Benha University
Faculty of Science
Department of Chemistry

Applied Chemistry B.Sc. Program

2016/2017- Updated 2018

Contents

Applied Chemistry
B.Sc. Program Specification

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A. Basic Information

Program Title:	Applied Chemistry B.Sc. Program
Program Type:	Single (undergraduate)
Department:	Chemistry Departement
Coordinator:	Prof. Dr. A. A. El-Sawy
Internal Evaluator	Assistant Professor Eman Gad El-Karim, Chemistry Department, Benha Faculty of Science
External Evaluator	Prof. Dr. Sedeek Attia Sedeek, Ex-Vice Dean of Faculty of Science, Zagazig Uni.

The most recent date of the program specification approval: 9/12/2015 (Faculty council; meeting number, 390), updated 10/ 1/2018 (Faculty council; meeting number, 419).

B. Professional Information

1. Program Aims:

The overall aims of the chemistry and applied chemistry program are to provide the graduate with the following:

a) Demonstrate the principles, basic knowledge, and theories dealing with chemistry and applied chemistry subjects.
b) Demonstrate the characteristics of atoms and molecules, the relationship between structure and reactivity from basics to the frontiers of current research.
c) Draw the facts and theories of mathematics and physics to determine and quantitatively describe chemical information.
d) Connect the theoretical background of chemistry and chemistry-related subjects to solve relevant Scientific, industrial and environmental problems.
e) Work safely in laboratory and field environments and have the basic understanding of applied chemistry, chemical engineering and management.
f) Manage risks, participate in and review quality control processes which are relevant to applied chemistry.
g) Recognize the role of Basic Sciences in developing the society.
h) Develop scientific routes that fulfil community nessicities including economic, environmental, social, ethical, and safety requirements and Apply efficiently information technology relevant to the field.
i) Participate effectively in a multidisciplinary teamwork, decision making and working under contradictory conditions and be flexible for adaptation, as well as showing the sense of beauty and neatness.

2. Intended Learning Outcomes (ILO's)

a. Knowledge and Understanding

The overall knowledge and understanding outcomes of chemistry and applied chemistry program are to provide the graduate with the following:

- **a.1** Define of terminology, facts, principles and theories related to chemistry and industrial disciplines.
- **a.2** Describe fundamental chemical reactions, technologies of inorganic, organic, physical and analytical chemistry.
- **a.3** Understand synthesis and characterization methods of inorganic and organic materials as well as modern techniques applied in qualitative and quantitative analysis.
- **a.4** Explain construction and properties of chemical industrial materials including the main synthetic pathways and relation between the properties of industrial products and their structure.
- **a.5** Define essential concepts and principles of production quality processes including quality control and quality assurance.
- **a.6** State management principles relevant to industrial and assessment of financial affairs.
- **a.7** Outline basic scientific facts, concepts, principles and techniques.
- **a.8** Know relevant theories and their applications.
- **a.9** Use processes and mechanisms supporting the structure and function of the specific topics.
- **a.10** Expain related terminology, nomenclature and systems classification.
- **a.11** Idetify theories and methods applied for interpreting and analyzing data related to discipline.
- **a.12** State developmental progress of the program-related knowledge.
- **a.13** Locate the relation between the studied topics and the environment.

b. Intellectual Skills

The overall intellectual skills of chemistry and applied chemistry program are to provide the graduate with the following:

- **b.1** Interpret common and emergence chemical and industrial problems and plan appropriate approaches for their solution.
- **b.2** Design and interpret information and data from wide variety of sources.
- **b.3** Organize between knowledge of chemistry and chemical processes to develop industrial products.
- **b.4** Report the relevant techniques and theories to recognize the corresponding

and proper applications for chemical materials.

b.5 Compare between subject-related theories and assess their concepts and principles.

b.6 Interpret qualitatively and quantitatively science relevant data.

b.7 Develop lines of argument and appropriate judgments in accordance with scientific theories and concepts.

b.8 Construct and deduce mechanisms and procedures to handle scientific problems.

b.9 Construct several related and integrated information to confirm, make evidence and test hypotheses.

c. Professional and Practical Skills

The overall professional and practical skills of chemistry and applied chemistry program are to provide the graduate with the following:

c.1 Show the specific hazards associated with the use of chemical materials in laboratories and industrial facilities used for evaluation of the industrial products.

