Faculty of Pharmacy

Medicinal Chemistry Department

Program and Course Specifications

Master and PH.D Degrees

2017/2018

Master Degree

Program Specification

Program Specification

A- Basic Information

1- Program title: M. Pharm. Sci Degree in **Medicinal Chemistry**

2- Program type: Monodisciplinary.

3- Faculty/ University: Faculty of Pharmacy, Zagazig University

4- Department: Medicinal Chemistry

5- Coordinator: Prof. Dr. Sayed Lashin

6- Date of program specification approval: 22/8/2017

B- Professional Information

1- Program aims:

The Medicinal chemistry Master program aims to equip students with the skills to do independent research at both experimental and theoretical levels through extended comprehension of key chemical concepts and in depth understanding of specialized areas.

Consistency of program aims with the mission of faculty of pharmacy:

Graduate attributes:

2-Intended Learning Outcomes (ILOs):

The Program provides excellent opportunities for students to demonstrate knowledge and understanding qualities and develop skills appropriate for **Medicinal chemistry** Master of sciences degree.

2-1- Knowledge and Understanding :

On successful completion of the Master degree Program, students will be able to:

A.1- Outline the concepts associated with medicinal chemistry.

A.2- Identify the applications of theories in developing molecules and drug design that serves the community and the patients.

A.3- Record the recent advances in the field of medicinal chemistry & their related subjects including computer-aided drug design & validation parameters in drug analysis.

A.4- Mention the legal aspects of the profession of Medicinal chemistry.

A.5- Identify the principles to ensure quality in the wide field of medicinal chemistry.

A.6- Write tasks given ethically and with dedication.

2-2 - Intellectual Skills:

On successful completion of the Master degree Program, students will be able to:

B.1- Analyze and interpret data obtained from medicinal chemistry study in a specific and suitable form.

B.2- Demonstrate skills in the solution of problems while there is lack of information.

B.3- Apply learnt knowledge to solve professional problems.

B.4- Conduct research and write concrete reports on the obtained results with conclusive significances.

B.5- Evaluate risks in experiments and deal with them effectively.

B.6- Plan and undertake a practical and research project including accessing relevant literature and awareness of recent technical and theoretical advances which could be applied.

B.7- Take professional decisions in the area of specialization.

2-3 - Professional and Practical Skills:

It is intended that, on successful completion of the Master degree Program, students will be able to:

C.1- Apply a wide range of synthetic and measurement techniques and develop appropriate practical skills within the workplace.

C.2- Evaluate results in medicinal chemistry research.

C.3- Conduct various methods and chemical techniques of analysis and assure the quality and suitability of instruments.

2-4 - General and Transferable Skills:

On successful completion of the Master degree Program, students will be able to:

D.1- Communicate and express clearly ideas both orally and in writing.

D.2- Demonstrate appropriate information technology skills especially in the areas of word processing, internet communication, information retrieval and online literature searching.

D.3- Practice self assessment of learning needs in the field of medicinal chemistry.

D.4- Find information from a range of sources in the field of medicinal chemistry.

D.5- Assess and form an opinion of other people's work.

D.6- Work effectively in a group environment.

D.7- Manage time and complete work to deadlines

D.8- Manage own learning and appreciate the importance of continuing professional development.

3- Academic Standards:

- NARS (National Academic Reference Standards)

Matrix: Comparison between Master degree program ILOs and the Academic Reference Standards (2009)

	ARS	Program ILOs
Knowledge and Understanding	2.1.1- Theories and fundamentals related to the field of learning as well as in related areas.	A.1- Outline the concepts associated with medicinal chemistry.
	2.1.2- Mutual influence between professional practice and its impact on the environment.	A.2- Identify the applications of theories in developing molecules and drug design that serves the community and the patients.
	2.1.3- Scientific developments in the area of specialization.	A.3- Record the recent advances in the field of medicinal chemistry & their related subjects including computer-aided drug design , validation parameters in drug analysis& Advanced medicinal chemistry.
	2.1.4- Moral and legal principles for professional practice in the area of specialization.	A.4- Mention the legal aspects of the profession of Medicinal chemistry.
	2.1.5- Principles and the basics of quality in professional practice in the area of specialization.	A.5- Identify the principles to ensure quality in the wide field of medicinal chemistry.
	2.1.6- The fundamentals and ethics of scientific research.	A.6- Write tasks given ethically and with dedication.
Intellectual Skills	2.2.1- Analyze and evaluate information in the field of specialization and analogies to solve problems	B.1- Analyze and interpret data obtained from medicinal chemistry study in a specific and suitable form.
	2.2.2- Solve specified problems in the lack or missing of some information.	B.2- Demonstrate skills in the solution of problems while there is lack of information.
	2.2.3-Correlate and integrate different pharmaceutical knowledge to solve professional problems.	B.3- Apply learnt knowledge to solve professional problems.
	2.2.4- Conduct research and write scientific report on research specified topics.	B.4- Conduct research and write concrete reports on the obtained results with conclusive significances.

	2.2.5- Evaluate and manage risks and potential hazards in professional practices in the area of specialization	B.5-Evaluate risks in experiments and deal with them effectively.
	2.2.6- Plan to improve performance in the field of specialization.	B.6- Plan and undertake a practical and research project including accessing relevant literature and awareness of recent technical and theoretical advances which could be applied.
	2.2.7- Professional decision-making in the contexts of diverse disciplines.	B.7- Take professional decisions in the area of specialization.
Professional and Practical Skills	2.3.1- Master basic and modern professional skills in the area of specialization.	C.1- Apply a wide range of synthetic and measurement techniques and develop appropriate practical skills within the workplace.
	2.3.2- Write and evaluate professional reports.	C.2- Evaluate results in medicinal chemistry research.
	2.3.3- Assess methods and tools existing in the area of specialization.	C.3- Conduct various methods and chemical techniques of analysis and assure the quality and suitability of instruments.
General and Transferable Skills	2.4.1- Communicate effectively.	D.1- Communicate and express clearly ideas both orally and in writing.
	2.4.2- Effectively use information technology in professional practices	D.2- Demonstrate appropriate information technology skills especially in the areas of word processing, internet communication, information retrieval and online literature searching.
	2.4.3- Self-assessment and define his personal learning needs.	D.3- Practice self assessment of learning needs in the field of medicinal chemistry.
	2.4.4- Use variable sources to get information and knowledge.	D.4- Find information from a range of sources in the field of medicinal chemistry.
	2.4.5- Set criteria and parameters to evaluate the performance of others	D.5- Assess and form an opinion of other people's work.
	2.4.6- Work in a team and lead teams carrying out various professional tasks.	D.6- Work effectively in a group environment.
	2.4.7- Manage time effectively.	D.7-Manage time and complete work to deadlines
	2.4.8- Continuous and self learning.	D.8- Manage own learning and appreciate the importance of continuing professional development.

4-Curriculum Structure and Contents:

a- Program duration: **3- 5** years

b- Program structure:

- The Masters program can be completed in 3-5 years.
- The Faculty of pharmacy implements the credit hour system.
- The program is structured as:

1- Courses: General (1 year) and Special

No. of credit hours for program courses:

Compulsory: 12

Elective: (2x4) 8

Special: (3x4) 12

2- Thesis: 30 hours

The candidate must complete a research project on an approved topic in the Pharmaceutical Sciences. To fulfill this requirement the student must present (written and orally) a research proposal and write a thesis.

3- General University Requirements: 10 credit hours including:

a- TOEFL (400 units)

b- Computer course

c-Program Curriculum:

Course Code	Course Title	Credit hours	Program ILOs Covered
	General Courses:		
M109	Drug design	4	A1, A2, A3, B3,D4
M101	Advanced Instrumental Analysis & chromatography I	4	A1, A2, B1,D4

M106	Physical chemistry	4	A1, B1, B2, D2, D5, D6
ME3	**Elective A** Good practice for analysis of drugs and quality control	4	A1, A3, A5, B1,B5,D2,D4
ME2	**Elective B** Drug Stability	4	A1, A2, A5, B1, B2
	Special Courses:		
Msp1	Computer Aided Drug Design	4	A1, A3, B7,D2,D4
Msp2	Validation Parameters in Drug Analysis	4	A1, A3, A5, B1, B7,D2,D4
Msp3	Advanced Medicinal Chemistry	4	A1, A3, B3, D2,D4
	Thesis	30	A1, A2, A3, A4, A5, A6, B1, B2, B3, B4, B5, B6, B7, C1, C2, C3, D1, D2, D3, D4, D5, D6, D7 and D8

5-Program admission requirements:

- Candidate should have obtained the certificate of Bachelor degree in pharmaceutical sciences with general grade good and grade good in the specialty from one of the Egyptian universities or an equivalent certificate from a foreign institute recognized by the university.

- Admission is in October each year.

6- Admission Policy:

The faculty complies with the admission regulations and requirements of the Egyptian Supreme Council of Universities (ESCU).

7-Student assessment methods:

Method	ILOS
Written exam	Knowledge and Understanding and Intellectual Skills
Oral exam	Knowledge and Understanding ,Intellectual Skills and General and Transferable Skills
Activity	Intellectual Skills and General and Transferable Skills
Seminars	Knowledge and Understanding ,Intellectual Skills & General and Transferable Skills
Follow up	Professional and practical Skills & General and Transferable Skills
Thesis and oral presentation	Knowledge and Understanding, Intellectual Skills, Professional and practical Skills & General and Transferable Skills

Grade Scale	Grade point average value (GPA)	Numerical scale
A+	5	≥ 95%
A	4.5	90- < 95%
B+	4	85- < 90%
B	3.5	80- < 85%

C+	3	75- < 80%
C	2.5	70- < 75%
D+	2	65- < 70%
D	1.5	60- < 65%

8-Failure in Courses:

Students who fail to get 60% (1 point)

9-Methods of program evaluation

Evaluator	Method	Sample
Internal evaluator: Professor Dr. Elsayed Lashen	Program evaluation Courses evaluation	Program report Courses report
External evaluator: Professor Dr.	Program evaluation Courses evaluation	Program report Courses report
Others methods	Matrix with ARS Questionnaires	The Matrix Results of the questionnaires

Program coordinator **Head of Department**

Prof. Dr. Sayed Lashin **Prof. Dr/ mohamed Baraka**

General Courses offered by Medicinal Chemistry Department in conjunction with Analytical Chemistry and Pharmaceutics Departments

Course Specification

Course title: Advanced Instrumental Analysis & chromatography I

Course code: M101

2017-2018

Course specification of Advanced Instrumental Analysis & chromatography I

Institution: Zagazig University
Faculty : Pharmacy

A- Course identification:

1. Program (s) on which the course is given: Master of Pharmaceutical Sciences	
2. Major or Minor element of programs:	Major
3. Department offering the course:	Medicinal chemistry Dept.
4. Academic year Level: premaster	2017/2018
5. Date of specification approval:	22/8/2017

B- Basic information:

1. Title: Advanced Instrumental Analysis & chromatography I Code: M101
2. Credit Hours: 4 hrs/week
3. Tutorials: 4 hrs/week

C- Professional information:

1- Objectives:

On completion of the course, the student will be able to: demonstrate fundamental knowledge and basic theories in instrumental analysis , state the concepts of diagnosing cardiac diseases, G.I.T diseases and infections through IR, HNMR and UV spectrophotometry and describe new aspects of (HPLC), HPLC/Mass, Gas Chromatography (GC) and GC/Mass and their medicinal applications.

2- Intended Learning Outcomes (ILOs):

ILOs		Course Teaching Strategies	Course Assessment Methods
A- Knowledge and Understanding:			
a1	List theories for separation of different components in combined therapy and their determination quantitatively using different instrumental techniques.	• Lectures • Self learning	Written exams to assess. Oral exams to assess
a2	State medicinal and pharmaceutical applications of spectroscopy , HPLC and GC	• Lectures • Self learning	Written exams to assess. Oral exams to assess
B- Intellectual skills:			

b1	Analyze & interpret qualitative & quantitative data obtained from instrumental analysis	• Lectures • Self learning • Open discussion	Written exams to assess. Oral exams to assess Activities to asses
C-General and Transferable skills:			
c1	Write reports and present it.	• Self learning • Open discussion	Written exams to assess. Oral exams to assess Activities to asses

D- Contents:

Week No.	Lecture contents (2 hrs/lec.)	Practical session (2hrs/lab)
1	Advanced Ultra-violet spectroscopy	**Activity (Reports)**
2	New aspects in vibrational spectroscopy (IR spectroscopy)	
3	Application of Nuclear magnetic resonance (NMR)	
4	Application of Mass spectrometry(MS)	
5	Medicinal application of spectroscopy in diagnosis of diseases	
6	Raman spectroscopy.	
7	Advanced HPLC.	
8	HPLC & its medicinal and pharmaceutical application	
9	High performance thin layer chromatography (HPTLC).	
10	Advanced Gas chromatography.	
11	GC & its medicinal and pharmaceutical application	
12	New aspects of Supercritical fluid chromatography (SFC) and ion exchange chromatography (IEC).	
13	Capillary electrophoresis(CE)	
14	Analytical application of dimeric and polymeric molecules.	
15	Revision & open discussion	

E- Schedule of Assessment Tasks for Students During the Semester:

	Assessment task (e.g. essay, test, group project, examination, speech, oral presentation, etc.)	Week Due	Proportion of Total Assessment
1	**Assessment (1):** Activity	Week 2-14	10 %
2	**Assessment (2):** Written exam	Week 16	75 %
3	**Assessment (3):** oral exam	Week 16	15 %

F- Facilities required for teaching and learning:

- **For lectures:** Black (white) boards, computer and data show.

