Academic Reference Standards (ARS)
for
PhD in Pharmaceutical Sciences
(Analytical Chemistry)

Pharmaceutical Analytical Chemistry Department

ARS

Academic Year: 2021/2022

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Pharmaceutical Analytical Chemistry Department
PhD in Pharmaceutical Science (pharmaceutical analytical chemistry)
Academic Reference Standards (ARS)

The academic reference standard (ARS) for PhD Degree in Pharmaceutical Sciences program regarding attributes and capabilities of the graduates were based essentially on the General Academic Reference Standard of graduate studies published by National Authority for Quality Assurance and Accreditation of Education (NAQAA 2009) The following specific (ARS) for this program were approved by the faculty council (2017).

(Department Council Approval on 17/9/2017)

Attributes of the graduate:

The graduates of the Ph. D. degree of pharmaceutical science (pharmaceutical analytical Chemistry) should be capable of:

- Mastering the basics and methodologies of scientific research in the fields of quantitative drug analysis, including instrumental analysis.
- Recognizing novel concepts, methods and/or techniques in the field of separation, therapeutic drug monitoring and sample preparation.
- Adopting the critical and analytical thinking approaches in advanced trends in electroanalytical chemistry, in testing drug stability, method devolepment and use of nanoparticles in electrochemistry.
- Integrating the knowledge in the field of environmental, pharmaceutical analysis and drug stability, with other relevant subjects.
- Generating and disseminating new knowledge that contributes to molecularly imprinted polymers and electromicroextraction (EME) for pharmaceuticals, therapeutic drug monitoring, use of nanoparticles in electrochemistry and drug stability enhancement.
- Showing considerable awareness regarding the current problems and the recent theories and trends in the field of drug analysis either in pure form or in pharmaceuticals and separation techniques.
- Identifying challenging professional problems and finding innovative solutions.
- Providing the ability to critically analyze the impact and outcomes of research results.
- Mastering of all new techniques used in the fields of drug analysis.
- Training in ethical and legal aspects of scientific inquiry.
- Mastering of advanced knowledge base, professional research skills, attitudes and values.
- Making the appropriate professional and scientific decision in light of the available information.
- Utilizing effectively available professional and scientific resources of drug analysis.
- Showing awareness about the role of the graduate in community development.
- Attaining communication skills, research ethics, time management, decision-making, and team-working.
- Demonstrating commitment to the transfer knowledge to others.
- Showing commitment for self-development and life-long learning.

1. Knowledge and Understanding

Upon completion of The Ph.D. program (Pharmaceutical Analytical Chemistry), the graduate should be able to:

1.1 Explain the basic theories and principles of drug analysis, separation techniques and their relevant subjects.
1.2 Identify recent advances in the fields of electroanalytical chemistry, environmental and biological analysis.
1.3 State the legal and ethical principles for practicing research in drug analysis and implementing guideline of experiments.
1.4 Recognize the effect of his/her professional practice on the environment and methods of environmental development and maintenance.
1.5 Define the basic and advanced research concepts in the field of analytical pharmaceutical chemistry

2. *Intellectual Skills*

Upon completion of this program the graduate should be able to:

2.1 Develop deductions and conclusions based on the information in the field of drug analysis in analytical pharmaceutical chemistry.
2.2 Solve problems related to drug analysis according to accompanying circumstances and underlining causes.
2.3 Apply advanced separation techniques in pharmaceutical and biological analysis.
2.4 Identify and classify the electrochemical procedure for various drugs to investigate other possible beneficial modifications.
2.5 Invent methods in environmental and biological analysis
2.6 Frame professionally a scientific paper in the fields of drug analysis.
2.7 Evaluate professional and scientific risks in practicing laboratory experiments.
2.8 Plan for performance development in the fields of drug analysis.
2.9 Take professional decisions and create scientific innovation regarding the analysis of drugs
2.10 Direct proofs and evidence based scientific and professional dialogues and discussions.