c.2 Analyze with accuracy and precision a range of standard and advanced laboratory techniques.

c.3 Investigate measurement during worl systematically and with high accuracy to conduct technical reports.

c.4 Make quality control review processes using the appropriate standard guide lines.

c.5 Make competent research technical reports and presentations related to basic and advanced technological applications.

c.6 Relate statistical and modeling applicatons in reporting the results obtained from industrial processes and draw conclusions.

c.7 Collect the investigated data for different problems, using appropriate techniques and considering scientific guidance and scientific ethics.

c.8 Analyse the different methods used in addressing subject related issues

d. General Skills

The overall gneral skills of chemistry and applied chemistry program are to provide the graduate with the following:

d.1 Use computers and internet for communication, data handling and word processing.

d.2 Collaborate effectively with teamwork members to maintain independent and

critical thinking, effective time-management and positive communication and cooperation with other members of the teamwork.

d.3 Solve problems on scientific basis.

d.4 Effectively manage tasks, time, and resources.

d.5 Search for information and engage in life-long self-learning discipline.

d.6 Help raising public awareness of the benefits of conserving intellectual property rights and scientific patents on the individuals and communities.

3- Academic standards of the program

3.1. The academic standard of the program are desgined and adapted to satisfay the criteria presented in academic reference standard (ARS) produced by the department of Chemistry council committee. It is approved by the faculty council committee in May, 2015. Currently, it is in the process of approval by the National Authority for Quality Assurance and Acreditation of Education.

4- Reference indices (Benchmarks)

4.1. The program outcomes are derived from our Academic Reference Standards (ARS) for Single programs in Science Faculities (Applied Chemistry).

5-Curricullum structure and contents of program

a- Program duration:

The period of study to obtain a B.Sc. degree is 4 academic years. The academic year is divided into two semesters. Each semester extends to 17 weeks. A summer semester extended for 8 weeks is a subject for approval by the faculty council.

b- Program structure:

No. of hours/No of units	Lectures	Practical	Total
	104	**36**	**140**

Program	Credit hours
Compulsory	123
Optional	12
Elective	5
Total	140

Program	Credit hours	Percentage
Basic sciences	41	29.3%
Humanities (including language)	5	3.6 %
Specialized courses	72	51.4%
Computer and IT	7	5%
Research and graduatin project	2	1.4%
Others (Discretionary)	13	9.3%
Total	140	100 %

- **Field traning:** 6 weeks

c- Program Courses:

- Symbols in the list and their meanings

Connotation	Symbol
University requirement	**Ur**
Faculty requirement	**Fr**
Botany	**B**
Chemistry	**Ch**
Entomology	**E**
Geology	**G**
Mathematics	**M**
Mathematical Statistics	**MS**
Physics	**Ph**
Zoology	**Z**

A. First level:

1. **The student studies (8 credit hours) in first level from the following table (University requirement courses):**

Code No.	Course Title	Pre. Req.	Hours		
			Lect.	Exer. / Prac.	total
015 Ur	English (1)	-	2	-	2
030 Ur	Computer Science (1)	-	2	2	3
040 Ur	Computer Science (2)	030 Ur	1	2	2
050 Ur	Human Rights	-	1	-	1

2. **The student studies (18 credit hours) in first level from the following table (Faculty requirement courses):**

Code No.	Course Title	Pre. Req.	Hours		
			Lect.	Exer. / Prac.	total
100 M	General Mathematics (1)	–	2	2/ –	3
105M	General Mathematics (2)	100 M	2	2/ –	3
100 Ph	General Physics (1)	–	2	- / -	2
105 Ph	General Physics (2)	100 Ph	2	- / -	2
180 Ph	Practical Physics (1)	—	–	- /3	1
181 Ph	Practical Physics (2)	180 Ph	–	- /3	1
100 Ch	General Chemistry (1)	–	2	- / -	2
105 Ch	General Chemistry (2)	100 Ch	2	- /-	2
181 Ch	Practical Chemistry (2)	–	–	- /3	1
180 Ch	Practical Chemistry (1)	181 Ch	–	- /3	1

3. **The student studies (6 credit hours including two hours from general culture courses) in first level from the following table:**