H- List of References:

1- A-Scientific papers

2- Essential Books:

-Chemical stability of pharmaceuticals, Kenneth A. Connors, Kenneth Antonio Connors, Gordon L. Amidon, Valentino J. Stella

-Pharmaceutical process validation Robert A. Nash, Alfred H. Wachter (2006)

3- Recommended Books

-Photostability of drugs and drug formulations**, Hanne Hjorth Tønnesen (2004)**

-U.S.P. & B.P (2010)

- Quantitative Chemical Analysis (Loose-Leaf) (Budget Books) by Daniel C. Harris (May 15, 2010)

4- Periodicals and websites:

http://www.ncbi.nlm.nih.gov/sites/entrez

http://journals.tubitak.gov.tr/chem/index.php

http://www.pharmacopoeia.co.uk/

www.Pubmed.Com , www.sciencedirect.com, www.amazon.com

- **Course Coordinator: Prof. Dr/ El Sayed Lashin.**

  Prof. Dr/Hisham Ezat.

- **Head of Department: Prof. Dr/ Mohamed Baraka.**

Date: 22/8/2017 تم مناقشة و اعتماد توصيف المقرر من مجلس القسم بتاريخ

Matrix I of Advanced Instrumental Analysis & chromatography I

Course Contents		ILOs of Advanced Instrumental Analysis & chromatography I course			
		Knowledge and understanding		Intellectual skills	General and Transferable skills
		a1	a2	b1	d1
1	Advanced Ultra-violet spectroscopy	x	x	X	
2	New aspects of Vibrational spectroscopy (IR spectroscopy)	x	x	X	
3	Application of Nuclear magnetic resonance (NMR)	x	x	X	
4	Application of Mass spectrometry(MS)	x	x	X	
5	Medicinal application of spectroscopy in diagnosis of diseases		x	X	
6	Raman spectroscopy.	x			
7	Advanced HPLC. **Activity (Reports)**	x		X	X
8	HPLC & its medicinal and pharmaceutical application		x		
9	High performance thin layer chromatography (HPTLC)	x		X	
10	Advanced Gas chromatography	x			
11	GC & its medicinal and pharmaceutical application		x	X	
12	New aspects of Supercritical fluid chromatography (SFC) and ion exchange chromatography (IEC)	x	x		
13	Capillary electrophoresis(CE)	x	x		
14	Analytical application of dimeric and polymeric molecules. **Activity (Reports)**		x	X	x
15	Revision and open discussion	x	x	X	

Matrix II of Advanced Instrumental Analysis & chromatography I

ARS		Program ILOs	Course ILOs	Course contents	Sources	Teaching and learning methods		Method of assessment		
						Lecture	Self learning	Written exam	Oral exam	Activities
2.1	2.1.1- Theories and fundamentals related to the field of learning as well as in related areas.	A.2- Illustrate theories of Qualitative and Quantitative estimation of different formulations	a1	Advanced Ultra-violet spectroscopy New aspects of Vibrational spectroscopy (IR spectroscopy) Application of Nuclear magnetic resonance (NMR) Application of Mass spectrometry(MS) Raman spectroscopy Advanced HPLC High performance liguid chromatography HPTLC Advanced Gas chromatography New aspects of Supercritical fluid chromatography (SFC) Capillary electrophoresis(CE)	Textbooks, Scientific papers and self learning	X	x	X	X	

	2.1.2- Mutual influence between professional practice and its impact on the environment.	A.4- Demonstrate applications of Quality control and Quality assurance that serves the community and patients.	a2	Advanced Ultra-violet spectroscopy New aspects of Vibrational spectroscopy (IR spectroscopy) Application of Nuclear magnetic resonance (NMR) Application of Mass spectrometry(MS) Medicinal application of spectroscopy in diagnosis of diseases Advanced HPLC & its medicinal and pharmaceutical application Advanced GC & its medicinal and pharmaceutical application New aspects of Supercritical fluid chromatography (SFC) Capillary electrophoresis(CE) Analytical application of dimeric and polymeric molecules.	Textbooks, Scientific papers and self learning	X	x	x	X	
2.2	2.2.1- Analyze and evaluate information in the field of specialization and analogies to solve problems	B.1- Analyze and interpret data obtained from Instrumental analysis of different drugs in a specific and suitable form.	b1	Advanced Ultra-violet spectroscopy New aspects of Vibrational spectroscopy (IR spectroscopy) Application of Nuclear magnetic resonance (NMR) Application of Mass spectrometry(MS) Medicinal application of spectroscopy in diagnosis of diseases Advanced HPLC & its medicinal and pharmaceutical application Advanced GC & its medicinal and pharmaceutical application	Textbooks, Scientific papers and self learning	X	x	X	X	

2.4	2.4.4- Use variable sources to get information and knowledge.	D.4- Find information from a range of sources in the field of Drug synthesis and analysis and recent topics in medicinal chemistry.	d1	Activity (Reports)	Internet Textbooks		x			x

Course Specification

Course title: Drug Design

Course code: M109

2017-2018

Course specification of Drug Design

Institution: Zagazig University
Faculty : Pharmacy

A- Course identification:

1. Program (s) on which the course is given:	Master of Pharmaceutical Sciences
2. Major or Minor element of programs:	Major
3. Department offering the course:	Medicinal chemistry Dept.
4. Academic year Level: premaster	2017-2018
5. Date of specification approval:	22/8/2017

B- Basic information:

4. Title: **Drug Design**	Code: M109
5. Credit Hours: 4 hrs/week	
6. Tutorials: Lectures→ 4 hrs/week	

C- Professional information:

2- Objectives:

On completion of the course, the student will be able to:

- outline principles of drug design, docking.
- utilize combinatorial chemistry in synthesis of drugs.

2- Intended Learning Outcomes (ILOs):

ILOs		Course Teaching Strategies	Course Assessment Methods
A- Knowledge and Understanding:			
a1	Outline principles of drug design and combinatorial chemistry.	• Lectures • Self learning	• Written exams • Oral exams
a2	Describe applications of drug design and QSAR.		
a3	State clearly the up-to date information & methods in drug design and docking.		
B- Professional and Practical skills:			
C- Intellectual skills:			
c1	Predict solutions to specified problems in drug design	• Lectures • Self learning	• Written exams • Oral exams

D-General and Transferable skills:			
d1	Write reports and present it.	• Self learning • Open discussions	• Activities

D- Contents:

Week No.	Lecture contents (2hrs/lec.)	Practical session (2hrs/lab)
1	Principles of drug design	Activity
2	Combinatorial chemistry (combinatorial and parallel synthesis in medicinal chemistry projects)	
3	Combinatorial chemistry (solid phase techniques)	
4	QSAR (hydrophobicity, electronic effects)	
5	QSAR(steric factors, other physicochemical parameters)	
6	**Activity(Reports)**	
7	Drug design and relationship of functional groups to biological activity (hydrophilic/ hydrophobic properties)	Activity
8	Drug design and relationship of functional groups to biological activity (resistance to chemical and enzymatic degradation)	
9	Relationship between molecular structure and biological activity	
10	Docking (Introduction)	
11	Docking (procedures)	
12	**Activity(Reports)**	
13	Applications of drug design (self destruct drugs, peptidomimetics)	Activity
14	Applications of drug design (targeting drugs)	
15	Revision & Open Discussion	

E- Schedule of Assessment Tasks for Students During the Semester:

	Assessment task (e.g. essay, test, group project, examination, speech, oral presentation, etc.)	Week Due	Proportion of Total Assessment
1	**Assessment (1):** Activity	Week 6-12	10 %
2	**Assessment (2):** Written exam	Week 16	75 %
3	**Assessment (3):** oral exam	Week 16	15 %

F- Facilities required for teaching and learning:

For lectures: Black (white) boards, computers and data show.

H- List of References:

1- Scientific papers

2- Essential Books:

i- Burger's medicinal chemistry and drug discovery. Edited by Manfred E.wolff(2006)
ii- Computer-aided molecular design. Application of Agrochemicals, Materials & pharmaceuticals. Edited by Charles H.Reynolds,M.Katharine Holloway and Harold K.COX(2003)

3- Recommended Books

i- The organic chemistry of drug design and drug action, second edition, Edited by Richard B.Silverman.(2005)
ii- Designing Bioactive molecules. Three dimensional Techniques and applications, Edited by Yvonne C.Martin and Peter Willett. (2009)
iii- Drug Design: Structure- and Ligand-Based Approaches by Kenneth M. Merz, Dagmar Ringe and Charles H. Reynolds (May 31, 2010)
iv- ORGANIC CHEMISTRY OF DRUG DESIGN AND DRUG ACTION , 2ND EDITION (2012)

4- Periodicals and websites:

http://www.ncbi.nlm.nih.gov/sites/entrez

http://journals.tubitak.gov.tr/chem/index.php

http://www.pharmacopoeia.co.uk/

www.Pubmed.Com

www.sciencedirect.com

www.amazon.com

- **Course lecturers:** **Prof.Dr/Mohammed Al-hussany.**
  Prof.Dr/ Mohamed Baraka.
  Prof.Dr/ Kamel Metwally.
- **Course Coordinator: Prof. Dr/Mohammed Al-hussany.**
- **Head of Department: Prof.Dr/ Mohamed Baraka.**

Date: 22/8/2017 تم مناقشة و اعتماد توصيف المقرر من مجلس القسم بتاريخ

Matrix I of Drug Design (2017-2018)

	Course Contents	ILOs of Drug Design course				
		Knowledge and understanding			Intellectual skills	General and Transferable skills
		a1	a2	a3	b1	d1
1	Principles of drug design	x				
2	Combinatorial chemistry (combinatorial and parallel synthesis in medicinal chemistry projects)	x				
3	Combinatorial chemistry (solid phase techniques)	x				
4	QSAR (hydrophobicity, electronic effects)		x			
5	QSAR(steric factors, other physicochemical parameters)		x			
6	**Activity(Reports)**					x
7	Drug design and relationship of functional groups to biological activity (hydrophilic/ hydrophobic properties)		x	x		
8	Drug design and relationship of functional groups to biological activity (resistance to chemical and enzymatic degradation)		x	x		
9	Relationship between molecular structure and biological activity		x	x		
10	Docking (Introduction)			x		
11	Docking (procedures)			x		
12	**Activity(Reports)**					x
13	Applications of drug design (self destruct drugs, peptidomimetics)				X	
14	Applications of drug design (targeting drugs)				**X**	
15	Revision & Open Discussion	x	x	x	X	x

Matrix II of Drug Design (2017-2018)

ARS		Program ILOs	Course ILOs	Course contents	Sources	Teaching and learning methods		Methods of assessment		
						Lecture	Self learning	Written exam	Oral exam	Activities
2.1	2.1.1- Theories and fundamentals related to the field of learning as well as in related areas.	A.1- Outline principles of drug design, docking and combinatorial chemistry.	a1	Principles of drug design. Combinatorial chemistry	Textbooks, Scientific papers and self learning	X	x	x	x	
	2.1.2- Mutual influence between professional practice and its impact on the environment.	A.3- Describe applications of drug design and QSAR	a2	QSAR Drug design and relationship of functional groups to biological activity. Relatioship between molecular structure and biological activity.	Textbooks, Scientific papers and self learning	X	x	x	x	
	2.1.3- Scientific developments in the area of specialization.	A.5- Record the recent advances in the field of instrumental analysis, CADD, and advanced medicinal chemistry.	a3	Drug design and relationship of functional groups to biological activity. Relationship between molecular structure and biological activity. Docking Activity	Textbooks, Scientific papers and self learning	X	x	x	x	

2.2	2.2.3-Correlate and integrate different pharmaceutical knowledge to solve professional problems.	B.3- Apply learnt knowledge to solve professional problems associated with drug design and synthesis.	b1	Applications of drug design.	Textbooks, Scientific papers and self learning	X	x	x	x	
2.4	2.4.4- Use variable sources to get information and knowledge.	D.4- Find information from a range of sources in the field of Drug synthesis and analysis and recent topics in medicinal chemistry.	d1	Activity (Reports)	Internet Textbooks		x			x

Course Specification

Course title: Good practice for analysis of drugs and quality control

Course code: ME3

2017-2018

Course specification of Good practice for analysis of drugs and quality control

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Institution: Zagazig University
Faculty : Pharmacy

A- Course identification:

1. Program (s) on which the course is given:	Master of Pharmaceutical Sciences
2. Major or Minor element of programs:	Major
3. Department offering the course:	Medicinal chemistry Dept.
4. Academic year Level: premaster	2017-2018
5. Date of specification approval:	22/8/2017

B- Basic information:

7. Title: **Good practice for analysis of drugs and quality control** Code: ME3
8. Credit Hours: 4 hrs/week
9. Tutorials: 4 hrs/week lectures

C- Professional information:

3- Objectives:

On completion of the course, the student will be able to: choose & develop suitable analytical methodology and find an effective solution for a given complex problem.

