Beni-Suef University Faculty of Science

Chemistry- Biochemistry Program specification

2023/2024

Beni-Suef University
Faculty of Science

Program specification
(Academic year 2023/2024)

A- Basic Information

Program title	Chemistry-Biochemistry
Program type	Double
Department	Biochemistry
Coordinator	Dr. Asmaa Mohamed Mahmoud
External evaluator	Prof. Dr. Ali El Nenaey
Last date of program specification approval:	9/2023
البرنامج مصمم طبقا للائحة كلية العلوم بنظام الساعات المعتمدة بقرار وزارى رقم (4904) بتاريخ (2019/10/29	

B- Professional information

Overall aims of Program:

This program aims to:

1. Provide graduate with a wide range of integrated knowledge, concepts and theories of basic science to interpret in the field of Biochemistry, natural products chemistry and biotechnology.
2. Enable graduate students to gain the practical and laboratory skills required for experiments in Chemistry-Biochemistry field.
3. Master safe handling techniques of chemicals and natural products
4. Develop graduates with the skills of data collection, interpretation and presentationdata in English and Arabic.
5. Participate as a member in team, recognize and respect the team members, and areflexible for adaptation to work conditions.
6. Provide with certain skills for using the different biochemical tools to

acquire data and to have the ability for analyzing, interpreting and figuring out the results.

7. Provide graduate with skills of quality control processes evaluation, risk managementand time organization.

8. Provide graduate with skills and attitude necessary for lifelong and independentlearning the ethics related to environment caring and community problems.

9. Demonstrate knowledge from an integrated point of view of theories, facts, conceptsand essentials of chemistry and biochemistry.

10. Provide experience of current analytical techniques and practical skills relevant tochemistry-biochemistry and appropriate for employment.

2- Intended learning outcomes of course (ILOs)

The Program provides excellent opportunities for students to demonstrate knowledge and understanding qualities and develop skills appropriate for Bachelor of sciences in Chemistry- Biochemistry.

A- Knowledge and understanding:

By the end of this program the student should be able to:

A1. Recall the influence of chemistry and biochemistry, professional ethics, andregulatory bodies in professional practice.

A2. Recall the importance of Arabic and English languages in professional practice.

A3. Define chemical structure, stereo chemical aspects, physicochemical propertiesand principles of chemical reactions.

A4. Define fundamental terminology and classification systems used in basic science.

A5. Explain concepts, principles and theories related to basic science.

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A6. Describe knowledge and comprehension of the theories, concepts and techniques related to aromatic, environmental, nuclear, inorganic and spectroscopic studies ofchemistry.

A7. Outline the principles of isolation, purification, as well as qualitative and quantitative analysis.

A8. Describe the relationship of chemical and molecular structure of metabolic components with mechanisms of actions, biological activities, concepts of informatics and designing and targeting of biological components.

A9. Explain key metabolic reactions involved in the biosynthesis and degradation ofbiological molecules.

A10. Understand the basic knowledge of the molecular biosciences, including biochemical processes, genetics, molecular biology and cell biology.

A11. Recognize the relevance of biochemistry, molecular biology, immunology, microbiology and toxicology to disease states, diagnosis and therapeutics.

A12. Name the principles of public health issues such as laboratory diagnosisof diseases.

A13. Recall the principles and techniques of compounding,manufacturing, biotechnology, and packaging of chemicals products.

A14. Memorize sterilization processes as well as quality control and assurance termsand procedures in the biochemistry and chemistry lab.

A15. List the basis of toxicity profiles of drugs/xenobiotic including source identification, symptoms, first aid measures and management.

A16. Identify the principles of thermodynamics and quantum mechanics including their applications in chemistry.

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B- Intellectual skills

By the end of this program the student should be able to:

B1. Evaluate knowledge and understanding of essential concepts, principles andtheories related to the studied basic science.

B2. Interpret qualitative and quantitative scientific data relevant to the various subjectsof chemistry and biochemistry.

B3. Evaluate data-processing skills, relating to chemical and biochemical informationdata.

B4. Deduce mechanisms and procedures for chemical and biochemical problems basedon critical thinking.

B5. Distinguish between different metabolic pathways.

B6. Decide the appropriate isolation and purification methods of active substancesfrom natural and synthetic origin.

B7. Generate and adopt the appropriate methods of synthesis, identification, andstandardization of active substances from natural and synthetic origins.

B8. Examine the different mechanisms of transcriptional, posttranscriptional andtranslational control of gene expression in prokaryotes and eukaryotes.

B9. Recognize signs, symptoms and risk factors that relate to medical or health problems that fall into the scope of practice of other healthcare professionals.

B10. Analyze literature, research skills, scientific thinking and statistics to enhancepractice-related activities.

B11. Contrast the role of oncogenes and tumor suppressor during the normal cellgrowth and carcinogenesis process.

B12. Interpret immunological and molecular reports.

B13. Organize of experimental work in molecular research laboratories.

B14. Critically evaluate their own research data and develop new approach to solvingtheir research questions.

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C- Professional and practical skills

By the end of this program the student should be able to:

C1. Measure the distinctive chemical properties of solutions and recognize the function of blood buffers and read a blind gases report

C2. Perform some chemical tests to identify different carbohydrates, lipids andproteins.

C3. Observe a demonstration for chromatography and electrophoresis techniques anduse them to separate different chemical compounds.

C4. Practice the use of laboratory equipment as pipettes, spectrophotometer andcentrifuges.

C5. Demonstrate animal dissection.

C6. Interpret biochemical calculations for normality and molarity.

C7. Apply buffer preparation and chemical and biological components determination.

C8. Apply spectrophotometer to determine the biological components contents.

C9. Apply Colorimetric assays to determine lipid, kidney, liver, heart and electrolytesprofile.

C10. Apply the safety precautions in chemistry and biochemistry labs (includes handling of samples and chemicals and General Housekeeping).

C11. Apply appropriate method to determine purity and integration of nucleic acidsuch as spectrophotometric method and agarose electrophoresis.

C12. Practice and perform the techniques of molecular biology including applying DNA and RNA isolation techniques such as Solvent extraction and spin column extraction.

C13. Conduct standard laboratory procedures involved in analytical and syntheticwork.

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C14. Apply computational tools and packages, to prepare technical reports and to usescientific literature effectively.

C15. Extract, isolate and purify active substances from different sources.

C16. Develop and assess novel methods of analysis.

C17. Develop advantageous analytical method over the existing traditional techniques

D- General and transferable skills

On successful completion of the Chemistry-Biochemistry Program, students will be ableto:

D1. Illustrate interpersonal skills, manage time, critical enquiry and self-learning skills.

D2. Address the community linked problems with considerable attention to the communityethics and traditions.

D3. Debate the scientific data in Arabic and English.

D4. Apply problem-solving skills, relating to qualitative and quantitative information.

D5. Investigate the thinking independently, set tasks and solve problems on ethical scientificbasis.

D6. Develop life-long learning and solve the community-linked problems.

D7. Deal with property rights legally and ethically.

D8. Exhibit the sense of beauty and neatness.

D9. Help students to work independently and as a part of a team and learn independently with open-mindedness and critical enquiry and Enhance self-learning skills.

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3- Academic Standards

The Academic Reference Standards for the award of the B.Sc. degree in chemistry- biochemistry as well as the attributes and capabilities of the graduates were based essentially on the National Academic Reference Standards (NARS) published by the National Authority for Quality Assurance and Accreditation of Education (2010/2011) for chemistry- biochemistry branch.

These general attributes of graduates were based essentially on the National Academic Reference Standards (NARS) as following:

1. Demonstrate wide background knowledge related to the different branches of chemistry / biochemistry
2. Acquire the knowledge and experience of principles and procedures employed in standard chemical and biochemical analyses using specialized laboratory techniques.
3. Review and evaluate quality control processes, safety regulations, manage risks and organize time to finish jobs.
4. Plan and conduct experimental work, critically evaluate the outcomes, review and report on practice.
5. Demonstrate knowledge, from an integrated point of view, of theories, facts, concepts and essentials of chemistry and biochemistry.
6. Recognize the relationship and interactions among chemistry, bio-chemistry and the environment and abide by the legislations and ethics related to the environment preservation and human health and welfare.
7- Apply theories and concepts of mathematics and statistics to understand the underlying mechanisms of the essential chemical and biochemical processes.