Code No.	Course Title	Pre. Req.	Hours		
			Lect.	Exer. / Prac.	total
183 Ch	Applied inorganic chemistry (1)	–	–	2/-	1
183 Ph	Applied physics (1)	–	–	2/-	1
185 Ch	Applied organic chemistry (2)	–	–	2/-	1
185 Ph	Applied physics (2)	–	–	2/-	1
11 Fr	Business Administation	–	2	-	2
12 Fr	History of Science	–	2	-	2
13 Fr	Healthy Nutrition	–	2	-	2
15 Fr	Scientific Thinking	–	2	-	2
17 Fr	Principles of labor law	—	1	-	1
19 Fr	Selected topics from the history of modern Egypt	–	1	-	1

B.Second level:

The student studies the following credit hours in second level from the following table:

Code No.	Course Title		Pre. Req.	Hours		
				Lect.	Exer. / Prac.	total
First semester						
217 Ch	Aliphatic organic chemistry		105 Ch	2	-/3	3
237Ch	Chemical Thermodynamics & Electrochem-istry		100 Ch, 105Ch	2	-/-	2
240Ch	Water treatment chemistry		100 Ch	2	-/2	3
235 G	Crystal and mineralogy		-	2	-/2	3
241M	Statistical and computer science		100 M	2	-/-	2
270 Ph	Physical optics		105 Ph	1	-/3	2
291 B	General Microbiology	Choose only one coure	-------	2	-/3	3
323Ph	Biophysics		105 Ph	2	-/3	3
No. of Hours						**18**
	Second semester					
210Ch	Small scale industrial chemistry		105 Ch	2	-/2	3
216Ch	Aromatic organic chemistry		105 Ch	2	-/2	3
222Ch	Inorganic Chemistry		100 Ch, 105Ch	2	-/-	2
242Ch	Analytical Chemistry		100Ch, 105 Ch	2	-/3	3
214 M	Differential equations		105 M	2	-/-	2
215 Ph	Modern physics		105 Ph	2	-/3	3
215Ch	Environmental green organic chemistry	Chooe only one coure	105 Ch	2	-/-	2
336Ch	Chemistry of catalysis tech-nology		100 Ch, 105 Ch	2	-/-	2
No. of Hours						**18**

C.Third level:

The student studies the following credit hours in third level from the following table:

Code No.	Course Title		Pre. Req.	Hours		
				Lect.	Exer. / Prac.	total
First semester						
313 Ch	Pesticides and poisons chemistry		-	2	-/-	2
315Ch	Polymer chemistry		216 Ch, 217Ch	2	-/2	3
317 Ch	Organic chemistry spectroscopy		217 Ch	2	-/3	3
319Ch	Petrolum chemisrty and Petrochemicals		105Ch	2	-/3	3
323 Ch	Transition elements & Coordination Chemistry		100 Ch	2	-/-	2
301M	Principles of account		-	2	-/-	2
321 Ch	Chemistry of Forgery and Counterfeiting	Choose only one coure	222 Ch	2	-/3	3
337 Ch	Applied electrochemistry (1)		100 Ch, 105Ch	2	-/3	3

No. of Hours						**18**
	Second semester					
310Ch	Organic reaction mechanism (2)		105Ch	2	1/-	2
316 Ch	Natural product & carbohydrates chemistry		105 Ch	2	-/3	3
321 Ch	Chemistry of Forgery and Counterfeiting		222 Ch	2	-/3	3
332 Ch	Surface chemistry, catalysis, colloids, and solid state		100 Ch, 105Ch	3	-/-	3
335 Ch	Chemistry thermodynamics of solutions		100 Ch, 105Ch	2	-/3	3
342 Ch	Analytical chemistry (2)		242Ch	2	-/3	3
324 Ch	Inorganic pigment chemistry	Chooe only one coure	323 Ch	2	-/-	2
350 Ch	Nuclear and radiochemistry		100 Ch	2	-/-	2
No. of Hours						**19**

D.Fourth level:

The student studies the following credit hours in fourth level from the following table:

Code No.	Course Title		Pre. Req.	Hours		
				Lect.	Exer. / Prac.	total
First semester						
413 Ch	Petroleum additives chemistry		-	2	-/-	2
417 Ch	Chemistry of fat and oil		-	2	-/3	3
435Ch	Corrosion chemistry and metal inhibition		237Ch	3	-/3	4
441 Ch	Instrumental analysis chemistry (1)		242 Ch	3	-/3	4
447Ch	Ore preparation chemistry		240 Ch	2	-/-	2
439 Ch	Quantum chemistry and statistical dynamic	Choose only one coure	100 Ch, 105Ch	2	1/-	2
440 Ch	Advanced analytical chemistry		240 Ch	3	-/-	3
No. of Hours						**17**
	Second semester					
400 Ch	Research and Essay		-	2	-/-	2
410 Ch	Textile and dyes chemistry		-	2	-/3	3
412 Ch	Heterocyclic organic chemistry		105 Ch	2	-/3	3
414 Ch	Industrial detergents chemistry		105 Ch	2	-/3	3
420Ch	Applied inorganic chemistry		240 Ch	2	-/-	2
432 Ch	Material science chemistry		100 Ch, 105Ch	2	-/2	3
416 Ch	Paints technology chemistry	Chooe only one coure	105 Ch	2	-/3	3
430Ch	Metallurgy chemistry		100 Ch, 105Ch	2	-/-	2
436Ch	Refractory chemistry and Thermal analysis		-	2	-/-	2
No. of Hours						**18**

6- Contents of the Courses

See course specification forms (Appendix 5)

7- Program admission requirements:

- Faculty of Benha Science accepts students who have a high school (the scientific branches) or equivalent according to the admission requirements specified by the Supreme Council of Universities.
- Faculty of Benha Science accepts transfer students from other science faculties; provided that the number of credit hours that were studied not more than 50% of the total number of credit hours necessary for his graduation. The student is exempt from the courses studied by successfully whatever their level.

8- Regulations for progression and program completion:

According to the bylaw of the faculty of Benha Science, the regulations for progression and program completion are:

- **Joining the Program:**

1. Vice Dean for Education and Student Affairs supervises on the implementation of the registration rules and procedures and prepare menus for each of the study groups, schedule, distribute students gentlemen academic advisers, processing cards courses for students which is about cards individual for each course as well as cards total for each student, that academic record data in accredited private records, and the completion of enrollment of students in the first week of the start of the semester.
2. Students may register early, after announcing the results of the end of the spring.
3. Take into account when you log decision student success in Prerequisite if any.
4. A student who was not able to register for compelling reasons approved by the
5. Student Affairs Committee and approved by the College Board to register record late in the additional period for registration (the second week).
6. Student selects one branch to research and essay from two specialized branches.

- **Study load:**

Students are allowed to register in at least 14 credit hours and no more than 19 credit hours per semester. With the exception of the following cases:

1. A student can superior (who has a cumulative average of 3 or more) that adds to it two hours, certified in one semester and a maximum of 8 credit hours throughout the study period in decisions, additional optional requirements, specialization departments, college different, that is added appreciation where to CGPA It is not permitted to be an elective requirement for another decision.
2. The College Board may increase the maximum for the academic workload in the last semester of the student up to a maximum of four credit hours to complete graduation requirements.
3. Not allows the student who has a cumulative rate (1) to register in more than 12 credit hours in a semester.

- **Additions, deletions, withdraw and modify the path:**

1. Any student after the approval of the academic advisor to add or delete scheduled or two until the end of the second week only study and without prejudice to the burden stipulated.
2. Student may withdraw from the study any decision until the end of the seventh week of the start of registration for the semester with the approval of the academic advisor. The record of this decision in the student's academic record estimate "withdrawn" on the condition that the student does not have absenteeism overruns before the withdrawal. And cases before the forced withdrawal over this period the Commission Education and Student Affairs for consideration and approval of the Faculty Council on the withdrawal shall be without prejudice boarding school student.
3. A student may alter the course of the specialization subject to the completion of the requirements of specialization desirable and not counting credit hours, which the student obtained by not located in the area of the requirements of the new specialization and after the approval of the academic advisor and the Committee on Education and Student Affairs and the College Board on this amendment.

- **Stop registration or drop out**

1. Stop registration: the student can apply to stop his registration for one semester and a maximum of four separate classes are connected and for compelling reasons approved by the College Board.
2. Dropout: the student can re-record if he dropouts for maximum two semesters and for compelling reasons approved by the College Board.