2- Intended Learning Outcomes (ILOs):

ILOs		Course Teaching Strategies	Course Assessment Methods
A- Knowledge and Understanding:			
a1	Outline the new aspects in drug analysis & quality control	• Lectures • Self learning • Open discussion	• Written exams • Oral exams
a2	State up-to-date information in the field of drug analysis		
a3	Name the applications of quality control & quality assurance		
B- Professional and Practical skills.			

C- Intellectual skills:			
c1	Analyze & evaluate obtained results qualitatively & quantitatively	• Lectures • Self learning • Open discussion	• Written exams • Oral exams
c2	Evaluate GMP to avoid any hazards		
D-General and Transferable skills:			
d1	Modify professional abilities by evaluation of information from different sources.	• Self learning • Open discussion	• Written exams • Oral exams • Activities
d2	Write reports and present it.		

D- Contents:

Week No.	Lecture contents (2 hrs/lec.)	Practical session (2hrs/lab)
1	Validation parameters in analysis	Activity
2	Application of quantitative analysis for different drugs.	
3	Quality control and how to minimize the synthesis errors.	
4	Quality assurance and basic requirement.	
5	Applications of Spectrophotometric analysis for dosage forms	
6	H1,C13,N15,F19- NMR	
7	Advanced techniques in mass spectroscopy	
8	Atomic absorption	
9	Fluorimetric analysis	
10	Radioimmune Assay	
11	Electrophoresis	
12	Advanced GC-MS chemistry	
13	Spectrodenistometric (TLC scanner)	
14	Forensic chemistry	
15	Revision & Open Discussion	

E- Schedule of Assessment Tasks for Students During the Semester:

	Assessment task (e.g. essay, test, group project, examination, speech, oral presentation, etc.)	Week Due	Proportion of Total Assessment
1	Activity	Week 5-12	10 %
2	Written exam	Week 16	75 %
3	oral exam	Week 16	15 %

F- Facilities required for teaching and learning:

For lectures: Black (white) boards, data show.

H- List of References:

1-Scientific papers

2- Essential Books:

Halpern,A in "Experimental physical chemistry"(2007)
Oxtoby,D and Nachtrieb, N in "Principles of Modern chemistry"(2009)

3- Suggested books:

Garfied, F .M., Klesta ,E and Hirsch, J in" Quality Assurance Principles for Analytical Laboratories"(2011)

4- Periodicals and websites:

http://www.ncbi.nlm.nih.gov/sites/entrez

http://journals.tubitak.gov.tr/chem/index.php

http://www.pharmacopoeia.co.uk/

www.Pubmed.Com , www.sciencedirect.com, www.amazon.com

Course lecturers: **Prof. Dr/ Abdalla Alsahanawany.**

Dr. Mahmoud Sebaiy.

Course Coordinator: Prof.Dr/ Abdalla Alsahanawany.

Head of Department: Prof.Dr/ Mohamed Baraka.

Date: 22/8/2017 **تم مناقشة و اعتماد توصيف المقرر من مجلس القسم بتاريخ**

Matrix I of Good practice for analysis of drugs and quality control

Course Contents		ILOs of Quality in Instrumental Analysis and Quality Control course						
		Knowledge and understanding			Intellectual skills		General and Transferable skills	
		a1	a2	a 3	b1	b 2	d1	d 2
1	Validation parameters in analysis	x		x				
2	Application of quantitative analysis for different drugs.	x	x	x				
3	Quality control and how to minimize the systemic errors.	x		x	x			
4	Quality assurance and basic requirements of GMP	x		x				
5	Application of Spectrophotometric analysis(UV-VIS-IR) **Activity**		x		x	x	x	X
6	H^{1},C^{13},N^{15},F^{19}- NMR	x	x			x		
7	Advanced techniques in mass spectroscopy		x			x		
8	Atomic absorption			x		x		
9	Fluorimetric analysis		x			x		
10	Radioimmune Assay		x					
11	Electrophoresis		x					
12	Advanced GS-MS chemistry. **Activity**	x		x			x	X
13	Spectrodenistometric (TLC scanner)	x		x	x			
14	Forensic chemistry.	x	x					

Matrix II of Good practice for analysis of drugs and quality control

ARS		Program ILOs	Course ILOs	Course contents	Sources	Teaching and learning methods		Method of assessment		
						Lecture	Self learning	Written exam	Oral exam	Activities
2.1	2.1.1- Theories and fundamentals related to the field of learning as well as in related areas.	A.2- Illustrate theories of Qualitative and Quantitative estimation of different formulations.	a1	Validation parameters in analysis Application of quantitative analysis for different drugs H^{1},C^{13},N^{15},F^{19}- NMR Forensic chemistry Spectrodenistometric (TLC scanner) Advanced GC-MS Techniques	Textbooks, Scientific papers and self learning	X	x	X	X	

	2.1.3- Scientific developments in the area of specialization	A.5- Record the recent advances in the field of Instrumental analysis, CADD, and advanced medicinal chemistry	a2	Application of quantitative analysis for different drugs Applications of Spectrophotometric analysis for dosage forms H1,C13,N15,F19 NMR Advanced techniques in mass spectroscopy Fluorimetric analysis Radioimmune Assay Electrophoresis Forensic chemistry	Textbooks, Scientific papers and self learning	X	x	X	X	
	2.1.5- Principles and the basics of quality in professional practice in the area of specialization.	A.7- Identify the principles to ensure quality and Validation of analysis results.	a3	Spectrodenistometric (TLC scanner) Atomic absorption GC-MS Techniques Validation parameters in analysis Application of quantitative analysis Quality control and how to minimize systemic erros. Quality assurance and basic requirements of GMP	Textbooks, Scientific papers and self learning	X	x	X	X	

2.2	2.2.1- Analyze and evaluate information in the field of specialization and analogies to solve problems	B.1- Analyze and interpret data obtained from Instrumental analysis of different drugs in a specific and suitable form.	b1	Quality control and how to minimize systemic error Applications of Spectrophotometric analysis for dosage forms Spectrodenistometric (TLC scanner)	Textbooks, Scientific papers and self learning	X	x	X	X	
	2.2.5- Evaluate and manage risks and potential hazards in professional practices in the area of specialization	B.6-Evaluate risks in experiments and techniques used during handling chemicals and deal with them effectively.	b2	Applications of Spectrophotometric analysis for dosage forms Advanced techniques in mass spectroscopy Atomic absorption Fluorimetric analysis H^1,C^{13},N^{15},F^{19}- NMR	Textbooks, Scientific papers and self learning	X	x	X	X	

2.4	2.4.2- Effectively use information technology in professional practices	D.2- Demonstrate appropriate information technology skills especially in the areas of word processing, internet communication, information retrieval and online literature searching	d1	Activity (Reports)	Internet Textbooks		x			x
	2.4.4- Use variable sources to get information and knowledge.	D.4- Find information from a range of sources in the field of Drug synthesis and analysis and recent topics in medicinal chemistry.	d2	Activity (Reports)	Internet Textbooks		x			X

Course Specification

Course title: Physical Chemistry
(Courses offered by other departments)

Course code: M106

2017-2018

Course specification of Physical Chemistry

Institution: Zagazig University
Faculty : Pharmacy

A- Course identification:

1. Program (s) on which the course is given:	Master's of Pharmaceutical Sciences
2. Major or Minor element of programs:	Major
3. Department offering the course:	Analytical Chemistry
4. Academic year Level: premaster	2017-2018
5. Date of specification approval:	22/8/2017

B- Basic information:

10. Title: **Physical Chemistry**	Code: M106
11. Credit Hours: 4 hrs/week	
12. Tutorials: Lectures→ 4 hrs/week	

C- Professional information:

4- Objectives:

On completion of the course, the student will be able to:

Outline the principles of kinetics, catalysis, solutions, photochemistry and Describe theories of reaction rate, types of chemical reaction criteria of catalysis.

2- Intended Learning Outcomes (ILOs):

ILOs		Course Teaching Strategies	Course Assessment Methods
A- Knowledge and Understanding:			
a1	Outline the principles of kinetics, catalysis, solutions and photochemistry	• Lectures • Self learning • Open discussion	• Written exams • Oral exam
a2	Describe the behavior and laws governing, photochemistry, solutions and chemical reactions and their applications.		
B- Professional and Practical skills:			
C- Intellectual skills:			
c1	Write units of measurements and calculations with chemical formulas and	• Lectures	• Written exams

	equations.	• Self learning • Open discussion	• Oral exam
c2	Develope the knowledge and information obtained from physical chemistry principles in determining rates of the reaction.		
D-General and Transferable skills:			
d1	Use Computer skills like preparing presentations and collecting information through different data-bases.	• Self learning • Open discussion	• Activity
d2	Work effectively as a member of team.		
d3	Improve scientific brain storming capabilities of team members		

D- Contents:

Week No.	Lecture contents (2 hrs/lec.)	Practical session (2hrs/lab)
1	Introduction of kinetics and rate of reactions	Activity
2	Molecular and order of reaction.	
3	Parallel and consecutive reactions.	
4	Methods used for determination of the order of reactions	
5	Theories of reaction rates and chain reaction	
6	Criteria of catalysis.	
7	Homogenous and enzyme catalysis	
8	Heterogeneous catalysis	
9	Nature of electrolytes in solution.	
10	Photochemistry and properties of electromagnetic radiations.	
11	Laws of photochemical process, quantum yield and chain reaction.	
12	• Solutions: Principles and concentration and solubility.	
13	• Factors affecting solubility • Solute-solvent interaction. • Solubility and temperature. • Effect of pressure on solubility.	
14	• Solutions of liquids in liquids • Solutions of solid in liquids (Colligative properties of solutions.)	
15	• Open discussion and revision	

E- Schedule of Assessment Tasks for Students During the Semester:

	Assessment task (e.g. essay, test, group project, examination, speech, oral presentation, etc.)	Week Due	Proportion of Total Assessment
1	**Assessment (1):** Activity	Week 8	10 %
2	**Assessment (2):** Written exam	Week 16	75 %
3	**Assessment (3):** oral exam	Week 16	15 %

F- Facilities required for teaching and learning:

For lectures: Black (white) boards, computer, data show.

H- List of References:

1- Scientific papers

2- Essential Books:

- Principles of Physical Chemistry(Part 1-2) by Lion el M. Raff, Prentice Hall; 1st edition (2001) .
- Physical chemistry of surfaces, Arthur Ademson, John Wiley & Sons.inc:1st edition (2000).

3- Periodicals and websites:

www.sciencedirect.com

www.rsc.org

Course Coordinator: Ass. Prof Dr/ Wafaa Hassan.

Head of Department: Prof. Dr. Magda Elhennawy.

Date: 22/8/2017 تم مناقشة و اعتماد توصيف المقرر من مجلس القسم بتاريخ

Course Specification

Course title: Drug Stability
(Courses offered by other departments)

Course code: Esp2

2017-2018

Course specification of Drug stability

Institution: Zagazig University
Faculty : Pharmacy

A- Course identification:

1. Program (s) on which the course is given:	Master of Pharmaceutical Sciences
2. Major or Minor element of programs:	Major
3. Department offering the course:	Pharmaceutics Dept.
4. Academic year Level: premaster	2017-2018
5. Date of specification approval:	22/8/2017

B- Basic information:

13. Title: **Drug stability**	Code: Esp2
14. Credit Hours: 4 hrs/week	
15. Tutorials:	Lectures→ 4 hrs/week

C- Professional information:

5- Objectives:

On completion of the course, the student will be able to:

describe the degradation of drugs and the methods to determine the order of reaction, Illustrate the stability programs for pharmaceutical products and the latest regulations for stability testing and ability to predict the degradation pathways of a drug design a stabilization protocol and predict a product shelf-life.

2- Intended Learning Outcomes (ILOs):

ILOs		Course Teaching Strategies	Course Assessment Methods
A- Knowledge and Understanding:			
a1	List the principles of order of reactions and methods of determination order of reactions	• Lectures • Self learning	• Writte exams • Oral exam • Activities
a2	Describe the principles of physical and chemical degradation of drugs in different dosage forms		
a3	Mention stability testing of different dosage forms		
B- Professional and Practical skills.			

