitatively science relevant data.

٤,٣. Develop lines of argument and appropriate judgments in accordance with scientific theories and concepts.

٤,٤. Postulate and deduce mechanisms and procedures to handle scientific problems.

٤,٥. Construct several related and integrated information to confirm, make evidence and test hypotheses.

In addition to the general Intellectual Skills of the graduate of faculties of sciences, the graduate of the chemistry / zoology program should be able to:

٤,٥. Test, evaluate and criticize an existing piece of information in the light of evidence provided by recent advances in zoology.

٤,٦. Analyze, evaluate, and interpret qualitative and quantitative scientific data relevant to various subjects of chemistry and zoology.

٤.٧. Construct several lines of related information to confirm, make evidence and test hypotheses related to recent progresses in research such as stem cell and applications of nanotechnology in biology.

٤.٨. Breakdown, synthesizes, reconstruct, and reformulate a bulk of information such as pathways for biosynthesis of biologically active compounds or macromolecules.

٤.٩. Analyze and interpret quantitative data in graphs, figures, tables, and other sources of information.

٤.١٠. Postulate and deduce mechanisms and procedures to deal with scientific problems relevant to advanced approaches in zoology and chemistry.

٤.١١. Link and integrate subject-specific theories, concepts, and principles such as relationship between genes and their products, interactions and modulation of the actions of different types of physiological regulators in animals.

٤.١٢. Combine knowledge gained from different sources to postulate the role of various cell signaling mechanisms in regulating cellular functions and growth.

٥. General and Transferable Skills

The graduates must be able to:

٥,١. Use information and communication technology effectively.

٥,٢. Identify roles and responsibilities, and their performing manner.

٥,٣. Think independently, set tasks, and solve problems on scientific basis.

٥,٤. Work in groups effectively; manage time, collaborate, and communicate with others. positively.

٥,٥. Consider community linked problems, ethics, and traditions.

٥,٦. Acquire self- and long life–learning.

٥,٧. Apply scientific models, systems, and tools effectively.
٥,٨. Deal with scientific patents considering property right.
٥,٩. Exhibit the sense of beauty and neatness.

National Academic Reference Standards for Mathematics

٨- برنامج الرياضيات

١,١. Attributes of a Mathematician

The mathematics graduates must be able to:

١,١,١. Recognize the role of Basic Sciences in the development of society.
١,١,٢. Develop scientific approaches that meet community needs considering economic, environmental, social, ethical, and safety requirements.
١,١,٣. Utilize scientific facts and theories to analyze and interpret practical data.
١,١,٤. Collect, analyze, and present data using appropriate formats and techniques.
١,١,٥. Postulate concepts and choose appropriate solutions to solve problems on scientific basis.
١,١,٦. Apply effectively information technology relevant to the field.
١,١,٧. Participate effectively in a multidisciplinary teamwork and be flexible for adaptation, decision making and working under contradictory conditions as well as exhibiting the sense of beauty and neatness.
١,١,٨. Adopt self and long life-learning and participate effectively in research activities.
١,١,٩. Deal with scientific data in Arabic, English or other languages.
١,١,١٠. Understand, recognize, and describe patterns and make abstractions about them.
١,١,١١. Draw conclusions about the real world using mathematical concepts.
١,١,١٢. Find true statements that can be made about mathematical objects.
١,١,١٣. Apply techniques, tools, and formulas to understand an object's attributes.
١,١,١٤. Recognize and use various types of reasoning and methods of proof.
١,١,١٥. Create and use representations to model and interpret mathematical ideas.
١,١,١٦. Recognize and understand how mathematical ideas interconnect and build on one another.