3. *Professional and Practical Skills*

Upon completion of this program the graduate should be able to:

3.1 Master a wide range of the basic and recent professional skills in the fields of analytical pharmaceutical chemistry.
3.2 Evaluate available methodologies and materials in drug analysis.
3.3 Deduce new methods in drug analysis based on available data.
3.4 Evaluate the information in the field of advanced trends in analytical pharmaceutical chemistry for better understanding.
3.5 Operate advanced technological research tools and equipments in professional practice relevant to drug analysis.
3.6 Assess professional and scientific risks in practicing laboratory experiments.
3.7 Handle safely the material used in research regarding their physical and chemical properties, including any specific hazards associated with their use.
3.8 Perform scientific research.
3.9 Manipulate different laboratory tools in the fields of drug analysis and separation techniques.

4. General and Transferable Skills:

Upon completion of this program the graduate should be able to:

4.1. Communicate effectively with research team members.
4.2. Utilize effectively information technology in professional development.
4.3. Manipulate computer programs, software, online database and other resources to get information and analyze the obtained research data
4.4. Transfer knowledge and experience to others and evaluate their performance.
4.5. Criticize scientific lectures and relevant workshops.
4.6. Anticipate needs and risks in scientific research.
4.7. Interpret data available from scientific research.
4.8. Perform self assessment and continuous learning skills.
4.9. Manage the time properly.
4.10. Develop presentation skills, give seminars and defend thesis in public.

Reference`:

National Academic reference Standard (NARS) for postgraduate studies issued by NAQAAE 2009

Program Coordinator: Head of Department

Head of Department: **Prof. Dr. Jenny Jehan Mohamed Nasr**

Program: PhD in Pharmaceutical Sciences (Pharmaceutical Analytical Chemistry)

Department of Pharmaceutical Analytical Chemistry

Program Specification

Academic Year: *2021/2022*

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A-Basic Information

1	**Faculty**	**Pharmacy**
2	**Program Title:**	**PhD in Pharmaceutical Sciences ((Pharmaceutical Analytical Chemistry)**
3	**Program Type:**	**Single**
4	**Department (s):**	**Department of Pharmaceutical Analytical Chemistry**
5	**Final award:**	**PhD degree in Pharmaceutical Sciences (Pharmaceutical Analytical Chemistry)**
6	**Coordinator:**	**Head of department**
7	**External Evaluator(s):**	Prof. Dr. Shereen Hamad
8	**Date of Program Specification Approval:**	***Department council: 11/5/2022,*** ***Faculty council: 5/2022***

B-Professional Information

1-Program Aims

Upon successful completion of the program, graduates should demonstrate comprehensive knowledge, clear understanding and outstanding skills in pharmaceutical sciences and **(Pharmaceutical Analytical Chemistry)**

Mastering the basics and methodologies of scientific research in the fields of quantitative drug analysis, including instrumental analysis.

1.2 Recognizing novel concepts, methods and/or techniques in the field of separation, therapeutic drug monitoring and sample preparation.

1.3 Adopting the critical and analytical thinking approaches in advanced trends in electroanalytical chemistry, in testing drug stability, method devolepment and use of nanoparticles in electrochemistry.

1.4 Integrating the knowledge in the field of environmental, pharmaceutical analysis and drug stability, with other relevant subjects.

1.5 Generating and disseminating new knowledge that contributes to molecularly imprinted polymers and electromicroextraction (EME) for pharmaceuticals, therapeutic drug monitoring, use of nanoparticles in electrochemistry and drug stability enhancement.

1.6 Showing considerable awareness regarding the current problems and the recent theories and trends in the field of drug analysis either in pure form or in pharmaceuticals and separation techniques.

1.7 Identifying challenging professional problems and finding innovative solutions.

1.8 Providing the ability to critically analyze the impact and outcomes of research results.

1.9 Mastering of all new techniques used in the fields of drug analysis.
1.10 Training in ethical and legal aspects of scientific inquiry.
1.11 Mastering of advanced knowledge base, professional research skills, attitudes and values.
1.12 Making the appropriate professional and scientific decision in light of the available information.
1.13 Utilizing effectively available professional and scientific resources of drug analysis.
1.14 Showing awareness about the role of the graduate in community development.
1.15 Attaining communication skills, research ethics, time management, decision-making, and team- working.
1.16 Demonstrating commitment to the transfer knowledge to others.
1.17 Showing commitment for self development and life-long learning..