C- Intellectual skills:			
c1	Interpret suitable stabilization methods for drugs in the various dosage forms.	• Lectures • Self learning	• Writte exams • Oral exam • Activities
c2	Design in a self-directed and original research investigations on drug stability in dosage forms from degradation pathways		
D-General and Transferable skills:			
d1	Use computer skills to present information	• Self learning • Open discussion	• Oral exam • Activities
d2	Collect information from a variety of sources		

D- Contents:

Week No.	Lecture contents (2 hrs/lec.)	Practical session (2hrs/lab)
1	• Rate of chemical reactions	
2	• Orders of reactions • Zero order	(Presentation)
3	• First order	
4	• Second order	
5	• Apparent zero order reaction • Pseudo first order reaction	
6	• Determination of order of reaction • Substitution method	
7	• Graphical method	
8	• Half-life method	
9	• Routes of degradation • Hydrolysis • Oxidation	
10	• Photochemical degradation • Incompatibility	
11	• Physical degradation routes • Vaporization • Aging • Adsorption	
12	• Complex reactions	
13	• Stability testing	
14	• Revision	
15	• Open discussion	(Final Presentation)

E- Schedule of Assessment Tasks for Students During the Semester:

	Assessment task (e.g. essay, test, group project, examination, speech, oral presentation, etc.)	Week Due	Proportion of Total Assessment
1	**Assessment (1):** Activity	Week 7-15	10 %
2	**Assessment (2):** Written exam	Week 16	75 %
3	**Assessment (3):** oral exam	Week 16	15 %

F- Facilities required for teaching and learning:

For lectures: Black (white) boards, data show.

H- List of References:

1- Essential Books:

Drug Stability: Principles and Practices (Drugs and the Pharmaceutical Sciences) by Jens T. Carstensen and Christopher Rhodes (2000).

2- Recommended Books:

1- Handbook of Stability Testing in Pharmaceutical Development: Regulations, Methodologies, and Best Practices, Kim Huynh-Ba, 389 (2008).
2- Extended Stability for Parenteral Drugs, 5th Edition (Extended Stability of Parenteral Drugs), Fifth Edition, Caryn Dellamorte Bing R.PH. M.S. FASHP and Anna Nowobilski-Vasilios , American Society of Health-System Pharmacists; (2013)

4- Periodicals and websites:

Pubmed, Sciencedirect, Weilyinterscience

- **Course Coordinator: Dr/ Hanaa Abd El-Fattah El-Ghamry.**

Head of Department: Prof Dr/ Nagia Almegrab.

Date: 22/8/2017 تم مناقشة و اعتماد توصيف المقرر من مجلس القسم بتاريخ

Special courses

Computer Aided Drug Design

Course Specification

Course title: Computer Aided Drug Design

Course code: Msp1

2017-2018

Course specification of Computer Aided Drug Design

Institution: Zagazig University
Faculty : Pharmacy

A- Course identification:

1. Program (s) on which the course is given:	Master of Pharmaceutical Sciences
2. Major or Minor element of programs:	Major
3. Department offering the course:	Medicinal chemistry department
4. Academic year Level:	2017/2018
5. Date of specification approval:	22/8/2017

B- Basic information:

16. Title: **Computer Aided Drug Design**	Code: Msp1
17. Credit Hours: 4 hrs/weeek	
18. Tutorials:	

C- Professional information:

6- Objectives:

On completion of the course, the student will be able to:
demonstrate computer-aided tools in drug design and find a starting point for a laboratory synthesis

2- Intended Learning Outcomes (ILOs):

ILOs		Course Teaching Strategies	Course Assessment Methods
A- Knowledge and Understanding:			
a1	Outline the principles of CADD (computer aided drug design)	Lectures	Final written exam + Oral exam
a2	Describe up-to-date information in computer aided drug design	Lectures	Final written exam + Oral exam
B- Intellectual skills:			
b1	Take professional decision in drug design with the aid of computer	Presentations	Final written exam + Oral exam

C-General and Transferable skills:			
d1	Improve professional abilities by evaluation of information from different sources	Open discussions	Activities
d2	Write reports and present it.	Self learning	Activities

D- Contents:

Week number	Lecture contents (4hrs/week)
1	History of Computer Aided Drug Design (CADD)
2	Types of Drug Design • Ligand based • Structure based
3	Structure based drug design
4	Protein based drug design
5	Computational chemistry (molecular properties)
6	Computational chemistry (conformational analysis)
7	Activity
8	Relation between CADD and Combinatorial Chemistry
9	Virtual Screening and machine learning
10	Molecular De- Novo design (principles)
11	Molecular De- Novo design (Automated de novo design)
12	Drug target profiling and Polypharmacology
13	Activity
14	Fields of computational chemistry applications
15	Revision & open discussion

E- Schedule of Assessment Tasks for Students During the Semester:

	Assessment task (e.g. essay, test, group project, examination, speech, oral presentation, etc.)	Week Due	Proportion of Total Assessment
1	Activity =10	Week 7-13	10 %
2	Written exam= 75	Weeks 16	75 %
3	Oral exam= 15	Weeks 16	15 %
Total	100		100 %

F- Facilities required for teaching and learning:

For lectures: Black (white) boards, computers and data show

H- List of References:

1- Scientific papers

2- Essential books:

- The organic chemistry of drug design and drug action , Edited by Richard B.Silverman.(2010)
- Designing Bioactive molecules Three dimensional Techniques and applications , Edited by Yvonne C.Martin and Peter Willett.(2008)

3- Recommended books

- Computer modeling of enzyme catalysed reaction mechanisms. A.J. Mulholland, G.H. Grant and W.G. Richards. ***Protein Eng.*** 6, 133 (1993).
- Similarity of molecular **shape.** A.Y. Meyer and W.G. Richards. ***J. Comput. Aided Mol. Design*** 5,427
- Rapid evaluation of **shape** similarity using gaussian functions. A.C. Good and W.G. Richards. J.***Chem.*** *Znfi* ***Comput. Sci.*** 33, 112
- Utilization of Gaussian functions for the rapid evaluation of molecular similarity. A.C. Good, E.E. Hodgkin and W.G. Richards. ***J. Chem.*** *Zn$* ***Comput. Sci.*** 32,188.
- A linear molecular similarity index. C.A. Reynolds, C. Burt and W.G. Richards. ***Quant. Struct. Act. Relat.*** 11, 34.
- Structure-activity relationships from molecular **si.milarity** matrices. A.C. Good, Sung-Sau **So** and W.G. Richards. ***J. Med. Chem.*** 36,433.
- Computer-Aided Drug Design and Delivery Systems by Ahindra Nag and Baishakhi Dey (Aug 12, 2010)
- Drug Design: Structure- and Ligand-Based Approaches by Kenneth M. Merz, Dagmar Ringe and Charles H. Reynolds (May 31, 2010)

4- Periodicals, Web Sites, etc

http://www.ncbi.nlm.nih.gov/sites/entrez

http://journals.tubitak.gov.tr/chem/index.php

http://www.pharmacopoeia.co.uk/

www.Pubmed.Com

www.sciencedirect.com

www.amazon.com

Course Coordinator: Prof. Dr./ Samy Megahed.

Head of Department: Prof.Dr./ Mohamed Baraka.

Date: 22/8/2017 **تم مناقشة و اعتماد توصيف المقرر من مجلس القسم بتاريخ**

Matrix I of Computer-Aided Drug Design

Course Contents		ILOs of Computer-Aided Drug Design course				
		Knowledge and understanding		Intellectual skills	General and Transferable Skills	
		a1	a2	b1	d1	d2
1	History of Computer Aided Drug Design (CADD)	x				
2	Types of Drug Design • Ligand based • Structure based	x				
3	Structure based drug design	x	x			
4	Protein based drug design	x	x			
5	Computational chemistry (molecular properties)	x	x			
6	Computational chemistry (conformational analysis)	x	x			
7	Activity				x	x
8	Relation between CADD and Combinatorial Chemistry		x			
9	Virtual Screening and machine learning		x			
10	Molecular De- Novo design (principles)		x			
11	Molecular De- Novo design (Automated de novo design)		x			
12	Drug target profiling and Polypharmacology		x			
13	Activity				x	x
14	Fields of computational chemistry applications		x	x		
15	Revision & open discussion	x	x	x		

Matrix II of Computer-Aided Drug Design

ARS		Program ILOs	Course ILOs	Course contents	Sources	Teaching and learning methods		Method of assessment		
						Lecture	Self learning	Written exam	Oral exam	Activities
2.1	2.1.1- Theories and fundamentals related to the field of learning as well as in related areas.	A.1- Outline Principles of Drug Design, Combinatorial chemistry.	a1	• History of Computer based drug design (CADD) • Types of Drug Design • Ligand based • Structure based • Computational chemistry • Structure based drug design • Protein based drug design • Revision and open discussion	Textbooks, Scientific papers and self learning	X	x	x	x	
	2.1.3- Scientific developments in the area of specialization.	A.5- Record the recent advances in the field of Instrumental analysis, CADD, and advanced medicinal chemistry.	a2	• Computational chemistry • Structure based drug design • Protein based drug design • Relation between CADD and Combinatorial Chemistry • Virtual Screening and machine learning	Textbooks, Scientific papers and self learning	x	x	x		

				• Molecular De- Novo design • Drug target profiling and Polypharmacology • Fields of computational chemistry applications • Revision & open discussion					x	
2.2	2.2.7- Professional decision-making in the contexts of diverse disciplines.	B.8- Take professional decisions in the area of Drug Design and analysis.	b1	Fields of computational chemistry applications	Textbooks, Scientific papers and self learning	x	x	x	x	
2.4	2.4.2- Effectively use information technology in professiona l practices	D.2- Demonstrate appropriate information technology skills especially in the areas of word processing, internet communication, information retrieval and online literature searching	d1	Reports	Reports		x			x

	2.4.4- Use variable sources to get information and knowledge.	D.4- Find information from a range of sources in the field of Drug synthesis and analysis and recent topics in medicinal chemistry.	d2	Reports	Reports		X			x

Validation Parameters in Drug Analysis

Course Specification

Course title: Validation Parameters in Drug Analysis

Course code: Msp2

2017-2018

Course specification of Validation Parameters in Drug Analysis

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Institution: Zagazig University
Faculty : Pharmacy

A- Course identification:

1. Program (s) on which the course is given:	Master of Pharmaceutical Sciences
2. Major or Minor element of programs:	Major
3. Department offering the course:	Medicinal chemistry department
4. Academic year Level:	2017/2018
5. Date of specification approval:	22/8/2017

B- Basic information:

19.Title: **Validation Parameters in Drug Analysis**	Code: **Msp2**
20.Credit Hours: 4 hrs/weeek	
21.Tutorials:	

C- Professional information:

7- Objectives:

On completion of the course, the student will be able to: choose & develop suitable analytical methodology, analyze & find an effective solution for a given complex problem.

2- Intended Learning Outcomes (ILOs):

ILOs		Course Teaching Strategies	Course Assessment Methods
A- Knowledge and Understanding:			
a1	Outline the principles of drug analysis	Lectures	Final written exam + Oral exam
a2	Identify recent information & methods in drug analysis	Lectures	Final written exam + Oral exam
a3	Describe the essentials for GLP & Q.A in the field of drug analysis		Final written exam + Oral exam
B- Intellectual skills:			

b1	Analyze quantitative data obtained from drug analysis	Presentations	Final written exam + Oral exam
b2	Choose & develop suitable analytical methodology	Presentations	Final written exam + Oral exam
C-General and Transferable skills:			
d1	Improve professional abilities by evaluation of information from different sources	Open discussions	Activities
d2	Write reports and present it.	Self learning	Activities

D- Contents:

Week number	Lecture contents (4hrs/week)
1	Sampling
2	Experimental errors
3	Choice methods of analysis Statistic of data analysis
4	Validation parameters of analytical procedures (specificity , linearity , range)
5	Validation parameters of analytical procedures (accuracy , precision , detection limit , quantitation limit)
6	Validation parameters of analytical procedures (robustness , ruggedness , system suitability test) Activity
7	Drug stability & stability indicating assay
8	Chemical purity & its control
9	Functional group analysis Classical analysis
10	Functional group analysis instrumental analysis
11	Automation in pharmaceutical analysis Mass spectroscopy Flow injection analysis
12	Automation in pharmaceutical analysis HPLC chromatography GC chromatography
13	Determination of active ingredients in different dosage forms Activity
14	Determination of active ingredients in different dosage forms
15	Revision & open discussion

E- Schedule of Assessment Tasks for Students During the Semester:

	Assessment task (e.g. essay, test, group project, examination, speech, oral presentation, etc.)	Week Due	Proportion of Total Assessment
1	Activity =10	Week 6-13	10 %
2	Written exam= 75	Weeks 16	75 %
3	Oral exam= 15	Weeks 16	15 %
Total	100		100 %

F- Facilities required for teaching and learning:

For lectures: Black (white) boards, computers and data show

H- List of References:

1- Scientific papers

2- Essential books:

- Halpern,A in "Experimental physical chemistry"(2007)
- Oxtoby,D and Nachtrieb, N in "Principles of Modern chemistry"(2011)

8- Recommended books

- Garfied, F .M., Klesta ,E and Hirsch, J in" Quality Assurance Principles for Analytical Laboratories"(2009)

9- Periodicals, Web Sites, etc

http://www.ncbi.nlm.nih.gov/sites/entrez
http://journals.tubitak.gov.tr/chem/index.php
http://www.pharmacopoeia.co.uk/
www.Pubmed.Com
www.sciencedirect.com
www.amazon.com

- **Course Coordinator: Prof. Dr/ Lobna Abdel-Aziz.**

Dr. Mahmoud Sebaiy.