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

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1.1 Recognize the role of basic sciences in the development of society.

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

2. 1. Demonstrate wide background knowledge related to the different branches of chemistry /biochemistry.

2.2. Have values and beliefs that are commensurate with the ethics of our Arab society and in line with its laws in force, and is committed to the ethics of scientific research.

3. Recognize the molecular and chemical basis of the processes that occur in cells and living organisms.

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

5. 1 Analyze the biochemical data to characterize biomolecules and evaluate the activity of biochemical processes.

5.2 Collect, analyze, and present data using appropriate formats and techniques and use information technology relevant to the field efficiently.

6. Use modern biotechnological sciences, skills, and computer aids to support the research anduses of chemistry and biochemistry.

7. Apply theories and concepts of mathematics and statistics to understand the underlying mechanisms of the essential chemical and biochemical processes.

8. Engage in research teams, especially multidisciplinary teams. participate in quality control and review processes, risk management and time management for job termination.

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4- External references for standard (Benchmark)

Not applied.

5- Curriculum Structure and Contents

البند	علوم انسانية	علوم الحاسب	علوم اساسية	علوم التخصص		الاجمالي
				الكيمياء الحيوية	الكيمياء	
عدد الساعات المعتمدة	٨	٨	٣٦	٤٢	٤٢	١٣٦
عدد المقررات الاجباري	٢	٤	١٦	١٣	١٥	٥٠
عدد المقررات الاختياري	٢	-	-	٧	٧	١٦

	مجال المقارنة طبقا للهيئة القومية لضمان جودة التعليم					
البند	العلوم الانسانية	علوم الحاسب	علوم اساسية	علوم التخصص		الاجمالي
				الكيمياء الحيوية	الكيمياء	
عدد المقررات الاجباري	2	4	16	13	15	50
عدد المقررات الاختياري	2	-	-	7	7	16
عدد الساعات المعتمدة	8	8	36	42	42	136
النسبة المئوية%	%6	%6	%27	%61		
النسبة المئوية المرجعية ل NARS	%7-5	%7-5	%29-27	%61-55		

Note:

The decision of the College Council to approve the amendment of the order of some courses in the new regulations of the chemistry -Biochemistry Program

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المستوي الاول **الفصل الدراسي الاول**

الكود	اسم المقرر	حالة المقرر	متطلب المقرر	عدد الساعات				مالحظات	عدد الساعات
				ن	ع	ت	س م		
1001-001	لغة انجليزية	اجباري	--	2	-	-	2		13 ساعة معتمدة + 4 ساعات اختياري معتمدة
3121-001	مقدمة في الحاسب	اجباري	--	1	2	-	2		
2201-001	كيمياء غيرعضوية 1 و فيزيائية 1	اجباري	--	2	2	-	3		
2301-001	فيزياء عامة 1	اجباري	--	2	2	-	3		
2111-005	تفاضل وتكامل)1(وهندسة	اجباري	--	2	2	-	3		
2201-002	كيمياء عضوية وحيوية 1	اجباري	--	1	2	-	2		
1001-002	مبادئ ادارة	اختياري	--	2	-	-	2	يختار مقرر واحد	
1001-003	ثقافة بيئية	اختياري	--	2	-	-	2		

المستوي الاول **الفصل الدراسي الثاني**

الكود	اسم المقرر	حالة المقرر	متطلب المقرر	عدد الساعات				مالحظات	عدد الساعات
				ن	ع	ت	س م		
1002-004	التفكير العلمي والكتابة العلمية	اجباري	--	2	-	1	2		13 ساعة معتمدة + 4 ساعات اختياري معتمدة
3122-002	مبادئ برمجة	اجباري	3121-001	1	2	-	2		
2502-001	أساسيات علم الحيوان 1 (فسيولوجي وأنسجة)	اجباري	--	2	2	-	3		
2402-001	نبات عام	اجباري	--	2	2	-	3		
2602-001	جيولوجيا عامة 1	اجباري	--	2	2	-	3		
4702-046	الامان الحيوي	اختياري	--	1	2	-	2	يختار مقرر واحد	
4702-047	معايير المختبرات الحيوية	اختياري	--	1	2	-	2		
1002-005	تاريخ وفلسفة العلوم	اختياري	--	2	-	-	2	يختار مقرر واحد	
1002-006	حقوق انسان ومكافحة الفساد	اختياري	--	2	-	-	2		

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المستوي الثاني **الفصل الدراسي الثالث**

الكود	اسم المقرر	حالة المقرر	متطلب المقرر	عدد الساعات				مالحظات	عدد الساعات
				ن	ع	ت	س م		
3123-003	تحليل وعرض بيانات	اجباري	3122-002	2	1	-	2		14 ساعة معتمدة + 4 ساعات اختياري معتمدة
2203-002	كيمياء تحليلية وفيزيائية 2	اجباري	2201-001	2	1	-	2		
2303-002	فيزياء عامة 2	اجباري	2301-001	1	2	-	2		
2113-140	رياضة عامة 1	اجباري	2111-005	2	-	1	2		
2403-002	مقدمة في التقسيم والميكروبيولوجي	اجباري	2502-001	1	2	-	2		
4243-058	كيمياء عضوية 2	اجباري	--	1	2	-	2		
40-08470	ايض الفيتامينات والمعادن	اجباري	--	1	2	-	2		
35-07470	علم التغذية	اختياري	--	2	-	-	2	يختار مقرر واحد	
33-07470	كيمياء وبيولوجية ضوئية	اختياري	--	2	-	-	2		
4243-011	كيمياء التحاليل الاروماتية	اختياري	--	1	2	-	2	يختار مقرر واحد	
4233-012	كيمياء المواد المنظمة	اختياري	--	1	2	-	2		

المستوي الثاني **الفصل الدراسي الرابع**

الكود	اسم المقرر	حالة المقرر	متطلب المقرر	عدد الساعات				مالحظات	عدد الساعات
				ن	ع	ت	س م		
3124-004	تطوير مواقع الويب	اجباري	3123-003	2	-	1	2		12 ساعة معتمدة + 4 ساعات اختياري معتمدة
2304-003	فيزياء عامة 3	اجباري	2303-002	1	2	-	2		
2114-141	رياضة عامة 2	اجباري	2113-140	2	-	1	2		
2504-002	أساسيات علم الحيوان 2 (الفقاريات وفقاريات)	اجباري	2502-001	2	1	-	2		
4224-051	كيمياء غير عضوية 3	اجباري	--	2	1	-	2		
4704-050	اسس كيمياء حيوية 3	اجباري	--	2	1	-	2		
4704-051	المعلومات الحيوية	اختياري	-	2	-	1	2	يختار مقرر واحد	
4705-054	كيمياء الغدد الصماء	اختياري	--	2	-	-	2		
4224-049	كيمياء غير عضوية حيوية	اختياري	--	2	1	-	2	يختار مقرر واحد	
4244-014	كيمياء الاصباغ	اختياري	--	1	2	-	2		

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المستوي الثالث **الفصل الدراسي الخامس**

الكود	اسم المقرر	حالة المقرر	متطلب المقرر	عدد الساعات				مالحظات	عدد الساعات
				ن	ع	ت	س م		
2605-002	جيولوجيا عامة 2	اجباري	2602-001	1	2	-	2		14 ساعة معتمدة + 4 ساعات اختياري معتمدة
4225-061	كيمياء الممثلة والانتقالية	اجباري	--	2	1	-	2		
4215-016	كيمياء الديناميكا الحرارية	اجباري	--	1	2	-	2		
4215-062	كيمياء التركيب والطيف الجزيئي	اجباري	--	2	-	1	2		
4135-142	احصاء حيوي	اجباري	--	2	-	1	2		
4705-053	علم الأنزيمات	اجباري	--	2	1	-	2		
4706-020	ايض المواد الكربوهيدراتية والدهون	اجباري	--	1	2	-	2		
4708-034	مقدمة في التكنولوجيا الحيوية	اختياري	--	2	-	-	2	يختار مقرر واحد	
4706-056	ايض المواد الغير عضوية	اختياري	--	1	2	-	2		
4235-026	التحليل باستخدام االجهزة	اختياري	--	1	2	-	2	يختار مقرر واحد	
4235-063	التحليل باستخدام الطبقة الرقيقة	اختياري	--	1	2	-	2		