2-Intended Learning Outcomes (ILOs)

a.Knowledge and Understanding:

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

A1	Explain the theories and fundamentals of drug analysis.
A2	Identify the basic principles of advanced separation techniques.
A3	Describe the application to pharmaceutical preparations and biological fluids.
A4	Recall the basic principles of molecularly imprinted polymers, electromicroextraction (EME) for pharmaceuticals, in testing drug stability, method devolepment and use of nanoparticles in electrochemistry.
A5	Demonstrate the mechanism of template-monomer interactions and operational parameters in EME.
A6	Understand the difference between different electrochemistry techniques and recognize the importance of nanoparticle in field of pharmaceutical analysis.
A7	Define the principle and new data in the field of environmental and biological analysis
A8	List the methods of drug analysis and the laboratory techniques.
A9	Define the validation parameters in analytical chemistry.
A10	Demonstrate the uses of software in statistical operations in order to assess the proposed methods.
A11	State the legal and ethical principles for practicing research in analytical pharmaceutical chemistry and implementing guidelines of experiments.
A12	Estimate the importance of professional practice in analytical pharmaceutical research on the environmental development and maintenance.
A13	Define the basic and advanced research concepts in analysis of drugs and separation techniques.

b.Intellectual Skills

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

B1	Develop deductions and conclusions based on the information in the field of drug analysis in analytical pharmaceutical chemistry.
B2	Propose procedures for the analysis of the target compounds either in pure form or in pharmaceutical dosage forms
B3	Apply advanced separation techniques in pharmaceutical and biological analysis.
B4	Select and design the proper polymer for determination of certain drugs.
B5	Predict the most suitable EME for different types of drugs.
B6	Identify and classify the electrochemical procedure for various drugs to investigate other possible benefical modifications.
B7	Invent methods in environmental and biological analysis.
B8	evaluate the scientific risks in practicing laboratory experiments and solve the problem related to drug analysis according to accompanying circumstances and underlining causes .
B9	Analyze statistically the obtained results.
B10	Modify existing parameters for amelioration of analytical methods.
B11	Frame professionally a scientific paper in the fields of drug analysis.
B12	Present research results in peer-reviewed publications and in a dissertation.
B13	Plan for amelioration of traditional techniques in drug analysis.
B14	Participate in professional discussion and decisions by evidence-based argument in drug analysis.

c.Professional and Practical Skills

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

C1	Use properly the instruments in drug analysis.
C2	Apply new methods of separation of pharmaceutical compounds.
C3	Implement new methods of drug, environmental and biological analysis and evaluate available methodology.
C4	Analyze drugs in pharmaceutical preparations and biological fluids by selecting the suitable analytical techniques.
C5	Utilize the information in the field of advanced electroanalytical chemistry in determination of pharmaceutical compounds in different matrices.
C6	Explain advantages and limitations of each technique.
C7	Counter act the problems that arise in applying such technique.

C8	Summarize data in publication form.
C9	Assess professional and scientific risks in practicing laboratory experiments in the fields of drug analysis.
C10	Select suitable and safe techniques for handling of research materials in drug analysis.
C11	Carry out scientific research and write professional reports and contribute to the knowledge in the field of analytical pharmaceutical chemistry.
C12	Write thesis in scientific and precise way.
C13	Manipulate different laboratory tools in the fields of drug analysis and separation techniques

d. General and Transferable Skills

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

D1	Direct and work effectively in a team.
D2	Manage the time properly.
D3	Transfer knowledge and experience to others and evaluate their performance.
D4	Develop written and oral communication skills.
D5	Organize and manage research schedule.
D6	Communicate research results effectively through oral presentations at scientific seminars, conferences, and other venues.
D7	Perform self and continuous education skills.
D8	Deal with obstacles and problems, and finding the proper solution.
D9	Prepare lucid reports on their own research, as well as the research of others.
D10	Accept responsibility to organize department and faculty scientific meetings.
D11	Utilize effectively computer programs, online database and different information resources relevant to drug analysis.
D12	Analyze data and facts available for scientific research

3-Academic Reference Standards (ARS):

Approved by both the Department and Faculty Councils
Department council Approval Date: *17/9/2017,*
Faculty council Approval Date: *11/2021*

3a- Academic References Standards: (**Attached**)

3b-Comparison of provision to External References

Achievement of academic reference standards via program Intended Learning Outcomes.