Head of Department: Prof.Dr/ Mohamed Baraka.

Date: 22/8/2017 تم مناقشة و اعتماد توصيف المقرر من مجلس القسم بتاريخ

Matrix I of Validation Parameters in drug analysis

Course Contents		ILOs						
		Knowledge and understanding			Intellectual skills		General and Transferable skills	
		a1	a2	a3	b1	b2	d1	d2
1	Sampling	x						
2	Experimental errors	x						
3	Choice methods of analysis Statistic of data analysis	x	x		X			
4	Validation parameters of analytical procedures (specificity , linearity , range)		x	x				
5	Validation parameters of analytical procedures (accuracy , precision , detection limit , quantitation limit)		x	x				
6	Validation parameters of analytical procedures (robustness , ruggedness , system suitability test) Activity		x	x			x	x
7	Drug stability & stability indicating assay			x				
8	Chemical purity & its control	x						
9	Functional group analysis Classical analysis			x				
10	Functional group analysis instrumental analysis			x				
11	Automation in pharmaceutical analysis Mass spectroscopy Flow injection analysis	x	x	x				
12	Automation in pharmaceutical analysis HPLC chromatography GC chromatography	x	x	x				
13	Determination of active ingredients in different dosage forms Activity					x	x	x
14	Determination of active ingredients in different dosage forms					x		
15	Revision and open discussion	x	x	x	X	x		

Matrix II of Validation Parameters in drug analysis

ARS		Program ILOs	Course ILOs	Course contents	Sources	Teaching and learning methods		Method of assessment		
						Lecture	Self learning	Written exam	Oral exam	Activities
2.1	2.1.1- Theories and fundamentals related to the field of learning as well as in related areas.	A.1- Outline the concepts associated with medicinal chemistry.	a1	Sampling Experimental errors Choice methods of analysis Statistic of data analysis chemical purity & its control Automation in pharmaceutical analysis	Textbooks, Scientific papers and self learning	x	x	X	X	
	2.1.3- Scientific developments in the area of specialization.	A.3- Record the recent advances in the field of medicinal chemistry & their related subjects including computer-aided drug design & validation parameters in drug analysis.	a2	Choice methods of analysis Validation parameters of analytical procedures Automation in pharmaceutical analysis	Textbooks, Scientific papers and self learning	x	x	X	X	

	2.1.5- Principles and the basics of quality in professional practice in the area of specialization.	A.5- Identify the principles to ensure quality in the wide field of medicinal chemistry.	a3	Validation parameters of analytical procedures Drug stability & stability indicating assay Functional group analysis Automation in pharmaceutical analysis	Textbooks, Scientific papers and self learning	x	x	X	X	
2.2	2.2.1- Analyze and evaluate information in the field of specialization and analogies to solve problems	B.1- Analyze and interpret data obtained from medicinal chemistry study in a specific and suitable form.	b1	Statistic of data analysis	Textbooks, Scientific papers and self learning	x	x	x	X	
	2.2.7- Professional decision-making in the contexts of diverse disciplines.	B.7- Take professional decisions in the area of specialization.	b2	Determination of active ingredients in different dosage forms	Textbooks, Scientific papers and self learning	x	x	x	X	
2.4	2.4.2- Effectively use information technology in professional practices	D.2- Demonstrate appropriate information technology skills especially in the areas of word processing, internet communication, information retrieval	d1	Activity	Internet					x

		and online literature searching								
	2.4.4- Use variable sources to get information and knowledge.	D.4- Find information from a range of sources in the field of medicinal chemistry.	d2	Activity	Internet		x			x

Advanced Medicinal Chemistry

Course Specification

Course title: Advanced Medicinal Chemistry

Course code: Msp3

2017-2018

Course specification of Advanced Medicinal Chemistry

Institution: Zagazig University
Faculty : Pharmacy

A- Course identification:

1. Program (s) on which the course is given:	Master of Pharmaceutical Sciences
2. Major or Minor element of programs:	Major
3. Department offering the course:	Medicinal chemistry department
4. Academic year Level:	2017/2018
5. Date of specification approval:	22/8/2017

B- Basic information:

22. Title: **Advanced Medicinal Chemistry**	Code: **Msp3**
23. Credit Hours: 4 hrs/weeek	
24. Tutorials:	

C- Professional information:

1- Objectives:

On completion of the course, the student will be able to:
illustrate strategies of gene therapy and show specific information about anti-aging drugs and antisense drugs.

2- Intended Learning Outcomes (ILOs):

ILOs		Course Teaching Strategies	Course Assessment Methods
A- Knowledge and Understanding:			
a1	Outline the strategies of gene therapy, anti-aging drugs and antisense drugs	Lectures	Final written exam + Oral exam
a2	Describe up-to-date information in gene therapy, anti-aging drugs and antisense drugs	Lectures	Final written exam + Oral exam
B- Intellectual skills:			
b1	Take professional decision in advanced medicinal chemistry	Open discussions	Final written exam + Oral exam

C-General and Transferable skills:			
d1	Improve professional abilities by evaluation information from different sources.	Open discussions	Activities
d2	Write reports and present it.	Self learning	Activities

D- Contents:

Week number	Lecture contents (4hrs/week)
1	Principles of gene therapy
2	Gene therapy: Challenges in gene therapy development
3	Strategies for gene therapy
4	Preventive gene therapy
5	Gene therapy: Clinical applications of gene therapy
6	Activity (Presentation)
7	Antisense therapy:Introduction about antisense drugs for treatment of cancer
8	Example antisense therapies Cytomegalovirus retinitis Hemorrhagic fever viruses
9	Example antisense therapies Cancer HIV/AIDS
10	Antiaging drugs
11	Activity
12	Antioxidants as Drugs against Aging
13	Antioxidant Drugs
14	Proposed strategies of life extension (Nanotechnology)
15	Revision & Open discussion

E- Schedule of Assessment Tasks for Students During the Semester:

	Assessment task (e.g. essay, test, group project, examination, speech, oral presentation, etc.)	Week Due	Proportion of Total Assessment
1	Activity =10	Week 6-11	10 %
2	Written exam= 75	Weeks 16	75 %
3	Oral exam= 15	Weeks 16	15 %
Total	100		100 %

F- Facilities required for teaching and learning:

For lectures: Black (white) boards, computers and data show

H- List of References:

1-Scientific papers

2-Essential books:

-Principles and Practice of Pharmaceutical medicine (Andrew J., Lionel D. Edwards, Peter D. Stonier, Anthony W. Fox) (2012)
-Age-related Macular Degeneration Study
-Gene Therapy a Suspect in Leukemia-like disease

3- Periodicals, Web Sites, etc

http://www.ncbi.nlm.nih.gov/sites/entrez

http://journals.tubitak.gov.tr/chem/index.php

http://www.pharmacopoeia.co.uk/

www.Pubmed.Com

www.sciencedirect.com

www.amazon.com

Course Coordinator: Prof. Dr. Mohammed Baraka.

Head of Department: Prof. Dr/ Mohamed Baraka.

Date: 22/8/2017 تم مناقشة و اعتماد توصيف المقرر من مجلس القسم بتاريخ

Matrix I of Advanced Medicinal Chemistry						
Course Contents		ILOs Advanced Medicinal Chemistry course				
		Knowledge and understanding		Intellectual skills	General and Transferable skills	
		a1	a2	b1	d1	d2
1	Principles of gene therapy	x				
2	Challenges in gene therapy		x			
3	Gene therapy: Strategies for gene therapy		x			
4	Preventive gene theapy		x			
5	Gene therapy: Clinical applications of gene therapy			x		
6	Activity(Presentation)				x	x
7	Antisense therapy:Introduction about antisense drugs for treatment of cancer	x				
8	Example antisense therapies 1 Cytomegalovirus retinitis 2 Hemorrhagic fever viruses		x			
9	Example antisense therapies 3 Cancer 4 HIV/AIDS		x			
10	Antiaging drugs	x				
11	Activity(Presentation)				x	x
12	Antioxidants as drugs against Aging	x				
13	Antioxidant as drugs against Aging		x			
14	Proposed strategies of life extension (nanotechnology)		x			
15	Revision & Open discussion	x	x			

Matrix II of Advanced Medicinal Chemistry										
ARS		Program ILOs	Course ILOs	Course contents	Sources	Teaching and learning methods		Method of assessment		
						Lecture	Self learning	Written exam	Oral exam	Activities
2.1	2.1.3- Scientific developments in the area of specialization.	A.5- Record the recent advances in the field of Instrumental analysis, CADD, and advanced medicinal chemistry.	a1	Principles of gene therapy Introduction about antisense drugs Antiaging drugs	Textbooks , Scientific papers and self learning	x	x	x	x	
	2.1.3- Scientific developments in the area of specialization.	A.5- Record the recent advances in the field of Instrumental analysis, CADD, and advanced medicinal chemistry.	a2	Challenges in gene therapy. Strategies for gene therapy. Preventive gene therapy. Examples of antisense therapy. Antioxidant drug .	Textbooks , Scientific papers and self learning	x	x	x	x	

2.2	2.2.2- Solve specified problems in the lack or missing of some information	B.2- Demonstrate skills in the solution of problems while there is lack of information.	b1	Clinical applications of gene therapy	Textbooks , Scientific papers and self learning	x	x	x	x	
2.4	2.4.2- Effectively use information technology in professional practices	D.2- Demonstrate appropriate information technology skills especially in the areas of word processing, internet communication, information retrieval and online literature searching	d1	Activity	Internet					x
	2.4.4- Use variable sources to get information and knowledge.	D.4- Find information from a range of sources in the field of Drug synthesis and analysis and recent topics in medicinal chemistry.	d2	Activity	Internet		x			x

Thesis Specification

Thesis of Master Degree

Thesis specifications:

- **Program on which the course is given:** Master of Pharmaceutical sciences (Medicinal Chemistry)
- **Major or Minor element of program:** Major
- **Department offering the program:** Medicinal Chemistry
- **Department offering the thesis:** Medicinal Chemistry
- **Date of specification approval:** 2017/2018

1- Basic information:

Title: Master Thesis in Medicinal Chemistry
Credit hours: 30 hrs

2- Overall aim of the thesis:

On completion of the thesis, the students will be able to:

Design a robust study to answer the research question**,** identify and perform different techniques and methods used in the experimental work according to the designed protocol**,** collect all the data needed to answer the research question using the developed study design**,** analyze the results of the study in the light of prior knowledge and draw conclusions about the contribution to knowledge made by the study.

3- Intended learning outcome's (ILOs):

Knowledge and Understanding	
a1	Understand all required knowledge related to thesis work.
a2	Select the point of the thesis according to the problems present in the community.
a3	Be aware with recent techniques and developments that can be used during study.
a4	Understand any legal aspects related to the thesis work.
a5	Identify the principles to ensure quality in the wide field of medicinal chemistry.
a6	Perform tasks given ethically and with dedication.
Intellectual skills	
b1	Analyze and interpret the experimental data in a suitable form to solve the suggested problem.
b2	Predict solution to the problem in the light of available data.
b3	Integrate all required knowledge to solve problems that may rise during practical work.
b4	Conduct a research project and write scientific reports.
b5	Manage risks and hazards during practical work.
b6	Plan and undertake a practical and research project including accessing relevant literature and awareness of recent technical and theoretical advances which could be applied.
b7	Make decisions related to recent and future studies.
Professional and practical skills	
c1	Apply a wide range of synthetic and measurement techniques and develop appropriate practical skills within the workplace.
c2	Report the work in a written report.
c3	Asses used methods, tools and instruments in the research.
General and Transferable skills	
d1	Communicate effectively with professionals.
d2	Use information technology in review and thesis preparation.
d3	Evaluate the work and learning needs.
d4	Use various sources to get information about the subject understudy.

d5	Set rules for evaluation and judging others performance.
d6	Work effectively as a member of a team.
d7	Acquire time management skills.
d8	Study independently and plan research studies.