المستوي الثالث **الفصل الدراسي السادس**

الكود	اسم المقرر	حالة المقرر	متطلب المقرر	عدد الساعات				مالحظات	عدد الساعات
				ن	ع	ت	س م		
4705-014	علم الهرمونات	اجباري	--	2	-	-	2		12 ساعة معتمدة + 4 ساعات اختياري معتمدة
4706-021	الوظائف الحيوية وسوائل الجسم البيولوجية	اجباري	--	2	-	-	2		
4706-019	ايض الاحماض االامينية والبروتينات	اجباري	--	1	3	-	2		
4246-010	كيمياء عضوية فيزيائية	اجباري	--	1	2	-	2		
4216-015	ك حركية التفاعلات الكيميائية	اجباري	--	1	2	-	2		
4246-037	كيمياء عضوية غير متجانسة الحلقات	اجباري	--	1	2	-	2		
4705-055	كيمياء حيوية اكلينيكية	اختياري	--	2	1	-	2	يختار مقرر واحد	
4706-057	ايض المواد الغذائية	اختياري	--	1	2	-	2		
4246-044	كيمياء المنتجات الطبيعة	اختياري	--	1	2	-	2	يختار مقرر واحد	
4216-068	تطبيقات جزئية طيفية طبية	اختياري	--	1	2	-	2		

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الكود	اسم المقرر	حالة المقرر	متطلب المقرر	عدد الساعات				مالحظات	عدد الساعات
				ن	ع	ت	س م		
4707-058	مشروع تخرج	اجباري	--	1	-	2	2		14 ساعة معتمدة + 4 ساعات اختياري معتمدة
4247-045	ك الاطياف الجزئية التطبيقية	اجباري	--	2	-	1	2		
4247-023	كيمياء البلمرات الطبيعة	اجباري	--	1	2	-	2		
4707-027	ك المناعة	اجباري	--	1	2	-	2		
4707-030	تكنولوجيا االحماض النووية	اجباري	--	2	-	-	2		
4707-036	ك الاورام	اجباري	--	2	-	-	2		
4707-059	ك الاحماض النووية والنيوكليتدات	اجباري	--	1	2	-	2		
4703-049	كيمياء العلاج الكيماوي الحيوي	اختياري	--	2	1	-	2	يختار مقرر واحد	
4703-048	كيمياء العلاج الاشعاعي الحيوي	اختياري	--	2	1	-	2		
4217-054	كيمياء السطوح	اختياري	--	1	2	-	2	يختار مقرر واحد	
4217-042	كيمياء المحاليل الغروية	اختياري	--	1	2	-	2		

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الكود	اسم المقرر	حالة المقرر	متطلب المقرر	عدد الساعات				مالحظات	عدد الساعات
				ن	ع	ت	س م		
4228-057	ك اشعاعية ونووية	اجباري	--	1	2	-	2		12 ساعة معتمدة + 4 ساعات اختياري معتمدة
4218-032	ك فيزيائية البلمرات	اجباري	--	1	2	-	2		
4218-065	كيمياء كهربية	اجباري	--	1	2	-	2		
4248-035	ميكانيكا التفاعلات العضوية	اجباري	--	1	2	-	2		
4708-038	علم السموم	اجباري	--	1	2	-	2		
4703-023	كيمياء العقاقير الحديثة	اجباري	--	2	-	-	2		
4708-032	مقدمة في الطب الشرعي	اختياري	430-634	2	-	-	2	يختار مقرر واحد	
4704-052	كيمياء العلاج الجيني	اختياري	--	2	1	-	2		
4248-066	كيمياء المبيدات	اختياري	--	1	2	-	2	يختار مقرر واحد	
4218-040	التحليل الحراري	اختياري	--	2	-	1	2		

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6- Programmed Admission Requirements

Registration to the Faculty of Science requires the student to have the General Egyptian Secondary Education in Science Group Certificate or equivalent certificates or degrees approved by the Egyptian ministry of higher education with qualifying grades according to the guidelines put annually by the Ministry of higher education.

7- Regulations for progression and program completion

Rules related to course outlines are applied, along the 136 credit hours.

7-1. Students must have a grade of 60% (1.0 GPA) or higher to pass each course. If the student fails a course (< 1.0 GPA), he/she must retake the course.

7-2. Students must apply for and attend a minimum of six-weeks summer practical training in fields or laboratories of related companies: this should be proven by an official letter from the place of training. For some departments, this training may be done in the faculty facilities.

7-3. The program is completed by at least two scientific fieldtrips, on which a scientific descriptive report must be submitted by each student.

7-4. A student successfully completes the program only if he/she had accumulative grade of atleast 60% (1.0 accumulate GPA).

8- Assessment of program intended learning outcomes

8-1. Student assessment

Every student must attend, at least, 75 % of practical sections, which measured by attendancesheet and student log notebook that marked by administrator staffs and online learning teaching method also added

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Tool or method	ILOs
1- Written	Knowledge and understanding and Intellectual skills
2- Practical	Practical and professional skills
3- Mid-term	Knowledge and understanding and Intellectual skills
4- Student Activity	General and transferable skills
5- Oral exam	Knowledge and understanding and Intellectual skills

Every course will be assessed for a weight of 100

Evaluation will be:

- **Theortical course only:**

- 15% weightage (Mid- term exam in the 6th week)
- 15 % weightage (Student activity throughout the term)
- 10% weightage (Oral examination in the 10th week)
- 60% weightage (Semester end written examination)

- **Practical course only:**

- 10% weightage (Oral examination in the 10th week)
- 15% weightage (Mid- term practical exam in the 6 th week)
- 15 % weightage (Student activity throughout the term)
- 60% weightage (Semester end laboratory examination)

Beni-Suef University
Faculty of Science

Program specification
(Academic year 2023/2024)

- **Theortical & Practical courses:**

- 5% weightage (Mid- term exam in the 6 th week)
- 5 % weightage (student activity throughout the term)
- 10% weightage (Oral examination in the 10th week)
- 20% weightage (Semester end laboratory examination)
- 60% weightage (Semester end written examination).

9- Methods of program evaluation

No.	Evaluator	Tool	Sample
1	Senior Students	Questionnaire and open Discussion	70%
2	Alumini	Meeting and Questionnaire	60%
3	Stakeholders	Meeting and Questionnaire	Approximate sample
4	External Evaluator(s)	Test reviews	All participants in the program
5	Others	Personal interview	All participle program ants in it

Program coordinator

Dr. Asmaa Mohamed Mahmoud

رئيس مجلس القسم

ا.د/ بسنت محمود

مصفوفة التوافق بين مواصفات الخريج لبرنامج الكيمياء والكيمياء الحيوية مع أهداف البرنامج	
General attributes of Graduates	**Program Aims**
1.1 Recognize the role of basic sciences in the development of society. **1.2** Develop scientific approaches that meet community needs considering economic, environmental, social ethical and safety requirements.	1. Provide graduate with a wide range of integrated knowledge, concepts and theories of basic science to interpret in the field of Chemistry and Biochemistry, 5. Participate as a member in team, recognize and respect the team members, and are flexible for adaptation to work conditions.
2.1. Demonstrate wide background knowledge related to the different branches of chemistry / biochemistry. 2.2. Has values and beliefs that are commensurate with the ethics of our Arab society and in line with its laws in	1. Provide graduate with a wide range of integrated knowledge, concepts and theories of basic science to interpret in the field of Chemistry and Biochemistry,

force, and is committed to the ethics of scientific research.	**2.** Enable graduate students to gain the practical and laboratory skills required for experiments in Chemistry-Biochemistry field. 3. Master safe handling techniques of chemicals and biological fluids. 9. Demonstrate knowledge from an integrated point of view of theories, facts, concepts and essentials of chemistry and biochemistry.
3. Recognize the molecular and chemical basis of the processes that occur in cells and living organisms.	6. Provide with certain skills for using the different biochemical tools to acquire data and to have the ability for analyzing, interpreting and figuring out the results. 4. Develop graduates with the skills of data collection, interpretation and presentation data in English and Arabic.