- **Attendance:**

1. The instructor shall register the presence of students at the start of each lecture theory or process in a practical period Prepared for by the Student Affairs and delivers this record at the end of the semester to manage the affairs of Students.
2. When the student exceeds the absence of 10% of the scheduled hour's instructor shall notify the Department of Affairs Students to guide the first warning to the student.
3. When the student exceeds the proportion of the absence of 20% of the scheduled hour's instructor shall notify the Department Student Affairs to direct second and final warning to the student.
4. If increased absenteeism 25% of the total scheduled hours and the absence of a student without an acceptable excuse Student Affairs Committee and approved by the College Board, student records estimate" deprived" decision and intervention as a result of failure to calculate the cumulative average of the student.
5. If increased absenteeism was 25% and the absence of the student excuse acceptable to the Commission, Education and Student Affairs and approved by the College Board, student records withdraw from the course.
6. In the case of a request student Add a new decision attendance is calculated from the date of registration.

9- Methods and rules of evaluation of students in rolled in the program:

Rating: The exam is evaluated each courses at 100 degrees and distributed degrees scheduled as the follows:

9.1- courses which did not include the part "practical":

Method of Assessment	Marks	learning outcomes assessed	Weighting
Mid term exam & Semester work	10	Knowledge and understanding (a1-a10); intellectual (b1-b5); professional and general skills (c5, d1-d7)	10%
Final Oral Exam	10	Knowledge and understanding (a1-a11); intellectual skills (b1-b10)	10 %
Final Term Examination	80	Knowledge and understanding (a1-a16); intellectual skills (b1-b10).	80%
	100		100 %

9.2-courses practical separate

Method of Assessment	Marks	learning outcomes assessed	Weighting
Mid term exam & Semester work	20	Knowledge and understanding (a1-a5); intellectual (b1-b4); professional and practical (c5, d1-d3); and general (d3) skills.	20%
Final Oral Exam	20	Knowledge and understanding (a1-a11); intellectual skills (b1-b10)	20 %
Final practical Examination	60	Intellectual (b6,b7); professional (c1-c7) and practical; and general skills(d3).	60%
total	100		%100

9.3 courses which include part "practical":

Part	marks		Method of Assessment	learning outcomes assessed	Weighting
Practical part	**40**	8	Mid term exam & Semester work for practical part	Knowledge and understanding (a1-a5); intellectual (b1-b4); professional and practical (c5, d1-d3); and general (d3) skills.	8 %
		8	Final Oral Exam for practical part	Knowledge and understanding (a1-a11); intellectual skills (b1-b6)	8 %
		24	Final practical Examination	Intellectual (b6,b7); professional and practical (c1-c5); and general skills(d3).	24 %
Theortical part	**60**	6	Mid term exam & Semester work for theortical part	Knowledge and understanding (a1-a7); intellectual (b1-b5); professional and general skills (c5, d1-d6)	6 %
		6	Final Oral Exam for theortical part	Knowledge and understanding (a1-a11); intellectual skills (b1-b6)	6 %
		48	Final Term Examination	Knowledge and understanding (a1-a14); intellectual skills (b1-b7).	48 %
	100				100%

60% of the total score lecture semester work for final oral exam.

9.4 Course search and essay

1. 50% of the total scores for the course search and essay of the various activities carried out by the student duing his study of the course.
2. 50% of the total scores for the course search and essay of the (25%) discussion and presentation (25%) session. **Updated 10/01/2018 (chemistry department council; Faculty council; meeting number, 419)**

The following grading system is applied:

Grades	Symbols	No. of points	Degree
Excellent	A	4	90% — 100%
	A-	3.7	85% — <90%
Very Good	B+	3.3	80% — <85%
	B	3	75% — <80%
Good	B-	2.7	70% — <75%
	C+	2.3	65% — <70%
Pass	C	2	60% — <65%
Fail	F	0	<60%
Absent	F-	0	—

10- Teaching and learning strategies used in the program:

a. Direct teaching strategy.
b. Cooperative learning strategy.
c. Brainstorming strategy.
d. Problem-solving strategy.
e. Effective discussion strategy.
f. Independent Study strategy.
g. E-learning strategy.

11- Methods of program evaluation: (Appendix 6)

Samples	Tool	Evaluators
1- Senior Students	Questionnaire	100%
2- Alumni	Questionnaire	100%
3- External Evaluators	Reports	

Program Coordinator: Prof. Dr. A. A. El-Sawy
Head of the Department: Prof. Dr. Alaa S. Amin
Date: 9/12/2015-updated 2018