4. Thesis Content:

Steps	Content
1st	• Suggest the possible points/ problems of research that the candidate can work on in the frame of the aim of work and choose proper point related to the problems of the community and surrounding environment. • Collect all available information about this subject by all possible means. • Use internet, journals, books and others thesis to get previous and recent information about the subject understudy. • Design the protocol including the steps of work following the suitable timetable. • Increase the awareness of the recent chemical and analytical techniques that will be used during practical work and determined by the protocol. • Integrate different knowledge (medicinal chemistry, organic chemistry, analytical chemistry ……..) to solve suggested problem. • Continuous evaluation to the thesis outcome according to the schedule.
2nd	• Identify different practical techniques and methods to assess chemical parameters related to the subject under study. • Operate scientific instruments according to instructions. • Evaluate and manage chemical hazards throughout the whole practical work. • Organize the experimental work according to the designed protocol (individual, parallel or sequential experiments). • Identify the essentials to good laboratory practice and quality assurance in the wide field of synthesis of a drug with a biological activity / analysis of drugs with different biological

	activities. • Understand any legal aspects related to the thesis work especially those related to dealing with chemicals. • Apply ethical recommendations in all aspects of scientific research e.g. citation, publication……..
3rd	• Collect raw data for the tested chemical parameters. • Interpret raw data to get valuable information. • Perform statistical analysis and chemical correlation for the results. • Present and describe the results graphically. • Suggest solution to the problem understudy based on this presented data.
4th	• Communicate with supervisors to discuss results. • Work effectively as a member of a team (e.g. Supervisors, various professionals and Technicians). • Present the results periodically in seminars. • Write scientific reports on the obtained results with conclusive significance. • Discuss obtained results in comparison with pervious literatures. • Suggest possible recommendations based on the outcome of the thesis and decide future plans. • Present the thesis in a written form • Summarize the thesis in an understandable Arabic language for non professionals. • Write references in the required form (Thesis, Paper…….). • Demonstrate the thesis in a final power point presentation. • Continue self-learning throughout the experimental work and writing scientific papers.

5- Teaching and Learning Methods:

- Self learning (Activities, Research….)
- Open discussion

6- References:

- **Websites:** Pubmed, Sciencedirect, Weilyinterscience

Facilities required for:

- **For practical work:** Heaters with magnetic stirrer- UV lamp- Rotary evaporator- Ice machine- Infrared- 1HNMR- Mass Spectrometer- Vacuum pump-UV-VIS spectrophotometer-Water bath-PH meter- Spectrofluorimetry -HPLC

- **Head of Department: Prof. Dr/ Mohamed Baraka**

Program matrix of master degree of Medicinal Chemistry

Program ILOs																									
		Knowledge and Understanding						Intellectual skills							Professional and practical skills			General and Transferable skills							
		A 1	A 2	A 3	A 4	A 5	A 6	B 1	B 2	B 3	B 4	B 5	B 6	B 7	C1	C2	C3	D 1	D 2	D 3	D 4	D 5	D 6	D 7	D 8
General courses	Drug design	x	x	x						x											x				
	Advanced Inst. Anal.& Chromatography	x	x					x													x				
	Physical chemistry	x						x	x										x			x	x		
	Good practice and quality control	x		x		x		x				x							x		x				
	Drug stability	x	x			x		x	x																
Special courses	Computer Aided Drug Design	x		x										x					x		x				
	Advanced Organic Chemistry: Reactions and Synthesis	x		x		x		x						x					x		x				
	Advanced Heterocyclic Organic Chemistry	x		x						x									x		x				
Thesis		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x

PhD Degree

Program Specification

Program Specification

A- Basic Information

1- Program title: PhD. Pharm. Sci Degree in **Medicinal Chemistry**

2- Program type: Single.

3- Faculty/ University: Faculty of Pharmacy, Zagazig University

4- Department: Medicinal Chemistry

5- Coordinator: Prof. Dr. Mohamed El- Husseiny

6- Date of program specification approval: 22/8/2017

B- Professional Information

1- Program aims:

The PhD program, Zagazig University (PSPZU) is a 3-5 five years pharmacy education offering a PHD degree in pharmaceutical sciences (Medicinal Chemistry). This Program aims at providing postgraduate students with knowledge, skills and abilities needed to practice the pharmacy profession effectively in various settings including Research Institutes, private and public medical laboratories, universities, National Quality Control Centers (foods & drugs) and Ministry of Health.

The program aims are summarized as follows:

1. Provide the community with highly qualified and professionals with skills and ethical values based on National Academic Reference Standards (NARS).
2. Acquire the advanced and in-depth knowledge and skills in areas related to Medicinal Chemistry, Drug Design and interpretation of data in Molecular Modeling.
3. Discover the principles of impurities analysis and those for confirming the structure and biological data in drug modeling.

4. Use the most contemporary techniques in ensuring Radio-Chemical purity, drug stability assays.

5-Achieve more innovative methods and tools in studying the topography of different receptors.

6- Employ information technology in the preparation and submission of a detailed literature review.

7-Contribute in developing knowledge and awareness of society.

- Graduate attributes:

By the end of PhD programme, the graduate should be able to:

1- Master the principles and methods of scientific research in the field of Medicinal Chemistry.

2- Use effectively molecular modeling and docking programmes.

3- Demonstrate knowledge about protein structure of drug biomolecular targets, and learn molecular geometry and conformations.

4- Gain continuous access to all the new in the field of drug design and analysis.

5- Lead a research team work

6- Develop imagination to be proactive in expecting and facing future problems related to drug synthesis and analysis.

7- Interpret scientific results independently.

8- Adhere to ethics of scientific research and scientific honesty.

9- Accept scientific criticism.

10- Communicate in an efficient way with the stock holders who get benefits from research in the field of drug synthesis.

11- Apply the scientific methods in the evaluation and formulate efficient generalizations.

2-Intended Learning Outcomes (ILOs):

The program provides great opportunities for PhD students to demonstrate extraordinary in-depth knowledge, understanding and develop unusual skills appropriate for PhD in Medicinal Chemistry.

2-1- Knowledge and Understanding :

On successful completion of the PhD degree Program, students will be able to:

A.1- Demonstrate fundamental theoretical concepts and in-depth information of medicinal chemistry and impurities analysis.

A.2- Outline theories and aspects of drug design, drug modeling.

A.3- Identify the possible mechanisms, techniques and theories present in papers.

A.4- Have the ability to record ethical and legal principles in academic practices.

A.5- list the principles and bases of quality assurance especially in pharmaceutical impurities in addition to drug design and modeling.

A.6- Identify the effect of the drug synthesis and analysis on the environment and society

A.7- Memorize new advances in medicinal chemistry research areas

A.8- Have good command of dealing with chemical hazards and waste disposal.

2-2 - Intellectual Skills:

On successful completion of the PhD degree Program, students will be able to:

B.1- Interpret data obtained from analysis of drug and impurities to use them in a suitable manner.

B.2- Evaluate obtained data during drug synthesis, drug design and their biological activity studies.

B.3- Analyze and solve chemistry based problems.

B.4- Explore new areas of research in various fields of chemistry and develop appropriate experimental design.

B.5- Write scientific papers on the obtained results from the research.

B.6- Recognize and avoid possible hazards during practical work.

B.7- Improve the performance by using new techniques and following a planned protocol to obtain new results.

B.8- Make effective decision in complex and unpredictable situations.

B.9- Try to introduce new ideas and applications in the field of impurities and drug synthesis.

B.10- Discuss results very carefully and reject errors.

2-3 - Professional and Practical Skills:

It is intended that, on successful completion of the PhD degree Program, students will be able to:

C.1- Perform standard laboratory procedures.

C.2- Write with confidence reliable scientific reports in medicinal chemistry research .

C.3- Conduct various methods and chemical techniques of analysis and assure the quality and suitability of instruments.

C.4- Use available technologies either in softwares or instruments in the professional work.

C.5- Search for newest programs in data analysis and help other scholars to use.

2-4 - General and Transferable Skills:

On successful completion of the PhD degree Program, students will be able to:

D.1- Communicate clearly in oral, written and non verbal form.

D.2- Use professional softwares and computer skills to improve performance.

D.3- Evaluate others achievement and help them to develop their performance.

D.4- Be life long learners and stay informed of the professional field.

D.5- Use a variety of resources to investigate topics of interest including libraries, databases and internet.

D.6- Function positively as a member of a team.

D.7- Get maximum use of time to achieve goals through hard work and attending scientific meetings.

3- Academic Standards:

- NARS (National Academic Reference Standards)
- **Matrix:** Comparison between PhD degree program ILOs and the Academic Reference Standards (ARS, 2009)

	ARS	Program ILOs
Knowledge and Understanding	2.1.1- Fundamental and in-depth knowledge and basic theories in the field of specialty and the closely related areas of pharmaceutical sciences.	A.1- Demonstrate fundamental theoretical concepts and in-depth information of medicinal chemistry and impurities analysis. A.2- Outline theories and aspects of drug design, drug modeling. A.3- Identify the possible mechanisms, techniques and theories present in papers. .
	2.1.2- Fundamentals, methods, techniques, tools and ethics of scientific research.	A.4- Have the ability to record ethical and legal principles in academic practices.
	2.1.3- The ethical and legal principles in pharmacy and academic practices.	A.5- List the principles and bases of quality assurance especially in pharmaceutical impurities in addition to drug design and modeling.
	2.1.4- The principles and bases of quality assurance in professional practice in the field of specialization.	A.6- Identify the effect of the drug synthesis and analysis on the environment and society A.7- Memorize new advances in medicinal chemistry research areas
	2.1.5- All relevant knowledge concerning the impact of professional practice on society and environment and the ways of their conservation and development.	A.8- Have good command of dealing with chemical hazards and waste disposal.

Intellectual Skills	2.2.1- Analyze and evaluate the data in his\her specified area and utilize them in logical inference processes (induction/deduction).	B.1- Evaluate data obtained from medicinal chemistry study e.g impurities and drug synthesis to use them in a suitable manner.
	2.2.2- propose solutions to specified problems in the light of the available data (information).	B.2- Analyze and solve chemistry based problems.
	2.2.3- Conduct research studies that add to the current knowledge.	B.3- Explore new areas of research in various fields of chemistry and develop appropriate experimental design.
	2.2.4- Formulate scientific papers.	B.4- Write scientific papers on the obtained results from the research.
	2.2.5- Asses hazards and risks in professional practice in his \ her areas of specialization.	B.5- Recognize and avoid possible hazards during practical work.
	2.2.6- Plan to improve performance in the pharmaceutical area of interest.	B.6- Improve the performance by using new techniques and following a planned protocol to obtain new results.
	2.2.7- Take Professional decisions and bears responsibility in wide array of pharmaceutical fields.	B.7- Make effective decision in complex and unpredictable situations.
	2.2.8- Be creative and innovative.	B.8- Try to introduce new ideas and applications in the field of impurities and drug synthesis.
	2.2.9- Manage discussions and arguments based on evidence and logic.	B.9- Discuss results very carefully and reject errors.
Professional and Practical Skills	2.3.1- Master basic and modern professional skills in the area of specialization.	C.1- Perform standard laboratory procedures.
	2.3.2- Write and critically evaluate professional reports.	C.2- Write with confidence reliable scientific reports in medicinal chemistry research .
	2.3.3- Evaluate and develop methods and tools existing in the area of specialization.	C.3- Conduct various methods and chemical techniques of analysis and assure the quality and suitability of instruments.
	2.3.4- Properly use technological means in abetter professional practice.	C.4- Use available technologies either in softwares or instruments in the professional work.
	2.3.5- Plan to improve professional practice and to improve the performance of other scholars.	C.5- Search for newest programs in data analysis and help other scholars to use.

General and Transferable Skills	2.4.1- Effective Communication in its different forms.	D.1-Communicate clearly in oral, written and non verbal form.
	2.4.2- Effective use of information technologies to improve professional practices.	D.2- Use professional softwares and computer skills to improve performance.
	2.4.3- Help others to learn and evaluate their performance.	D.3- Evaluate others achievement and help them to develop their performance.
	2.4.4- Self-assessment and continuous learning.	D.4- Be life long learners and stay informed of the professional field.
	2.4.5- Use various sources to get information and knowledge.	D.5- Use a variety of resources to investigate topics of interest including libraries, databases and internet.
	2.4.6- Work as a member and lead a team of workers.	D.6- Function positively as a member of a team.
	2.4.7- Direct scientific meetings and to manage time effectively.	D.7- Get maximum use of time to achieve goals through hard work and attending scientific meetings.

4-Curriculum Structure and Contents:

a- Program duration: **3- 5** years

b- Program structure:

- The PhD program can be completed in 3-5 years.
- The Faculty of pharmacy implements the credit hour system.
- The program is structured as:

1- Courses:

No. of credit hours for program courses:

Special: (3x4) 12

2- Thesis: 30 hours

The candidate must complete a research project on an approved topic in the Pharmaceutical Sciences. To fulfill this requirement the student must present (written and orally) a research proposal and write a thesis.