	10. Provide experience of current analytical techniques and practical skills relevant to chemistry-biochemistry and appropriate for employment.
4. Recognize the relationship and interactions among chemistry, biochemistry and the environment and abide by the legislations and ethics related to the environment preservation and human health and welfare.	6. Provide with certain skills for using the different biochemical tools to acquire data and to have the ability for analyzing, interpreting and figuring out the results. 7. Provide graduate with skills of quality control processes evaluation, risk management and time organization.
5.1. Analyze the biochemical data to characterize biomolecules and evaluate the activity of biochemical processes.	2. Demonstrate knowledge from an integrated point of view of theories, facts, concepts and essentials of chemistry and biochemistry.

5.2 Collect, analyze, and present data using appropriate formats and techniques and use information technology relevant to the field efficiently.	7. Provide graduate with skills of quality control processes evaluation, risk management and time organization
6. Use modern biotechnological sciences, skills, and computer aids to support the research and uses of chemistry and biochemistry.	**4.** Provide experience of current analytical techniques and practical skills relevant to chemistry-biochemistry and appropriate for employment.
7. Apply theories and concepts of mathematics and statistics to understand the underlying mechanisms of the essential chemical and biochemical processes.	**5.** Participate as a member in team, recognize and respect the team members, and are flexible for adaptation to work conditions 6. Provide with certain skills for using the different biochemical tools to acquire data and to have the ability for analyzing, interpreting and figuring out the results.

8. Engage in research teams, especially multidisciplinary teams. participate in quality control and review processes, risk management and time management for job termination.	**5.** Participate as a member in team, recognize and respect the team members, and are flexible for adaptation to work conditions. **8.** Provide graduate with skills and attitude necessary for lifelong and independent learning the ethics related to environment caring and community problems.

عميد الكلية

ا.د/ حمدي محمد محمود

رئيس مجلس القسم

ا.د/ بسنت محمود

كلية العلوم – جامعة بني سويف

قسم الكيمياء الحيوية

مصفوفة التوافق بين المعايير الأكاديمية لبرنامج الكيمياء والكيمياء الحيوية ونواتج التعلم المستهدفة من البرنامج		
A-Knowledge and understanding		
NARS (5)	**Program ILOS (16)**	**Couse code**
A. 1. Demonstrate knowledge and comprehension of the theories, facts, concepts, fundamentals and techniques related to the fields of chemistry and biochemistry.	A1. Recall the influence of chemistry and biochemistry, professional ethics, and regulatory bodies in professional practice. A3. Define chemical structure, stereo chemical aspects, physicochemical properties and principles of chemical reactions.	**1001-002; 1001-003; 1002-005; 1002-006; 4243-058;; 3121-001; 2201-001; 2301-001; 2111-005; 2201-002; 2113-140; 2203-002; 2303-002; 2502-001; 2402-001; 2602-001**

	A4. Define fundamental terminology and classification systems used in basic science	
A. 2. Acquire the essential knowledge in mathematics, physics, biology, statistics and other collateral subjects in order to understand the advanced and contemporary topics of chemistry and biochemistry..	A2. Recall the importance of Arabic and English languages in professional practice. A5. Explain concepts, principles and theories related to basic science.	**1001-001; 1001-003; 1002-004; 1002-005; 4135-142; 2605-002; 4224-049; 2504-002; 4704-050; 2304-003; 3124-004**
A.3. Exhibit familiarity with the principles and procedures used in chemical analyses as well as in	A6. Describe knowledge and comprehension of the theories, concepts and techniques related to	**3124-004; 4233-012; 4224-051; 4215-016; 4225-061; 4215-062; 4216-015; 4246-010; 4703-048;**

characterization and structural investigation of Compounds.	aromatic, environmental, nuclear, inorganic and spectroscopic studies of chemistry. A7. Outline the principles of isolation, purification, as well as qualitative and quantitative analysis.	**4703-049; 4218-032; 4228-057; 4248-066; 4218-040; 4235-026; 4235-063; 4243-011; 4224-049; 2201-001; 2203-002**
A.4. Characterize the chemical nature and behavior of the functional groups in different types of molecules.	A8. Describe the relationship of chemical and molecular structure of metabolic components with mechanisms of actions, biological activities, concepts of informatics and designing and targeting of biological components.	**4707-035; 4708-040; 4705-054; 2114-141; 4705-014; 4705-053; 4707-059; 4705-055; 4708-032; 4708-038; 4248-066; 4704-052;; 4706-057; 4707-030; 4706-019; 4706-021; 4706-020; 4708-034; 4706-056; 4702-047; 4702-046;**

	A9. Explain key metabolic reactions involved in the biosynthesis and degradation of biological molecules A10. Understand the basic knowledge of the molecular biosciences, including biochemical processes, genetics, molecular biology and cell biology. A14. Memorize sterilization processes as well as quality control and assurance terms and procedures in the biochemistry and chemistry lab.	**4244-014; 4707-033; 4216-015; 4235-026; 4705-055; 4246-037; 4703-023**

A.5. Appreciate the concepts of biodiversity and maintaining of natural resources	A11. Recognize the relevance of biochemistry, molecular biology, immunology, microbiology and toxicology to disease states, diagnosis and therapeutics. A12. Name the principles of public health issues such as laboratory diagnosis of diseases. A13. Recall the principles and techniques of compounding, manufacturing, biotechnology, and packaging of chemicals products. A15. List the basis of toxicity profiles of drugs/xenobiotic including source	**4702-046; 4704-051; 4705-055; 4707-027; 4707-036; 4703-048; 4703-049; 4703-023; 4708-038; 4704-052; 4707-058; 4706-021; 4705-014; 4707-035; 4708-040; 4702-046; 4702-047; 3123-003; 4218-040; 4248-066; 4218-032; 4218-065; 4248-035; 4708-038; 4703-023; 4217-042; 4217-054; 4247-023; 4247-045; 4216-015; 4216-068; 4246-037; 4246-010; 4244-014; 4215-016; 4233-012**

	identification, symptoms, first aid measures and management. A16. Identify the principles of thermodynamics and quantum mechanics including their applications in chemistry.	
B- Intellectual skills		
NARS (6)	**Program ILOS (14)**	**Couse code**
B. 1. Discuss subject- related theories and assess their concepts and principles.	B1. Evaluate knowledge and understanding of essential concepts, principles and theories related to the studied basic science.	**2201-001; 2301-001; 2111-005; 2201-002; 2502-001; 2602-001; 2302-002; 2131-140; 2123-003; 4243-058**

B. 2 Analyze, evaluate and interpret qualitative and quantitative scientific data relevant to the various subjects of chemistry and biochemistry	B2. Interpret qualitative and quantitative scientific data relevant to the various subjects of chemistry and biochemistry. B3. Evaluate data-processing skills, relating to chemical and biochemical information data B4. Deduce mechanisms and procedures for chemical and biochemical problems based on critical thinking. B5. Decide the appropriate isolation and purification methods of active	**3121-001; 1002-004; 3123-003; 2304-003; 3124-004; 4224-051; 2504-002; 2605-002; 4704-051; 4135-142; 4225-061; 4707-058; 4703-049; 4703-023; 4703-048; 4708-040; 2114-141; 4705-054; 4215-062; 4705-053; 4706-020; 4706-056; 4705-014; 4706-021; 4706-019; 4246-037; 4705-055; 4706-057; 4216-068; 4247-045; 4707-059; 4217-054; 4248-035; 4228-057; 4247-023; 1001-001; 4707-035; 4704-050; 4704-051; 4244-014; 4246-010; 4216-015.**

	substances from natural and synthetic origin B10. Analyze literature, research skills, scientific thinking and statistics to enhance practice-related activities.	
B. 3. Postulate and deduce mechanisms and procedures to handle scientific problems and choose optimum solutions for chemical and biochemical problems based on critical thinking.	B6. Generate and adopt the appropriate methods of synthesis, identification, and standardization of active substances from natural and synthetic origins	**4707-030; 4708-034; 2403-002**