١,٢ Knowledge and Understanding

Mathematicians must acquire knowledge and understanding of:

١,٢,١. The related basic scientific facts, concepts, principles, and techniques.
١,٢,٢. The relevant theories and their applications.
١,٢,٣. The processes and mechanisms supporting the structure and function of the specific topics.
١,٢,٤. The related terminology, nomenclature, and classification systems.
١,٢,٥. The theories and methods applied for interpreting and analyzing data related to discipline.
١,٢,٦. The developmental progress of the program-related knowledge.
١,٢,٧. The relation between the studied topics and the environment.
١,٢,٨. Numerical mathematics, and the different ways in which numerical information is used.
١,٢,٩. Abstract algebraic structures and their roles in solving problems expressed with symbols and in developing mathematical theories and techniques.
١,٢,١٠. Mathematical methods and techniques that deal with differential equations and their applications.
١,٢,١١. Geometrical concepts, and processes used in measuring attributes of objects.
١,٢,١٢. The concept of function, and its role in mathematical analysis.
١,٢,١٣. Discrete mathematics, algorithms, and combinatorial abilities in order to solve problems of finite character and enumerate sets without direct counting.
١,٢,١٤. Probability and statistical models to make inferences about real-world situations.

١,٢,١٥. Modeling and symbolic representations of problem situations.
١,٢,١٦. The deductive nature of mathematics, and the roles of definitions, axioms, and theorems to identify and construct valid deductive arguments.
١,٢,١٧. Theories and applications of other mathematical trends and/or applied mathematics and/or mathematical statistical and/or computer science.

١,٣. Practical and Professional Skills

Graduates of Mathematics program must be able to:

١,٣,١. Plan, design, process and report on the investigated data, using appropriate techniques and considering scientific guidance.
١,٣,٢. Apply techniques and tools considering scientific ethics.
١,٣,٣. Solve problems using a range of formats and approaches.
١,٣,٤. Identify and criticize the different methods used in addressing subject related issues.
١,٣,٥. Apply reasoning techniques to build convincing mathematical arguments.
١,٣,٦. Develop conjectures and draw appropriate conclusions and test these conjectures.
١,٣,٧. Identify required mathematics and other technical information independently.
١,٣,٨. Use technology to enhance mathematical thinking and understanding.
١,٣,٩. Conduct independent nontrivial exploration in mathematics.
١,٣,١٠. Develop and reinforce tenacity and confidence in their abilities to use mathematics.

١,٤. **Intellectual Skills**

Graduates of mathematics program must be able to:

١,٤,١. Differentiate between subject-related theories and assess their concepts and principles.
١,٤,٢. Analyze, synthesize, assess and interpret qualitatively and quantitatively science relevant data.
١,٤,٣. Develop lines of argument and appropriate judgments in accordance with scientific theories and concepts.
١,٤,٤. Postulate and deduce mechanisms and procedures to handle scientific problems.
١,٤,٥. Construct several related and integrated information to confirm, make evidence and test hypotheses.
١,٤,٦. Formulate mathematical ideas and procedures using appropriate mathematical vocabulary and notation.
١,٤,٧. Construct symbolic forms of problem situations through modeling real-world situations, develop and use the models to make predictions and informed decisions.
١,٤,٨. Recognize, compare, and transform mathematical objects.
١,٤,٩. Represent, abstract and interpret problems.
١,٤,١٠. Develop connections within branches of mathematics and between mathematics and other disciplines.
١,٤,١١. Utilize appropriate processes in applied mathematical studies.
١,٤,١٢. Judge the validity of mathematical arguments and the reasonableness of results.

١,٥. General and Transferable Skills

Graduates of mathematics program must be able to:

١,٥,١. Use information and communication technology effectively.
١,٥,٢. Identify roles and responsibilities, and their performing manner.
١,٥,٣. Think independently, set tasks and solve problems on scientific basis.
١,٥,٤. Work in groups effectively, manage time, collaborate and communicate with others positively.
١,٥,٥. Consider community linked problems, ethics and traditions.
١,٥,٦. Acquire self- and long life–learning.

١,٥,٧. Apply scientific models, systems, and tools effectively.
١,٥,٨. Deal with scientific patents considering property right.
١,٥,٩. Exhibit the sense of beauty and neatness.