3- General University Requirements: 10 credit hours including:

a- TOEFL (500 units)

b- Computer course

c-Program Curriculum:

Course Code	Course Title	Credit hours	Program ILOs Covered
	Special Courses:		
Msp4	Drug modeling	4	A2, A4,B2, B3, D2, D5
Msp5	Qualitative and Quantitative analysis of impurities in pharmaceutical preparation	4	A1, A4, A5, B1, D5
Msp6	Selected topics in drug design	4	A2, A6, B2, B3, D2, D5
	Thesis	30	A1, A2, A3, A4, A5,A6, A7, A8, B1, B2, B3, B4, B5, B6, B7, B8, B9, B10, C1, C2, C3,C4, C5, D1, D2, D3, D4, D5, D6 and D7

5-Program admission requirements:

Applicants are admitted to PhD degree any time throughout the academic year upon fulfillment of the following:

1. The applicants should be holders of Bachelor in Pharmaceutical Sciences from any Faculty of Pharmacy and also finish M.Sc. degree affiliated to the Egyptian Universities affiliated to the Egyptian Supreme Council of Universities (ESCU).
2. Students should fulfill all the admission requirements stated by the concerned Departmental Board.

Regulations to complete the program:

Conditions of granting the degree

The Faculty Council, in compliance with the concerned Departmental Board as well as Graduate Studies and Research Committee recommendation awards the PhD degree upon fulfillment of the following requirements:

1. Carrying out a deep research in the area of specialization for at least two calendar years from the time of registration.
2. The student has to succeed in all courses examinations.
3. Acceptance of the research thesis by the judges Committee according to statement 104 of universities regulating law.

Cancellation of Registration

The Faculty Board is allowed to cancel registration for PhD programs in the following circumstances:

1. Student's failure to pass the course examinations for two times.
2. Student's nonattendance or unsatisfactory progress in research work being reported by the advisors to the Departmental Board and forwarded to the Graduate Studies and Research Committee for approval of cancellation.
3. Dissertation refusal by the Jury Committee.

Incapability of the student to graduate by the deadlines indicated

6- Admission Policy:

The faculty complies with the admission regulations and requirements of the Egyptian Supreme Council of Universities (ESCU).

7-Student assessment methods:

Method	ILOS
Written exam	Knowledge and Understanding and Intellectual Skills
Oral exam	Knowledge and Understanding ,Intellectual Skills and General and Transferable Skills
Activity	Intellectual Skills and General and Transferable Skills
Seminars	Knowledge and Understanding ,Intellectual Skills & General and Transferable Skills
Follow up	Professional and practical Skills & General and Transferable Skills
Thesis and oral presentation	Knowledge and Understanding, Intellectual Skills, Professional and practical Skills & General and Transferable Skills

Grade Scale	Grade point average value (GPA)	Numerical scale
A+	5	≥ 95%
A	4.5	90- < 95%
B+	4	85- < 90%
B	3.5	80- < 85%
C+	3	75- < 80%
C	2.5	70- < 75%
D+	2	65- < 70%
D	1.5	60- < 65%

8-Failure in courses:

Students who fail to get 60 % (1 Point)

9-Methods of program evaluation

Evaluator	Method	Sample
Internal evaluator: Professor Dr. El-Sayed Lashin	Program evaluation Courses evaluation	Program report Courses report
External evaluator: Professor Dr. Samir El Moghazy	Program evaluation Courses evaluation	Program report Courses report
Other methods • **Stockholders** • **Alumni**	Matrix with NARS Questionnaires	The Matrix Results of the questionnaires

Program coordinator

Prof. Dr. Mohammed El-Husseiny

Head of Department

Prof. Dr/ Mohamed Baraka

Drug Modeling

Course Specification

Course title: Drug Modeling

Course code: Msp4

2017-2018

Course specification of Drug Modeling

Institution: Zagazig University
Faculty : Pharmacy

A- Course identification:

1. Program (s) on which the course is given:	PH.D of Pharmaceutical Sciences
2. Major or Minor element of programs:	Major
3. Department offering the course:	Medicinal chemistry department
4. Academic year Level:	2017/2018
5. Date of specification approval:	22/8/2017

B- Basic information:

25. Title: **Drug Modeling**	Code: **Msp4**
26. Credit Hours: 4 hrs/weeek	
27. Tutorials:	

C- Professional information:

2- Objectives:

On completion of the course, the student will be able to:
understand the basics and aspects of drug modeling and perform an effective method for a given problem associated with drug receptor interaction.

2- Intended Learning Outcomes (ILOs):

ILOs		Course Teaching Strategies	Course Assessment Methods
A- Knowledge and Understanding:			
a1	Outline the principles of drug modeling.	Lectures	Final written exam + Oral exam
a2	Identify up-to-date information, mechanisms and methods in drug modeling.	Lectures	Final written exam + Oral exam
a3	Confirm the principles of structure data and biological data in molecular	Lectures	Final written exam + Oral exam

	modeling		
B- Intellectual skills:			
b1	Analyze and interpret data obtained from drug modeling	Presentations	Final written exam + Oral exam
b2	Choose & develop suitable method for a significant problem in drug receptor interaction.	Presentations	Final written exam + Oral exam
C-General and Transferable skills:			
d1	Improve professional abilities by evaluation of information from different sources	Open discussions	Activities
d2	Write reports and present it.	Self learning	Activities

D- Contents:

Week number	Lecture contents (4hrs/week)
1	Principles of drug modeling.
2	Aspects of drug modeling
3	General purpose molecular modeling
4	Quantum chemistry calculations
5	Database of molecular structures
6	Activity
7	Molecular graphics
8	Data Analysis: Structure data(X-rays,NMRstructure determination)
9	Data analysis: Biological data(Bioinformatics)
10	Data analysis:Chemical data(QSAR)
11	Theory and prediction:Molecular energy
12	Activity
13	Theory and prediction:Molecular dynamics
14	Theory and prediction:Molecular recognition
15	Revision & open discussion

E- Schedule of Assessment Tasks for Students During the Semester:

	Assessment task (e.g. essay, test, group project, examination, speech, oral presentation, etc.)	Week Due	Proportion of Total Assessment
1	Activity =10	Week 6-12	10 %
2	Written exam= 75	Weeks 16	75 %
3	Oral exam= 15	Weeks 16	15 %
Total	100		100 %

F- Facilities required for teaching and learning:

For lectures: Black (white) boards, computers and data show

H- List of References:

1- Scientific papers

2- Essential books:

- Cohen, N. Claude in" Guidebook on Molecular Modeling "(2009)
- Leach, Andrew R in " Structure-based Drug Discovery".(2011)
- Schneider G, Fechner U in" Computer-based de novo design of drug-like molecules".(2012)

• 3- Periodicals, Web Sites, etc

pubmed, Sciencedirect, Nejm,Weilyinterscience and wikepedia

Course Coordinator: Prof. Mohammed Al-hussany.

Head of Department: Prof.Dr/ Mohamed Baraka.

Date: 22/8/2017 تم مناقشة و اعتماد توصيف المقرر من مجلس القسم بتاريخ

Matrix I of Drug Modeling								
Course Contents		ILOs of Drug Modeling course						
		Knowledge and understanding			Intellectual skills		General and Transferable skills	
		a1	a2	a3	b1	b2	d1	d2
1	Principles of drug modeling..	x						
2	Aspects of drug modeling	x						
3	General purpose of molecular modeling	x						
4	Quantum chemistry calculations				x	x		
5	Data of molecular structure		x		x			
6	Activity						x	x
7	Molecular graphics		x					
8	Data analysis: structure data			x		x		
9	Data analysis: biological data			x				
10	Data analysis chemical data			x				
11	Theory and predication :Molecular energy			x				
12	Activity						x	x
13	Theory and predication :Molecular dynamics			x				
14	Theory and predication :Molecular recognition			x				
15	Revision and open discussion	x	x	x	x	x		

Matrix II of Drug Modeling										
ARS		Program ILOs	Course ILOs	Course contents	Sources	Teaching and learning methods		Method of assessment		
						Lecture	Self learning	Written exam	Oral exam	Activities
2.1	2.1.1- Fundamental and in-depth knowledge and basic theories in the field of specialty and the closely related areas of pharmaceutical sciences.	A.2- Illustrate theories and aspects of drug design and drug modeling	a1	Principles of drug modeling. Aspects of drug modeling. General purpose of molecular modeling.	Textbooks, Scientific papers and self learning	x	x	x	x	
	2.1.2- Fundamentals, methods, techniques, tools and ethics of scientific research.	A.4- Identify the possible mechanisms, techniques and theories present in papers.	a2	Database of molecular structure. Molecular grhics	Textbooks, Scientific papers and self learning	x	x	x	x	

	2.1.4- The principles and bases of quality assurance in professional practice in the field of specialization	A.6- Confirm the principles and bases of quality assurance especially in pharmaceutical impurities in addition to drug design and drug modeling.	a3	Data analysis: structure data Biological data Chemical data Theory and prediction Molecular energy, molecular dynamics, molecular recognition	Textbooks, Scientific papers and self learning	x	x	x	x	
2.2	2.2.1- Analyze and evaluate the data in his\her specified area and utilize them in logical inference processes (induction/deduction) .	B.2- Evaluate data obtained drug design, drug synthesis and their biological activity studies.	b1	Quantum chemistry calculations	Textbooks, Scientific papers and self learning	x	x	x	x	
	2.2.2- Propose solutions to specified problems in the light of the available data (information).	B.3- Analyze and solve chemistry based problems.	b2	Quantum chemistry calculations	Textbooks, Scientific papers and self learning	x	x	x	x	

	2.4.2- Effective use of information technologies to improve professional practices.	D.2- Use Professional softwares and computer skills to improve performance.	d1	Activity	Internet					x
2.4	2.4.5- Use various sources to get information and knowledge.	D.5- Use a variety of resources to investigate topics of interest including libraries, data bases, and internet	d2	Activity	Internet					x

Qualitative and Quantitative analysis of impurities in pharmaceutical preparations

Course Specification

Course title: Qualitative and Quantitative analysis of impurities in pharmaceutical preparations

Course code: Msp5

2017-2018

Course specification of Qualitative and Quantitative analysis of impurities in pharmaceutical preparations

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Institution: Zagazig University
Faculty : Pharmacy

A- Course identification:

1. Program (s) on which the course is given:	PH.D of Pharmaceutical Sciences
2. Major or Minor element of programs:	Major
3. Department offering the course:	Medicinal chemistry department
4. Academic year Level:	2017/2018
5. Date of specification approval:	22/8/2017

B- Basic information:

28. Title: **Drug Modeling**	Code: Msp5
29. Credit Hours: 4 hrs/weeek	
30. Tutorials:	

C- Professional information:

3- Objectives:

On completion of the course, the student will be able to:
Choose specific analytical methodology and analyze and find an effective solution for a given complex problem of impurities.

2- Intended Learning Outcomes (ILOs):

ILOs		Course Teaching Strategies	Course Assessment Methods
A- Knowledge and Understanding:			
a1	Clarify the different techniques of impurities analysis.	Lectures	Final written exam + Oral exam
a2	Keep up-to-date with new methods, programs and theories in impurities analysis.	Lectures	Final written exam + Oral exam
a3	Apply the theories and bases of quality assurance in pharmaceutical impurities analysis.	Lectures	Final written exam + Oral exam

B- Intellectual skills:			
b1	Statistically perform best analysis method and interpret data obtained from impurities analysis by using suitable program.	Presentations	Final written exam + Oral exam
b2	Choose a new advanced applied method for a significant problem in impurities analysis and try to solve it.	Presentations	Final written exam + Oral exam
C-General and Transferable skills:			
d1	Improve professional abilities by evaluation of information from different sources	Open discussions	Activities
d2	Write reports and present it.	Self learning	Activities

D- Contents:

Week number	Lecture contents (4hrs/week)
1	Introduction to more recent impurities analysis.
2	Principles of impurities analysis.
3	The most recent in drug stability assay.
4	Survey on aspects of impurities analysis.
5	Application of UPLC.
	Application of validation parameters in impurities analysis (accuracy, precision, detection limit, quantitation limit).
6	Activity
7	Tandem mass application.
8	Most recent in Radio-chemical purity & its control
9	Determination of impurities in pharmaceutical preparations containing folic acid.
10	HPLC Determination of Impurities in the Cephalosporin Antibiotic Cefepime by Ion Chromatography.
11	HPLC Determination of Impurities in the fluoroquinolone ciprofloxacin tablets.
	Determination of Impurities in the antibiotic clindamycin capsules.
12	Activity
13	Rapid detection of Impurities in the fluoroquinolone lomefloxacin tablets.
14	Determination of Impurities in enalapril tablets.
15	Revision & open discussion

E- Schedule of Assessment Tasks for Students During the Semester:

	Assessment task (e.g. essay, test, group project, examination, speech, oral presentation, etc.)	Week Due	Proportion of Total Assessment
1	Activity =10	Week 6-12	10 %
2	Written exam= 75	Weeks 16	75 %
3	Oral exam= 15	Weeks 16	15 %
Total	100		100 %

F- Facilities required for teaching and learning:

For lectures: Black (white) boards, computers and data show

H- List of References:

1- Scientific papers

2- Essential books:

Garfied, F .M., Klesta ,E and Hirsch, J in" Quality Assurance Principles for Analytical Laboratories".(2011)C- Suggested books:

3- Periodicals, Web Sites, etc

: pubmed, Sciencedirect, Nejm,Weilyinterscience and wikepedia.-------

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Course Coordinator: Prof. Dr/ Abd-Allah El-Shanawany.