B. 4. Develop lines of argument and appropriate judgment in accordance with scientific theories and concepts in the area of study.	B7. Generate and adopt the appropriate methods of synthesis, identification, and standardization of active substances from natural and synthetic origins B8. Examine the different mechanisms of transcriptional, posttranscriptional and translational control of gene expression in prokaryotes and eukaryotes	**4215-016; 4215-062; 4235-26; 4235-063; 4246-037; 4246-044; 4218-032; 4217-042**
B.5. Analyze and interpret quantitative data relevant to the fields of chemistry and biochemistry in graphs, figures,	B9. Recognize signs, symptoms and risk factors that relate to medical or health problems that fall into the	**4707-033; 4705-054; 4705-055; 4216-068; 4707-058; 4707-036;**

tables, equations, and other sources of information.	scope of practice of other healthcare professionals B11. Contrast the role of oncogenes and tumor suppressor during the normal cell growth and carcinogenesis process	**4708-038; 4808-032; 4704-052; 4248-066**
B6. Construct several related and integrated information to confirm, make evidence and test hypotheses.	B12. Interpret immunological and molecular reports. B13. Organize of experimental work in molecular research laboratories. B14. Critically evaluate their own research data and develop new approach to solving their research questions.	**1001-003; 1002-005; 1001-002; 4224-049; 4705-014; 4706-021; 4706-019; 4247-045; 4707-027; 4707-030; 4707-059; 4808-038; 4707-058; 4248-066**

C- Practical and Professional Skills		
NARS (7)	**Program ILOS (17)**	**Couse code**
C. 1. Plan and conduct investigations using appropriate techniques relevant to the fields of chemistry and biochemistry and write structural reports on the data in accordance with the standard scientific guide lines.	C1. Measure pH of a solution and recognize the function of blood buffers and read a blind gases report	**2201-001; 4224-051; 3123-003; 4224-049**
C. 2. Handle chemical materials safely and conduct risk assessments taking into account their physical and	C3. Observe a demonstration for chromatography and electrophoresis techniques and use them to separate different chemical compounds	**2201-001; 2301-001; 2201-002; 1002-004; 2402-001; 4702-046; 4702-047; 2203-002; 2303-002; 2403-002; 4243-011; 4233-012;**

chemical properties to avoid hazards associated with their use.	C4. Practice the use of laboratory equipment as pipettes, spectrophotometer and centrifuges.	**2304-003; 2114-141; 4224-051; 4244-014; 4225-061; 4215-061; 4215-062; 4705-053; 4706-020; 4706-056; 4235-026; 4235-063; 4706-019; 4246-037; 4705-055; 4706-057; 4216-068; 4247-045; 4707-027; 4703-048; 4703-049l 4218-065; 4248-035; 4708-038; 4703-023; 4248-066; 4218-040**
C.3. Solve problems related to the fields of chemistry and biochemistry using a range of formats and approaches and employ appropriate techniques and	C2. Perform some chemical tests to identify different carbohydrates, lipids and proteins. C6. Interpret biochemical calculations for normality and molarity.	**4704-050; 4706-020; 4706-056; 4706-019; 4246-04; 4706-057; 4703-023; 4705-055; 4706-056; 4235-026; 4706-020; 4225-061; 4215-016; 4215-062; 4224-049;**

tools in accordance with scientific ethics.	C7. Apply buffer preparation and chemical and biological components determination	**4244-014; 4224-051; 4243-011; 4233-012; 2203-002; 2201-001**
C. 4. Employ standard laboratory instruments, procedures, and techniques used in the chemical and biochemical investigations.	C3. Observe a demonstration for chromatography and electrophoresis techniques and use them to separate different chemical compounds C8. Apply spectrophotometer to determine the biological components contents. **C10**. Apply the safety precautions in molecular biology labs (includes	**1002-004; 2114-141; 2203-002; 4235-026; 4215-062; 4216-068; 4235-063; 4218-065; 4247-045; 4703-023; 4248-035; 4218-040; 4248-066; 4708-040; 4705-053; 2114-141; 4706-020; 4706-019; 4705-055; 4708-038; 4248-066; 4702-047; 4702-046; 4235-026; 4704-051; 4704-052; 4707-027;**

	handling of samples and chemicals and General Housekeeping). **C14.** Apply computational tools and packages, to prepare technical reports and to use scientific literature effectively	**3121-001; 3123-003; 3122-002; 3124-004**
C. 5. Apply mathematical and computational tools to analyze and interpret experimental data in terms of theories relevant to chemistry and biochemistry.	**C13.** Conduct standard laboratory procedures involved in analytical and synthetic work	4243-058; 4244-014; 4224-051; 4246-037; 4246-010; 4228-057; 4218-032; 4248-035; 4703-023

C. 6. Read, scrutinize, and evaluate the validity and relevance of literature in a critical thinking approach.	C9. Apply Colorimetric assays to determine lipid, kidney, liver, heart and electrolytes profile. **C10**. Apply the safety precautions in molecular biology labs (includes handling of samples and chemicals and General Housekeeping). **C14.** Apply computational tools and packages, to prepare technical reports and to use scientific literature effectively **C15**. Extract, isolate and purify active substances from different sources	**4246-044; 4235-063; 4708-040; 4702-046; 4235-026; 4704-051; 4704-052; 4707-027; 3121-001; 3123-003; 3122-002; 3124-004 ; 4243-011; 4246-044; 4247-023.**

C7. Consider variations inherent in dealing with biological materials such as sample size, accuracy, precision and calibration.	C11. Apply appropriate method to determine purity and integration of nucleic acid such as spectrophotometric method and agarose electrophoresis. C12. Practice and perform the techniques of molecular biology. C16. Develop and assess novel methods of analysis C17. Develop advantageous analytical method over the existing traditional techniques	**4704-051; 4247-045; 4707-059; 4703-048; 4703-049; 4218-065; 4217-042; 4704-052; 4244-014; 4215-062; 4235-026; 4235-063; 4216-015; 4246-037; 4246-044; 4216-068; 4247-045; 4703-049; 4217-054; 4217-042; 4228-057; 4218-032; 4218-065; 4248-035; 4708-038248-066; 4704-052; 4218-040**
D-General and Transferable Skills		
NARS (8)	**Program ILOS (9)**	**Couse code**

D. 1. Use information and communication technology effectively.	**D1.** Illustrate interpersonal skills, manage time, critical enquiry and self-learning skills.	1001-001; 2301-001; 1001-002; 1001-003; 3122-002; 3121-001; 2502-001; 2602-001; 1002-005; 1002-006; 3123-003; 2113-140; 4243-058; 4708-040; 4707-035; 4243-011; 4233-012 ; 2304-003; 2504-002; 4224-051 ; 4706-056; 4707-058; 4705-014; 4707-030
D. 2. Identify roles and responsibilities, delegate tasks, and set clear guidelines and performance indicators.	**D2.** Address the community linked problems with considerable attention to the community ethics and traditions. **D3.** Debate the scientific data in Arabic and English	**2201-002; 1001-002; 1001-003 ;1002-004; 4702-046; 2402-001; 2203-002; 4702-047; 2403-002; 4243-058; 4707-033; 4243-011; 3124-004; 2504-002; 4224-051; 4704-050; 4704-051; 4705-054;**

	D 4. Apply problem-solving skills, relating to qualitative and quantitative information.	**4224-049; 2605-002; 4705-053; 4215-062; 4235-026; 4235-063; 4706-021; 4706-019; 4247-045; 4246-037; 4707-036; 4703-049; 4703-048; 4218-032; 4217-042; 4703-023; 4708-032; 4704-052; 4218-040**
D. 3. Exhibit the sense of beauty and neatness.	**D 4.** Apply problem-solving skills, relating to qualitative and quantitative information.	**4707-033; 3124-004; 2504-002; 4224-051; 4704-050; 4704-051; 4705-054; 4224-049; 2605-002; 4705-053; 4215-062; 4235-026; 4235-063; 4706-021; 4706-019; 4247-045; 4246-037; 4707-036; 4703-049; 4703-048; 4218-032;**

		4217-042; 4703-023; 4708-032; 4704-052; 4218-040
D. 4. Think independently and solve problems on scientific basis.	**D5.** Investigate the thinking independently, set tasks and solve problems on ethical scientific basis **D6.** Develop life-long learning and solve the community-linked problems	**2502-001; 4708-040; 2114-141; 4706-020; 4708-034; 4706-056; 4235-026; 4216-068; 4246-010; 4216-015; 4707-036; 4707-027; 4228-057; 4708-038; 4703-023.**
D. 5. Address the community linked problems with considerable attention to the community ethics and traditions.	**D2** Address the community linked problems with considerable attention to the community ethics and traditions	**1001-002; 1001-003 ;1002-004; 4702-046; 2203-002; 4702-047; 2403-002; 4243-011; 4703-049; 4703-048; 4703-023**
D. 6. Work in a team effectively, manage time, collaborate and communicate with others positively.	**D7** Deal with property rights legally and ethically.	**2403-002; 1001-002; 4246-068; 4224-049; 4247-023; 4707-059; 4248-066;**