ILOs	ARS	Program
1. **Knowledge and Understanding**	**1.1**	A1, A2, A3, A7, A8, A13
	1.2	A3, A4,A5,A6, A7, A8, A12
	1.3	A1, A8, A13
	1.4	A12
	1.5	A13
2. **Intellectual Skills**	**2.1**	B1
	2.2	Bb8
	2.3	B3
	2.4	B6
	2.5	B7
	2.6	B11
	2.7	B8
	2.8	B13
	2.9	B14
	2.10	B14
3. **Professional and Practical Skills**	**3.1**	C1, C2, C3, C4, C9
	3.2	C3
	3.3	C2, C3, C4
	3.4	C5
	3.5	C1, C13
	3.6	C9
	3.7	C10
	3.8	C11
	3.9	C13
4. **General and Transferable Skills**	**4.1**	D1
	4.2	D11
	4.3	D11
	4.4	D3
	4.5	D3, D9
	4.6	D8
	4.7	D12
	4.8	D7
	4.9	D2
	4.10	D6, D7

4-Curriculum Structure and Contents

4A. Program duration: 2-5 years.

4B. Program structure:

a- The program consists of 50 credit hours of study (8 credit hours of courses and 42 credit hours for thesis).

b- Courses include 6 credit hours of obligatory courses, in addition to 2 credit hours for an elective course., All courses possess the code number [300], According to Faculty By-Law..

c- A scientific research thesis of 42 credit hours represent a main component of the program. It is achieved in a subject assigned by the supervision committee, endorsed by the Department Council, the committee of graduate studies & research and the Faculty Council.

d- The student should publish at least one scientific research paper in scientific journals before the public defense of the Thesis..

4c. Program Components

1- Courses according to the By-law

Code number	Name of the course	Type	Credit Hours	Semester
(PAP-301)	***Automated method of analysis***	Compulsory	2	Fall
(PAP-302)	***Advanced Separation Techniques***	Compulsory	2	Fall
(PAP-303)	***Advanced Electroanalytical Chemistry***	Compulsory	2	Spring
(PAP-304	***Environmental analysis) (elective)***	elective	2	Spring
(PAP-305)	***Biological analysis***	elective	2	Spring
Total (Courses)			8	
	Thesis		42	
Total			50	

5- Program Courses

1- Achievement of Program Intended Learning Outcomes via the courses

Course Name	C.H/ week	Program ILOs (by No.)			
		K.U*	IS**	P.P.S***	G.T.S****
Special Courses (8 C.H.)					
First Semester					

Automated method of analysis (PAP-301)	**2**	A1, A3 , A8	b1, b2	c1, c3, c4, c9, c10, c13	d3, d7
Advanced Separation Techniques (PAP-302)	**2**	A2, A3	b3	c2, c3, c4	d3, d7
Second Semester					
Advanced Electroanalytical Chemistry (PAP-303)	**2**	A3, A4, A5, A6	b4, b5, b6	c5	d3, d7
Environmental analysis (PAP-304) (elective)	**2(E)**	A6	b7	c3	d3, d7
Biological analysis (PAP-305) (elective)	**2(E)**	A3, A6	b7	c3, c4	d3, d7
Total	**8**				
Thesis	**42**	A9, A10, A11, A12	b8, b9, b10, b11, b12, b13, b14	c6, c7, c8, c9, c10, c11, c12, c13	d1, d2, d3, d4, d5, d6, d7, d8, d9, d10, d11, d12
Total	**50**				

* ***K**nowledge and **U**nderstanding*
** ***I**ntellectual **S**kills*
*** ***P**rofessional and **P**ractical **S**kills*
**** ***G**eneral and **T**ransferable **S**kills*