D. 7. Deal with property rights legally and ethically.	**D7** Deal with property rights legally and ethically. **D8** Exhibit the sense of beauty and neatness. **D9** Help students to work independently and as a part of a team and learn independently with open-mindedness and critical enquiry and Enhance self-learning skills.	**2403-002; 1001-002; 4246-068; 4224-049; 4247-023; 4707-059; 4248-066; 4708-040; 4224-051; 4225-061; 4215-062; 4706-020; 4246-010; 4706-057; 4217-054; 2602-001; 1002-005; 4246-037; 4707-035; 4705-055; 4228-057; 4248-035; 4708-032; 4218-040.**
D8. Acquire self - and lifelong learning.	**D8** Exhibit the sense of beauty and neatness. **D9** Help students to work independently and as a part of a team	**4708-040; 4224-051; 4225-061; 4215-062; 4706-020; 4246-010; 4706-057; 4217-054; 2602-001; 1002-005; 4246-037; 4707-035;**

	and learn independently with open-mindedness and critical enquiry and Enhance self-learning skills.	**4705-055; 4228-057; 4248-035; 4708-032; 4218-040.**

رئيس مجلس القسم

ا.د/ يسنت محمود

عميد الكلية

ا.د/ حمدي محمد محمود

مصفوفة التوافق بين مواصفات الخريج واهداف البرنامج مع نواتج التعلم المستهدفة بالبرنامج مع نواتج التعلم المتبناة من الهيئة مع المقررات الدراسية للبرنامج (الكيمياء والكيمياء الحيوية) [لائحة جديدة]

General attributes of graduates	Program aim	NARS	Program ILOS	Course codes
1.1 Recognize the role of basic sciences in the development of society. **1.2** Develop scientific approaches that meet community needs considering economic, environmental, social ethical and safety requirements.	1. Provide graduate with a wide range of integrated knowledge, concepts and theories of basic science to interpret in the field of Chemistry and Biochemistry, 5. Participate as a member in team, recognize and respect the team members, and are flexible for adaptation to work conditions.	**A. 1.** Demonstrate knowledge and comprehension of the theories, facts, concepts, fundamentals and techniques related to the fields of chemistry and biochemistry. **B. 1.** Discuss subject- related theories and assess their concepts and principles. **C. 1.** Plan and conduct investigations using appropriate techniques relevant to the fields of chemistry and biochemistry and write structural reports on the data in accordance with the standard scientific guide lines. **D. 1.** Use information and communication technology effectively.	A1. Recall the influence of chemistry and biochemistry, professional ethics, and regulatory bodies in professional practice. A3. Define chemical structure, stereo chemical aspects, physicochemical properties and principles of chemical reactions. A4. Define fundamental terminology and classification systems used in basic science. B1. Evaluate knowledge and understanding of essential concepts, principles and theories related to the studied basic science. C1. Measure pH of a solution and recognize the function of blood buffers and read a blind gases report C5. Demonstrate animal dissection. **D1.** Illustrate interpersonal skills, manage time, critical enquiry and self-learning skills.	**3121-001; 2201-001; 2301-001; 2111-005; 2201-002; 1001-002; 1001-003 1002-005; 1002-006; 2203-002; 4243-058; 2502-001; 2402-001; 2602-001; 2302-002; 2131-140; 3123-003; 4224—049; 4224-051; 2504-002; 4706-056; 4705-014; 4707-058; 4707-030**
2.1. Demonstrate wide background knowledge related to the different	1. Provide graduate with a wide range of integrated knowledge, concepts and theories of basic science to	**A. 2.** Acquire the essential knowledge in mathematics, physics, biology, statistics and other collateral subjects in	A2. Recall the importance of Arabic and English languages in professional practice. A5. Explain concepts, principles and theories related to basic science.	**1001-001; 1001-004; 1002-005; 3121-001; 3123-003; 4704-050; 4224-049; 4135-142;**

General attributes of graduates	Program aim	NARS	Program ILOS	Course codes
branches of chemistry / biochemistry. 2.2. Has values and beliefs that are commensurate with the ethics of our Arab society and in line with its laws in force, and is committed to the ethics of scientific research.	interpret in the field of Chemistry and Biochemistry, **2.** Enable graduate students to gain the practical and laboratory skills required for experiments in Chemistry-Biochemistry field. 3. Master safe handling techniques of chemicals and biological fluids. 9. Demonstrate knowledge from an integrated point of view of theories, facts, concepts and essentials of chemistry and biochemistry.	order to understand the advanced and contemporary topics of chemistry and biochemistry.. **B. 2** Analyze, evaluate and interpret qualitative and quantitative scientific data relevant to the various subjects of chemistry and biochemistry. **C. 2.** Handle chemical materials safely and conduct risk assessments taking into account their physical and chemical properties to avoid hazards associated with their use. **D. 2.** Identify roles and responsibilities, delegate tasks, and set clear guidelines and performance indicators.	B2. Interpret qualitative and quantitative scientific data relevant to the various subjects of chemistry and biochemistry. B3. Evaluate data-processing skills, relating to chemical and biochemical information data C3. Observe a demonstration for chromatography and electrophoresis techniques and use them to separate different chemical compounds C4. Practice the use of laboratory equipment as pipettes, spectrophotometer and centrifuges. **D2.** Address the community linked problems with considerable attention to the community ethics and traditions. **D3.** Debate the scientific data in Arabic and English	**2304-003; 4704-051; 4707-058; 4215-062; 4235-026; 4216-068; 4247-045; 4218-065; 4248-035; 4218-040; 2301-001; 2403-002; 4707-033; 4233-012; 2304-003; 4244-014; 4225-061; 4215-016; 4705-053; 4706-020; 4706-056; 4706-019; 4705-055; 4706-057; 4216-068; 4707-027; 4703-048; 4708-038; 4248-066; 1001-002; 1001-003; 3122-002; 2402-001; 4702-046; 4702-047; 2203-002; 2403-002; 3124-004; 4707-059; 4703-049; 4703-023; 4246-037; 4707-036; 2504-002; 4224-051; 4235-026; 4235-063; 4243-058; 4243-011; 2201-001; 2111-005; 2201-002; 2203-002.**

General attributes of graduates	Program aim	NARS	Program ILOS	Course codes
3. Recognize the molecular and chemical basis of the processes that occur in cells and living organisms.	6. Provide with certain skills for using the different biochemical tools to acquire data and to have the ability for analyzing, interpreting and figuring out the results. 4. Develop graduates with the skills of data collection, interpretation and presentation data in English and Arabic. 10. Provide experience of current analytical techniques and practical skills relevant to chemistry-biochemistry and appropriate for employment.	**A.3.** Exhibit familiarity with the principles and procedures used in chemical analyses as well as in characterization and structural investigation of Compounds. **B. 2.** Analyze, evaluate and interpret qualitative and quantitative scientific data relevant to the various subjects of chemistry and biochemistry. **C.3.** Solve problems related to the fields of chemistry and biochemistry using a range of formats and approaches and employ appropriate techniques and tools in accordance with scientific ethics. **D. 2.** Identify roles and responsibilities , delegate tasks, and set clear guidelines and performance indicators. **D. 3.** Exhibit the sense of beauty and neatness.	A6. Describe knowledge and comprehension of the theories, concepts and techniques related to aromatic, environmental, nuclear, inorganic and spectroscopic studies of chemistry. A7. Outline the principles of isolation, purification, as well as qualitative and quantitative analysis. B4. Deduce mechanisms and procedures for chemical and biochemical problems based on critical thinking. C2. Perform some chemical tests to identify different carbohydrates, lipids and proteins. C6. Interpret biochemical calculations for normality and molarity. C7. Apply buffer preparation and chemical and biological components determination **D 4.** Apply problem-solving skills, relating to qualitative and quantitative information.	**4707-033; 4233-012; 3124-004; 4224-051; 4215-016; 4215-062; 4246-010; 4216-015; 4703-049; 4703-048; 4228-057; 4218-032; 4248-066; 2201-001; 2203-002; 422-011; 4224-049; 4235-026; 4235-063; 4218-040; 4705-054; 4705-053; 4705-014; 4706-021; 4246-037; 4705-055; 4216-068; 4247-045; 4217-054; 4248-035; 4704-050; 4706-020; 4706-056; 4706-019; 4706-057; 4246-044; 4244-014; 4703-023; 4704-051; 2605-002; 4217-042; 4708-032; 4704-052.**