Code	Course title	K.U*							IS**						
		a1	a2	a3	a4	a5	a6	a8	b1	b2	b3	b4	b5	b6	b7
PAP-301	*Automated method of analysis*	√		√				√	√	√					
PAP-302	*Advanced Separation Techniques*		√	√							√				
PAP-303	*Advanced Electroanalytical Chemistry)*			√	√	√	√					√	√	√	
PAP-304	*Environmental analysis (E)*						√								√
PAP305	*Biological analysis (E)*			√			√								√

* ***K**nowledge and **U**nderstanding*
** ***I**ntellectual **S**kills*

Code	Course title	P.P.S***								G.T.S****	
		c1	c2	c3	c4	c5	c9	c10	c13	d3	d7
PAP-301	*Automated method of analysis*	√		√	√		√	√	√	√	√
PAP-302	*Advanced Separation Techniques*		√	√	√					√	√
PAP-303	*Advanced Electroanalytical Chemistry)*					√				√	√
PAP-304	*Environmental analysis (E)*			√						√	√
PAP305	*Biological analysis (E)*			√	√						

*** ***P**rofessional and **P**ractical **S**kills*
**** ***G**eneral and **T**ransferable **S**kills*
E ***E**lective course*

6- Student Assessment Methods

6.1- Written exam (special courses).	To assess Knowledge and Understanding and Intellectual Skills
6.2- Oral exam (special courses).	To assess Knowledge and Understanding, Intellectual Skills and General and transferable Skills
6.3- Scientific seminar for thesis registration	To assess Knowledge and Understanding, Intellectual Skills and General and transferable Skills
6.4- Published scientific research paper.	Knowledge and Understanding, Intellectual Skills, Professional and practical Skills
6.5- Thesis writing	Knowledge and Understanding, Intellectual Skills, Professional and practical Skills & General and Transferable Skills
6.5- Public presentation and discussion of the thesis.	Knowledge and Understanding, Intellectual Skills, Professional and practical Skills & General and Transferable Skills

7- Program Admission Requirements

7.1- The candidate should hold a Master degree in pharmaceutical sciences in the same specialization from any faculty of pharmacy, from Egypt or Arabian countries or foreign universities recognized by the Supreme Council of Universities.

7.2- The candidate should be available for study at least two days per week throughout the duration of study.

7.3- The candidate should follow postgraduate rules of by-law (**2014**) and its modified by-law **(2017)** of Faculty of Pharmacy-Mansoura University.

8- Regulations for progression and program completion

8.1- The minimum duration of time to gain the PhD degree is two years from the approval date of university council of graduate studies ad research on the registration of the PhD thesis.

8.2- The maximum duration of time to gain the PhD degree is 5 years from the date of registration, putting in consideration the periods of enrollment suspension. It is possible to extend this period up to two years (one year at a time) based on a request from the candidate's major supervisor, a suggestion from the department council and the committee of graduate studies & research and the approval of the faculty council. The final decision should be endorsed by the university council of graduate studies & research.

8.3- The student has to pass the assigned courses, and to practically do a scientifc research thesis for complete fulfilment of the PhD degree.

8.4- An annual progress report is presented by the supervisors of Thesis to the Dept Council by December.

8.5- The candidate should follow postgraduate rules of by-law (**2014**) and its modified by-law **(2017)** of Faculty of Pharmacy-Mansoura University.

9- Facilities Required for Search:

9.1- Computers.

9.2- Library and digital library supplied by recent scientific books and journals.

9.3- Laboratories with enough chemicals, apparatus and advanced instruments.

9.4- Access to research engines for scientific periodicals in the field of *(Pharmaceutical Analytical Chemistry)*

10-Thesis

A thesis should be prepared by the student for complete fulfilment of the PhD degree.