General attributes of graduates	Program aim	NARS	Program ILOS	Course codes
4. Recognize the relationship and interactions among chemistry, biochemistry and the environment and abide by the legislations and ethics related to the environment preservation and human health and welfare.	6. Provide with certain skills for using the different biochemical tools to acquire data and to have the ability for analyzing, interpreting and figuring out the results. 7. Provide graduate with skills of quality control processes evaluation, risk management and time organization.	**A.4.** Characterize the chemical nature and behavior of the functional groups in different types of molecules. **B. 2.** Analyze, evaluate and interpret qualitative and quantitative scientific data relevant to the various subjects of chemistry and biochemistry. **C. 4.** Employ standard laboratory instruments, procedures, and techniques used in the chemical and biochemical investigations. **D. 4.** Think independently and solve problems on scientific basis.	A8. Describe the relationship of chemical and molecular structure of metabolic components with mechanisms of actions, biological activities, concepts of informatics and designing and targeting of biological components. A9. Explain key metabolic reactions involved in the biosynthesis and degradation of biological molecules A10. Understand the basic knowledge of the molecular biosciences, including biochemical processes, genetics, molecular biology and cell biology. B5. Decide the appropriate isolation and purification methods of active substances from natural and synthetic origin C3. Observe a demonstration for chromatography and electrophoresis techniques and use them to separate different chemical compounds C8. Apply spectrophotometer to determine the biological components contents. **D5.** Investigate the thinking independently, set tasks and solve problems on ethical scientific basis	**2114-141; 4708-040; 4707-035; 4705-054; 4705-053; 4705-014; 4705-055; 4707-059; 4708-038; 4708-032;4248-066; 4706-020; 4706-056; 4706-021; 4706-019; 4706-057; 4708-034; 4707-030; 4704-052; 2203-002; 4215-062; 4235-026; 4235-063;4216-068; 4247-045; 4218-065;4248-035;4703-023.**
5.1. Analyze the biochemical data to characterize biomolecules and evaluate	2. Demonstrate knowledge from an integrated point of view of theories, facts, concepts and essentials of	**A.5.** Appreciate the concepts of biodiversity and maintaining of natural resources.	A13. Recall the principles and techniques of compounding, manufacturing,	**4702-046; 4702-047; 2403-002; 4708-034; 4707-030; 1001-001; 4707-035; 4704-050;**

General attributes of graduates	Program aim	NARS	Program ILOS	Course codes
the activity of biochemical processes. 5.2 Collect, analyze, and present data using appropriate formats and techniques and use information technology relevant to the field efficiently.	chemistry and biochemistry. 7. Provide graduate with skills of quality control processes evaluation, risk management and time organization	**B. 3.** Postulate and deduce mechanisms and procedures to handle scientific problems and choose optimum solutions for chemical and biochemical problems based on critical thinking. **C. 5.** Apply mathematical and computational tools to analyze and interpret experimental data in terms of theories relevant to chemistry and biochemistry. **D. 4.** Think independently and solve problems on scientific basis.	biotechnology, and packaging of chemicals products. B6. Generate and adopt the appropriate methods of synthesis, identification, and standardization of active substances from natural and synthetic origins B10. Analyze literature, research skills, scientific thinking and statistics to enhance practice-related activities. **C13.** Conduct standard laboratory procedures involved in analytical and synthetic work **D6.** Develop life-long learning and solve the community-linked problems	**4704-051; 4244-014; 4246-010; 4216-015; 4247-023; 4228-057; 2502-001; 4708-040; 4706-020; 4706-056; 4235-026; 4707-027; 4707-036; 4703-023; 4243-058; 4224-051; 4246-037; 4246-044; 4218-032; 4248-035.**
6. Use modern biotechnological sciences, skills, and computer aids to support the research and uses of chemistry and biochemistry.	**4.** Provide experience of current analytical techniques and practical skills relevant to chemistry-biochemistry and appropriate for employment.	**A.4.** Characterize the chemical nature and behavior of the functional groups in different types of molecules. **B. 4.** Develop lines of argument and appropriate judgment in accordance with scientific theories and concepts in the area of study.	A14. Memorize sterilization processes as well as quality control and assurance terms and procedures in the biochemistry and chemistry lab. B7. Generate and adopt the appropriate methods of synthesis, identification, and standardization of active substances from natural and synthetic origins B8. Examine the different mechanisms of transcriptional, posttranscriptional and	**4702-046; 4707-033;4705-055;4702-047;4217-042; 4218-032;4215-016; 4215-062; 4235-026; 4235-063; 4246-037; 4246-044; 4708-040; 1001-002;1001-003;3122-002;2402-001;2203-002; 2403-002; 3124-**

General attributes of graduates	Program aim	NARS	Program ILOS	Course codes
		C. 6. Read, scrutinize, and evaluate the validity and relevance of literature in a critical thinking approach. **D. 5.** Address the community linked problems with considerable attention to the community ethics and traditions.	translational control of gene expression in prokaryotes and eukaryotes C9. Apply Colorimetric assays to determine lipid, kidney, liver, heart and electrolytes profile. **C15**. Extract, isolate and purify active substances from different sources **D2** Address the community linked problems with considerable attention to the community ethics and traditions	**004; 4703-048; 4703-023; 4243-011; 4247-023.**
7. Apply theories and concepts of mathematics and statistics to understand the underlying mechanisms of the essential chemical and biochemical processes.	**5.** Participate as a member in team, recognize and respect the team members, and are flexible for adaptation to work conditions 6. Provide with certain skills for using the different biochemical tools to acquire data and to have the ability for analyzing, interpreting and figuring out the results.	**A. 5.** Appreciate the concepts of biodiversity and maintaining of natural resources. **B.5.** Analyze and interpret quantitative data relevant to the fields of chemistry and biochemistry in graphs, figures, tables, equations, and other sources of information. **C. 4.** Employ standard laboratory instruments, procedures, and techniques used in the chemical and biochemical investigations. **D.6.** Read, scrutinize, and evaluate the validity and relevance of literature in a critical thinking approach.	A11. Recognize the relevance of biochemistry, molecular biology, immunology, microbiology and toxicology to disease states, diagnosis and therapeutics. A12. Name the principles of public health issues such as laboratory diagnosis of diseases. B9. Recognize signs, symptoms and risk factors that relate to medical or health problems that fall into the scope of practice of other healthcare professionals B11. Contrast the role of oncogenes and tumor suppressor during the normal cell growth and carcinogenesis process **C10**. Apply the safety precautions in molecular biology labs (includes handling	**4702-046; 4704-051; 4705-055; 4216-068; 4707-027; 4707-036; 4703-049; 4703-048; 4708-038; 4703-023; 4704-052; 4708-040; 4707-035; 4705-014; 4706-021; 4707-058; 4707-033; 4705-054; 4708-032; 4248-066; 4702-047; 4235-026; 2201-001; 1001-002; 4203-002; 4224-049; 4246-044; 4247-023; 4707-059; 3121-001; 3122-002; 3123-003; 3124-004.**