11- Evaluation of program

Evaluator	Method	Sample
Internal evaluator	Program evaluation Courses evaluation	Program report Courses report
External evaluator	Program evaluation Courses evaluation	Program report Courses report
Stakeholders	Questionnaires	To be Attached
Postgraduates	Questionnaires	To be Attached
Self-evaluation	Matrices	To be Attached
Supervisors of Thesis	Reports	Reports of staff members of committee to evaluate the thesis

11– List of References

11.1Essential Books (Text Books)

- Skoog D A, Holler F J, Crouch S R. "Principles of Instrumental Analysis", 6th Ed., Thomson, Belmont, USA, 2007.
- Handbook of electrochemistry, edited by: Cynthia G. Zoski, First edition (2007), Elsevier.
- Roger N. Reeve, “Introduction to Environmental Analysis” John Wiley & Sons, 2002.
- Damia Barcelo ”Environmental Analysis” Elsevier Science, 1993
- Ahuja, S. and Rasmussen, H. "HPLC Method Development for Pharmaceuticals" 1st edition, Academic Press, vol.8 (2007).
- Webb, M. L. and Smith, R. J. "Analysis of Drug Impurities" 1st edition, Wiley-Blackwell, (2007)

11.2 Recommended Books

- Sarker, D. K. "Quality Systems and Controls for Pharmaceuticals", 1st edition, Wiley, (2008)
- Michael R. Greenberg "Environmental Policy Analysis and Practice" Rutgers University Press, 2007.
- Skoog D A, Holler F J, Crouch S R. "Principles of Instrumental Analysis", 6th Ed., Thomson, Belmont, USA, 2007.
- Miller J.C, Miller J. N. "Statistics and chemometrics for analytical chemistry" 5th Ed., Pearson Education Limited, Harlow, U.K, 2005.
- Electrochemical Methods; Fundamentals and Applications, Allen J. Bard and Larry R. Faulkner, Second edition (2001), John Wiley & Sons.
- Heftmann, E. Chromatography: "Fundamentals and Applications of Chromatography and Related Differential Migration Methods Techniques" 6th edition, Elsevier Science, (2004)

11.3- Periodicals, Web Sites, …etc

- http:// www.sciencedirect.com
- http:// www.pubmed.com
- http:// www.merck.com
- http:// www.chemhelper.com
- http:// www.springer.com.
- ICH, Q2 (R1), Validation of Analytical Procedures: Text and Methodology, International Conference on Harmonization, Geneva, 2010.
- http:// www.fda.gov

Program Coordinator: Head of department

Head of Department: Prof. Dr. Prof. Dr. Jenny Jehan Nasr

Signature:

Date:

Program: PhD in Pharmaceutical Sciences (Pharmaceutical Analytical Chemistry)

Department of Pharmaceutical Analytical Chemistry

PhD Thesis Specification

Academic Year: 2021/2022

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A-Basic Information

1	**Faculty**	**Pharmacy**
2	**Program Title:**	**PhD of Pharmaceutical Sciences (Pharmaceutical Analytical Chemistry)**
3	**Program Type:**	**Single**
4	**Department (s):**	**Department of Pharmaceutical Analytical Chemistry**
	Total credits of the Thesis	**42 C. H.**
	Total credits of the Program	**50 C.H.**
5	**Final award of the Program:**	**PhD degree of Pharmaceutical Sciences (Pharmaceutical Analytical Chemistry)**
6	**Coordinator:**	**Head of department**
7	**External Evaluator(s):**	**Prof. Dr. Shereen Hamad**
8	**Date of Program Specification Approval:**	***Department council: 11/5/2022,*** ***Faculty council: 5/2022***

B-Professional Information

1-Aims

The overall aims of the thesis:

Mastering the basics and methodologies of scientific research in the fields of quantitative drug analysis, including instrumental analysis.

1.2 Recognizing novel concepts, methods and/or techniques in the field of separation, therapeutic drug monitoring and sample preparation.

1.3 Adopting the critical and analytical thinking approaches in advanced trends in electroanalytical chemistry, in testing drug stability, method devolepment and use of nanoparticles in electrochemistry.

1.4 Integrating the knowledge in the field of environmental, pharmaceutical analysis and drug stability, with other relevant subjects.

1.5 Generating and disseminating new knowledge that contributes to molecularly imprinted polymers and electromicroextraction (EME) for pharmaceuticals, therapeutic drug monitoring, use of nanoparticles in electrochemistry and drug stability enhancement.