General attributes of graduates	Program aim	NARS	Program ILOS	Course codes
		D. 6. Work in a team effectively, manage time, collaborate and communicate with others positively. **D. 7.** Deal with property rights legally and ethically.	of samples and chemicals and General Housekeeping). **C14.** Apply computational tools and packages, to prepare technical reports and to use scientific literature effectively **D7** Deal with property rights legally and ethically.	
8. Engage in research teams, especially multidisciplinary teams. participate in quality control and review processes, risk management and time management for job termination.	**5.** Participate as a member in team, recognize and respect the team members, and are flexible for adaptation to work conditions. **8.** Provide graduate with skills and attitude necessary for lifelong and independent learning the ethics related to environment caring and community problems.	**A5.** Appreciate the concepts of biodiversity and maintaining of natural resources. **B6.** Construct several related and integrated information to confirm, make evidence and test hypotheses. **C7.** Consider variations inherent in dealing with biological materials such as sample size, accuracy, precision and calibration. **D7.** Exhibit the sense of beauty and neatness.. **D8.** Acquire self - and lifelong learning.	A15. List the basis of toxicity profiles of drugs/xenobiotic including source identification, symptoms, first aid measures and management. A16. Identify the principles of thermodynamics and quantum mechanics including their applications in chemistry. B12. Interpret immunological and molecular reports. B13. Organize of experimental work in molecular research laboratories. B14. Critically evaluate their own research data and develop new approach to solving their research questions. C11. Apply appropriate method to determine purity and integration of nucleic acid such as spectrophotometric method and agarose electrophoresis. C12. Practice and perform the techniques of molecular biology.	**4244-014; 4708-038; 4703-023; 4233-012; 4215-016; 4246-010; 4247-023; 4705-014; 4707-027; 4707-030; 1001-003; 1002-005; 4706-021; 4706-019; 4707-059; 4704-051; 4703-048; 4703-049; 4704-052; 4244-014; 4215-062; 4235-026; 4235-063; 4703-049; 4216-015; 4246-037; 4246-044; 4216-068; 4247-045; 4217-054; 4217-042; 4228-057; 4218-032; 4218-065; 4248-035; 4708-038; 4248-066; 4218-040; 4708-040; 4224-051; 4225-061; 4706-020;**

General attributes of graduates	Program aim	NARS	Program ILOS	Course codes
			C16. Develop and assess novel methods of analysis C17. Develop advantageous analytical method over the existing traditional techniques **D8** Exhibit the sense of beauty and neatness. **D9** Help students to work independently and as a part of a team and learn independently with open-mindedness and critical enquiry and Enhance self-learning skills.	**4246-010; 4706-057; 2602-001; 1002-005; 4707-035; 4705-055; 4703-049; 4707-058; 4248-066**

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ا.د/ حمادة محمد مسعود

رئيس مجلس القسم
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منسق البرنامج

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قسم الكيمياء الحيوية

مصفوفة التوافق بين نواتج التعلم المستهدفة بالبرنامج مع المقررات الدراسية لبرنامج (كيمياء - كيمياء حيوية)

Level	Semester	Course Code	Course name	A- Knowledges & Understanding																B- Intellectual Skills														C- Professional and Practical Skills																	D-General and Transferable Skills								
				A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	A12	A13	A14	A15	A16	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	D1	D2	D3	D4	D5	D6	D7	D8	D9
1st level	1st Semester	1001-001	English		X																						X																						X								
		3121-001	Introduction to Computer Sciences				X	X														X																							X								
		2201-001	Inorganic and Physical Chemistry (1)			X				X										X												X				X		X											X							
		2301-001	General Physics (1)				X													X																X													X							
		2111-005	Calculus and Analytical Geometry (1)				X													X																														X						
		2201-002	Organic Chemistry and Biochemistry (1)			X														X																X													X						
		1001-002	Administration Principals	X																											X																		X	X					X		
		1001-003	Environmental Culture	X	X																										X																		X	X							
	2nd Semester	1002-004	Scientific Thinking and Writing		X			X													X	X														X	X														X	X	X						
		3122-002	Fundamentals of Programming																																																X	X							
		2502-001	Zoology Principals 1 (Physiology and histology)				X													X																		X														X					X		
		2402-001	General Botany				X													X																			X														X							
		2602-001	General Geology (1)				X													X																																X							X
		4702-046	Biosafety											X		X	X																				X					X									X						
		4702-047	Bio-laboratories Standards													X	X																				X					X														
		1002-005	History and Philosophy of Science	X	X																										X																		X							X
		1002-006	Human Rights	X																																														X							
2nd Level	3rd semester	3123-003	Data Analysis and Presentation					X								X						X												X													X								
		2203-002	Analytical and Physical Chemistry (2)			X				X										X																X	X		X	X										X	X					
		2303-002	General Physics (2)				X													X																		X																		
		2113-140	General Math (1)				X													X																															X						
		2403-002	Principals of Systematic and Microbiology					X																	X													X														X					X	
		4243-058	Organic chemistry (2)			X														X																	X											X				X				
		4708-040	Mineral and Vitamins Metabolism								X				X									X																		X	X										X			X		
		4707-035	Nutrition								X				X														X																							X						X
		4707-033	Chemistry and Photobiology						X								X											X																											X			
		4243-011	Chemistry of Aromatic Analysis							X																											X			X											X			X				
		4233-012	Catalytic Chemistry						X										X																		X			X											X						
	4th Semester	3124-004	Website Development					X	X													X																													X					X		
		2304-003	General Physics 3					X													X															X																X							
		2114-141	General Math 2								X	X	X										X													X				X															X				
		2504-002	Zoology Principals 2 (vertebrates and invertebrates)					X													X																		X														X		X				
		4224-051	Inorganic Chemistry 3						X												X														X			X		X									X					X				
		4704-050	Principals of Biochemistry 3					X																					X						X																				X				
		4704-051	Bioinformatics											X								X							X																					X						
		4705-054	Chemistry of Endocrine Glands								X	X											X						X																										X			
		4224-049	Biochemistry and Inorganic Chemistry					X		X																						X		X						X														X			
		4244-014	Chemistry of Dyes														X	X											X								X														X			X				

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3rd Level	5th Semester	2605-002	General Geology 2					X													X																																						
		4225-061	Chemistry of Transition Elementals						X												X																																				
		4215-016	Thermodynamic Chemistry						X										X								X																													
		4215-062	Spectroscopy and Structural Chemistry						X														X				X									X						X															
		4135-142	Biostatics					X														X																																				
		4705-053	Enzymology							X													X														X				X															
		4706-020	Lipid and Carbohydrate Metabolism									X												X											X		X				X	X													X		
		4708-034	Introduction to Biotechnology										X												X																																	
		4706-056	Inorganic Metabolism									X												X											X		X				X														X		
		4235-026	Instrumentation Analysis							X							X										X								X						X		X											X		
		4235-063	Thin Layer Analysis							X																	X								X	X						X											X		
	6th Semester	4705-014	Endocrinology								X				X								X						X																									X		
		4706-021	Body Fluids and Biological Functions									X			X								X								X																									
		4706-019	Amino acids and Protein Metabolism									X												X							X				X		X					X													
		4246-010	Physical Organic Chemistry						X										X										X																				X					X		X	
		4216-015	Kinetics of Chemical Reactions						X								X		X										X																										X			
		4246-037	Heterocyclic Organic Chemistry														X		X				X				X										X												X				X				X
		4705-055	Clinical Biochemistry								X			X			X						X					X									X			X	X	X															X
		4706-057	Nutrients Metabolism									X												X											X		X																		X	
		4246-044	Chemistry of Natural Product																								X							X							X		X				X		X			X		
		4216-068	Medical Spectroscopy Applications											X					X				X					X								X	X															X					
4th level	7th semester	4707-058	Graduation Project												X							X						X				X																						X				
		4247-045	Applied Spectroscopy Chemistry																X				X								X					X								X									X				
		4247-023	Chemistry of Natural Polymers																X									X																				X					X			
		4707-027	Immune Chemistry											X																	X					X					X													X		
		4707-030	Nucleic acid Technology										X												X					X																								X				
		4707-036	Chemistry of Tumor											X	X													X		X																									X			
		4707-059	Chemistry of Nucleic acids and Nucleotides								X													X								X																							X			
		4703-049	Chemistry of Chemotherapy						X					X								X														X													X							X
		4703-048	Chemistry of Radiotherapy						X					X								X														X													X							
		4217-054	Surface Chemistry																X					X																																	X		
		4217-042	Chemistry of Colloidal Solutions																X						X																														X			
	8th Semester	4228-057	Nuclear and Radiation Chemistry						X																				X																													X
		4218-032	Physical polymer Chemistry						X										X							X																													X			
		4218-065	Electrochemistry																X																	X																		X			
		4248-035	Mechanism of Organic Chemistry																X				X													X																					X
		4708-038	Toxicology								X				X				X								X				X						X				X													X			
		4703-023	Advanced Drug Chemistry												X			X	X			X														X	X				X														X			
		4708-032	Introduction to Forensic Medicine								X		X																X																											X			
		4704-052	Chemistry of Genotherapy										X	X															X																											X			
		4248-066	Chemistry of Pesticides						X		X							X											X								X	X				X												X			
		4218-040	Thermal Analysis							X									X																	X																		X			X

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