1.6 Showing considerable awareness regarding the current problems and the recent theories and trends in the field of drug analysis either in pure form or in pharmaceuticals and separation techniques.

1.7 Identifying challenging professional problems and finding innovative solutions.

2-Intended Learning Outcomes (ILOs)

a- Knowledge and Understanding:

Upon successful completion of the thesis, the graduate should be able to efficiently demonstrate the essential knowledge and understanding of:

A9	Define the validation parameters in analytical chemistry.
A10	Demonstrate the uses of software in statistical operations in order to assess the proposed methods.
A11	State the legal and ethical principles for practicing research in analytical pharmaceutical chemistry and implementing guidelines of experiments.
A12	Estimate the importance of professional practice in analytical pharmaceutical research on the environmental development and maintenance.
A13	Define the basic and advanced research concepts in analysis of drugs and separation techniques.

b- Intellectual Skills

By the end of this thesis, the graduate should be able to:

B8	Evaluate the scientific risks in practicing laboratory experiments and solve the problem related to drug analysis according to accompanying circumstances and underlining causes .
B9	Analyze statistically the obtained results.
B10	Modify existing parameters for amelioration of analytical methods.
B11	Frame professionally a scientific paper in the fields of drug analysis.
B12	Present research results in peer-reviewed publications and in a dissertation.
B13	Plan for amelioration of traditional techniques in drug analysis.
B14	Participate in professional discussion and decisions by evidence-based argument in drug analysis.

c- Professional and Practical Skills

By the end of this thesis, the graduate should be able to:

C6	Explain advantages and limitations of each technique.
C7	Counter act the problems that arise in applying such technique.
C8	Summarize data in publication form.
C9	Assess professional and scientific risks in practicing laboratory experiments in the fields of drug analysis.
C10	Select suitable and safe techniques for handling of research materials in drug analysis.
C11	Carry out scientific research and write professional reports and contribute to the knowledge in the field of analytical pharmaceutical chemistry.

C12	Write thesis in scientific and precise way.
C13	Manipulate different laboratory tools in the fields of drug analysis and separation techniques

d. General and Transferable Skills

By the end of this thesis, the graduate should be able to:

D1	Direct and work effectively in a team.
D2	Manage the time properly.
D3	Transfer knowledge and experience to others and evaluate their performance.
D4	Develop written and oral communication skills.
D5	Organize and manage research schedule.
D6	Communicate research results effectively through oral presentations at scientific seminars, conferences, and other venues.
D7	Perform self and continuous education skills.
D8	Deal with obstacles and problems, and finding the proper solution.
D9	Prepare lucid reports on their own research, as well as the research of others.
D10	Accept responsibility to organize department and faculty scientific meetings.
D11	Utilize effectively computer programs, online database and different information resources relevant to drug analysis.
D12	Analyze data and facts available for scientific research

3- Thesis Contents:

Part	Topics
1	Abstract (Arabic and English)
2	Introduction
3	Aims, Objectives and Rational of the work
4	Results and Discussion, covering all fields
5	Methodology and Experimental Work of all fields
6	Conclusion
7	References

4- Matrix of knowledge and skills of the Thesis:

Part	Topics	Course ILOs			
		K.U*	IS**	P.P.S***	G.T.S****
2	Introduction	A9	B9	C6	D5, D6
3	Objectives/Rational	A12	B11, B13	C7, C13	D1, D2, D3, D7
4	Results and Discussion	A13	B10, B12	C8, C9	D9, D10
5	Experimental Work	A11	B8	C10	D8
6	Conclusion	A10	B14	C11, C12	D11, D12

* ***K**nowledge and **U**nderstanding* *****I**ntellectual **S**kills* ******P**rofessional and **P**ractical **S**kills* *******G**eneral and **T**ransferable **S**kills*

5. Student Assessment:

A written Thesis	√
Published Research Paper(s)	√
Public Defense	√
Committee-in-Charge Report	√
Dept Council Approval	√

Guidelines of the Thesis (according to By-Law).

1- The minimum period for obtaining a PhD is two years from the date of approval of the University's Graduate Studies Council for registration.

2- The maximum limit for obtaining a doctoral degree is five years from the date of registration, taking into account cases of suspension of registration, and registration may be extended upon the request of supervisors and the approval of the relevant department council, the Graduate Studies and Research Committee, and the College Board for an academic year with a maximum of two years.

3- The student must pass the English Language Examination with the minimum score specified by the University Studies Board to approve the PhD defense date.

4- The total number of credit hours for obtaining a doctoral degree is 50 credit hours (8 course hours, 42 credit hours per thesis).

5- The student conducts a research on a topic determined by the supervisory committee and approved by the relevant department council and the college, graduate studies and research councils.

6- The researcher submits, before registering for the academic degree, the research plan in a public discussion in the department to discuss the topic of the thesis, determine the objectives of the research, the extent of its application, potential problems and how to overcome them.

7- After the approval of the Graduate Studies and Research Committee and the College Board, the scientific departments develop specialized courses from code (300) whose number of credit hours does not exceed 8 hours, and their average points are not less than 2.00, and these hours are calculated within the hours prescribed for the program.

8- The scientific thesis is the responsibility of the relevant department council and is accomplished scientifically and technically under the responsibility of the supervisory committee. Scientific, technical and administrative support must be provided to the researcher for its completion, and the supervision committee is formed as follows:
9- The College Council, upon the proposal of the relevant Department Council, appoints a professor who supervises the thesis (principal supervisor). The council may entrust the supervision of the thesis to one of the assistant professors.
10- It is permissible for the supervisors to be many professors or assistant professors, and teachers may participate with a maximum of one in the same specialty.
11- A member from abroad who has experience in the specialty to which the dissertation belongs may be joined to the supervision committee.
12- The student should meet his main supervisor at least once monthly and a semi-annual report must be provided by the supervisor(s) on the progress of student to the department council and the Graduate Studies Committee and the graduate should be given a copy of the report. The annual report must be submitted to the college council in October each year.
13- A postgraduate student registered to obtain a master's degree or a doctorate degree, after completing the thesis preparation, holds a public discussion session on the thesis summary and the results he reached, during which the supervisors determine the extent to which the student fulfills the research point before submitting the thesis to the department council.
14- The principal supervisor submits an application that includes a proposal to form a discussion committee and judge the thesis after preparing it and preparing it for discussion in preparation for presentation to the Postgraduate Studies and Research Committee and then the College Board for approval and is supported by the following:
15- The report on the validity of the dissertation for discussion, signed by the majority of the members of the supervisory committee, one of whom is the main supervisor.
16- A copy of the thesis prepared according to the instructions for writing scientific theses in the faculty.
17- At least one research published in a scientific refereed journal.
18- The committee for discussion and judgment on the dissertation is formed of three members based on the proposal of the relevant department council, the graduate studies and research committee, and the approval of the college council, one of whom is the main supervisor or two members with one vote. And two other members from among the professors or assistant professors, at least one of them is from outside the college for master's theses, and at least one of them is from outside the university for doctoral theses (the two are from outside the college) according to the text of Article 153 of the Universities Organization Law.

19- The department council approves the individual reports, the group report, and what indicates that the student has made the proposed amendments from the discussion and judgment committee and submitted them to the Graduate Studies and Research Committee and the College Board in preparation for presentation to the University Council.
20- The date of awarding the academic degree is the date on which the University Council approved the College Board’s recommendation for grants.
21- The college council, based on the proposal of the discussion and judgment committee, may return the message to the student to correct the errors and complete what the committee deems short of or submit another message in case the thesis is rejected.

6 – Facilities Required:

Laboratory	Laboratories with enough chemicals, apparatus and advanced instruments.
Library	Library and digital library supplied by recent scientific books and journals.
Others	Access to research engines for scientific periodicals in the field of Pharmaceutical Analytical Chemistry.

Thesis Coordinator	Head of Department	Date
Prof. Dr. Jenny Jehan Mohamed Nasr	Prof. Dr. Jenny Jehan Mohamed Nasr	11/5/2021

* Date of Dept. Council Approval 11/2021