Head of Department: Prof. Dr/ Mohamed Baraka.

Date: 22/8/2017 تم مناقشة و اعتماد توصيف المقرر من مجلس القسم بتاريخ

Matrix I of Qualitative and Quantitative analysis of impurities in pharmaceutical preparations

Course Contents		ILOs						
		Knowledge and Understanding			Intellectual skills		General and Transferable skills	
		a1	a2	a3	b1	b2	d1	d2
1	Introduction to more recent impurities analysis.	x						
2	Principles of impurities analysis .	x						
3	The most recent in drug stability assay.	x						
4	Survey on aspects of impurities analysis .		x					
5	Application of UPLC.		x		x			
6	Application of validation parameters in impurities analysis (accuracy , precision , detection limit , quantitation limit). **Activity**		x		x		x	
7	Tundem mass application.		x		x			
8	Most recent in Radio-chemical purity & its control		x					
9	Determination of impurities in pharmaceutical preparations containing folic acid.			x				
10	HPLC Determination of Impurities in the Cephalosporin Antibiotic Cefepime by Ion Chromatography.			x		x		
11	HPLC Determination of Impurities in the fluoroquinolone ciprofloxacin tablets.			x				
12	Determination of Impurities in the antibiotic clindamycin capsules. **Activity**			x			x	
13	Rapid detection of Impurities in the fluoroquinolone lomefloxacin tablets.			x				
14	Determination of Impurities in enalapril tablets.			x				
15	Revision & open discussion	x	x	x	x	x		

Matrix II of Qualitative and Quantitative analysis of impurities in pharmaceutical preparations

ARS		Program ILOs	Course ILOs	Course contents	Sources	Teaching and learning methods		Method of assessment		
						Lecture	Self learning	Written exam	oral exam	Activities
2.1	2.1.1- Fundamental and in-depth knowledge and basic theories in the field of specialty and the closely related areas of pharmaceutical sciences.	A.1- Demonstrate fundamental theoretical concepts and in-depth information of medicinal chemistry and Impurities analysis.	a1	Introduction to more recent impurities analysis. Principles of impurities analysis . The most recent in drug stability assay.	Textbooks, Scientific papers and self learning	x	x	X	x	
	2.1.2- Fundamentals, methods, techniques, tools and ethics of scientific research.	A.4- Identify the possible mechanisms, techniques and theories present in papers.	a2	Survey on aspects of impurities analysis . Application of UPLC Validation parameters in impurities analysis (accuracy, precision, detection limit, quantitation limit). Tandem mass application Most recent in Radio-chemical purity & its control	Textbooks, Scientific papers and self learning	x	x	x	x	

	2.1.4- The principles and bases of quality assurance in professional practice in the field of specialization.	A.6- Confirm the principles and bases of quality assurance especially in pharmaceutical impurities in addition to drug design and modeling .	a3	Determination of impurities in pharmaceutical preparations containing folic acid. HPLC Determination of Impurities in the Cephalosporin Antibiotic Cefepime by Ion Chromatography. HPLC Determination of Impurities in the fluoroquinolone ciprofloxacin tablets. Determination of Impurities in the antibiotic clindamycin capsules. Rapid detection of Impurities in the fluoroquinolone lomefloxacin tablets. Determination of Impurities in enalapril tablets.	Textbooks, Scientific papers and self learning	x	x	x	x	
2.2	2.2.1- Analyze and evaluate the data in his\her specified area and utilize them in logical inference processes (induction/deduction).	B.1- Interpret data obtained from analysis of drugs and impurities to use them in a suitable manner	b1	Application of UPLC Application of validation parameters in impurities analysis (accuracy , precision , detection limit , quantitation limit). Tandem mass applications	Textbooks, Scientific papers and self learning	x	x	x	x	

	2.2.2- propose solutions to specified problems in the light of the available data (information).	B3- Analyze and solve chemistry based problems.	b2	HPLC Determination of Impurities in the Cephalosporin Antibiotic Cefepime by Ion Chromatography.	Textbooks, Scientific papers and self learning	x	x	X	x	
2.4	2.4.2- Effective use of information technologies to improve professional practice	D.2- Use professional softwares and computer skills to improve performance	d1	Activity	Internet					X
	2.4.5- Use various sources to get information and knowledge	D.5- Use a variety of resources to investigate topics of interest including libraries, data bases and internet.	d2	Activity	Internet					X

Selected topics in drug design

Course title: Selected topics in drug design

Course code: Msp6

Course specification of selected topics in drug design

Institution: Zagazig University
Faculty : Pharmacy

A- Course identification:

1. Program (s) on which the course is given:	PH.D of Pharmaceutical Sciences
2. Major or Minor element of programs:	Major
3. Department offering the course:	Medicinal chemistry department
4. Academic year Level:	2017/2018
5. Date of specification approval:	22/8/2017

B- Basic information:

31. Title: **Selected topics in drug design**	Code: Msp6
32. Credit Hours: 4 hrs/weeek	
33. Tutorials:	

C- Professional information:

4- Objectives:

On completion of the course, the student will be able to:

understand in depth aspects of drug design and perform an effective method for Studying topography of different receptors and enzymes.

2- Intended Learning Outcomes (ILOs):

ILOs		Course Teaching Strategies	Course Assessment Methods
A- Knowledge and Understanding:			
a1	List aspects of drug design.	Lectures	Final written exam + Oral exam
a2	Know recent information, modes and methods in drug design.	Lectures	Final written exam + Oral exam
a3	Outline Topography of different receptors and enzymes	Lectures	Final written exam + Oral exam
B- Intellectual skills:			
b1	Deduce and explain data obtained from	presentations	Final written exam

	drug design.		+ Oral exam
b2	Choose and try a suitable method for a significant problem of computer associated drug design.	Presentations	Final written exam + Oral exam
C-General and Transferable skills:			
d1	Improve professional abilities by evaluation of information from different sources	Open discussions	Activities
d2	Write reports and present it.	Self learning	Activities

D- Contents:

Week number	Lecture contents (4hrs/week)
1	Aspects of drug design.
2	Computerized applications in drug design.
3	Design of 5-HT3 antagonists .
4	Design of Acetylcholine receptor agonists .
5	Design of Dopamine receptor agonists
6	Activity
7	Design of Angiotensin receptor blockers .
8	Design of Cannabinoid receptor antagonists .
9	Design of CCR5 receptor antagonists .
10	Design of Bcr-Abl tyrosine kinase inhibitors .
11	Design of Cyclooxygenase 2 inhibitors . Activity
12	Design of bcl2 receptor antagonists
13	Design of Dipeptidyl peptidase-4 inhibitors .
14	Design of HIV protease inhibitors .
15	Revision & open discussion

E- Schedule of Assessment Tasks for Students During the Semester:

	Assessment task (e.g. essay, test, group project, examination, speech, oral presentation, etc.)	Week Due	Proportion of Total Assessment
1	Activity =10	Week 6-11	10 %
2	Written exam= 75	Weeks 16	75 %
3	Oral exam= 15	Weeks 16	15 %
Total	100		100 %

F- Facilities required for teaching and learning:

For lectures: Black (white) boards, computers and data show

H- List of References:

Scientific papers

Essential books:

Krogsgaard-Larsen in" Textbook of Drug Design and Discovery "(2008)

Guner, Osman F in " Pharmacophore Perception, Development, and use in Drug Design ".(2011)

Suggested books:

Schneider G, Fechner U in" Computer-based de novo design of drug-like molecules".(2009)

Periodicals, Web Sites, etc

: pubmed, Sciencedirect, Nejm,Weilyinterscience and wikepedia.

Course Coordinator: Prof. Dr\ El-Sayed Lashin.

Head of Department: Prof.Dr/ Mohamed Baraka.

Date: 22/8/2017 تم مناقشة و اعتماد توصيف المقرر من مجلس القسم بتاريخ

Matrix II of selected topics in drug design

ARS		Program ILOs	Course ILOs	Course contents	Sources	Teaching and learning methods		Method of assessment		
						Lecture	Self learning	Written exam	Oral exam	Activities
2.1	2.1.1- Fundamental and in-depth knowledge and basic theories in the field of specialty and the closely related areas of pharmaceutical sciences.	A.2- Outline theories and aspects of drug design and drug modeling.	a1	Aspects of drug design	Textbooks, Scientific papers and self learning	x	x	x	x	
	2.1.2- Fundamentals, methods, techniques, tools and ethics of scientific research.	A.4- Identify the possible mechanisms, techniques and theories present in papers.	a2	Computerized applications in drug design. Activity	Textbooks, Scientific papers and self learning	x	x	x	x	

	2.1.4- The principles and bases of quality assurance in professional practice in the field of specialization.	A.6- Confirm the principles and bases of quality assurance especially in pharmaceutical impurities in addition to drug design and modeling .	a3	Design of 5-HT3 antagonists . Design of Acetylcholine receptor agonists . Design of Dopamine receptor agonists Design of Angiotensin receptor blockers . Design of Cannabinoid receptor antagonists . Design of CCR5 receptor antagonists . Design of Bcr-Abl tyrosine kinase inhibitors . Design of Cyclooxygenase 2 inhibitors . Design of bcl2 receptor antagonists Design of Dipeptidyl peptidase-4 inhibitors . Design of HIV protease inhibitors .	Textbooks, Scientific papers and self learning	x	x	x	x	
2.2	2.2.1- Analyze and evaluate the data in his\her specified area and utilize them in logical inference processes (induction/deduction).	B.2- Evaluate obtained data during drug synthesis, drug design and their biological activity studies.	b1	Computerized applications in drug design.	Textbooks, Scientific papers and self learning	x	x	x	x	

	2.2.2- Propose solutions to specified problems in the light of the available data (information).	B.3- Analyze and solve chemistry based problems.	b2	Design of 5-HT3 antagonists .	Textbooks, Scientific papers and self learning	x	x	x	x	
2.4	2.4.2- Effective use of information technologies to improve professional practice	D.2- Use professional softwares and computer skills to improve performance	d1	Activity	Internet					x
	2.4.5- Use various sources to get information and knowledge	D.5- Use a variety of resources to investigate topics of interest including libraries, data bases and internet.	d2	Activity	Internet					x

Thesis Specification

Thesis Specification of PhD Degree

Course specifications:

- **Program on which the course is given:** PhD of Pharmaceutical sciences (Medicinal Chemistry)
- **Major or Minor element of program:** Major
- **Department offering the program:** Medicinal Chemistry
- **Department offering the thesis:** Medicinal Chemistry
- **Date of specification approval:** 2018/2019

1- Basic information:

Title: PhD Thesis in Medicinal Chemistry

Credit hours: 30 hrs

2- Overall aim of the thesis:

On completion of the thesis, the students will be able to:

Outline the possible protocol for solving harsh problem that the candidate can work after integrating suitable knowledge about this point of research, Predict new technique to solve research problems, identify and perform different techniques and methods used in the experimental work according to the designed protocol, derive and present the results of the study from the data collected , analyze the results of the study in the light of prior knowledge and draw conclusions about the contribution to knowledge made by the study which may be concerned with the problem under investigation, the methods deployed or the student as researcher.

3- Intended learning outcomes (ILOs):

Knowledge and Understanding	
a1	Illustrate fundamentals and advanced knowledge in the field of medicinal chemistry and their related subjects including computer-aided drug design, drug modeling and impurities analysis that help to better understand the subject understudy.
a2	Determine methods, tools and techniques used during work.
a3	Carry out professional duties in accordance with legal and ethical guidelines.
a4	Confirm the principles and bases of quality assurance especially in pharmaceutical impurities in addition to drug design and modeling .
a5	Describe the purpose of the research work and its impact on the community and human health.
Intellectual skills	
b1	Analyze and interpret the experimental data in a suitable form to utilize them properly.
b2	Propose a solution to the point understudy depending on available data.
b3	Explore new areas of research in various fields of chemistry and develop appropriate experimental design.
b4	Write scientific papers on the obtained results from the research.
b5	Manage risks during dealing with chemical reagents.
b6	Improve the performance during the practical work.
b7	Make decisions related to recent and future studies.
b8	Be creative, innovative and original in one's approach to research.
b9	Discuss by theoretical evidences the whole work results.
Professional and practical skills	
c1	Perform practical experiments related to the point understudy.
c2	Report the work in a written report.
c3	Select appropriate methods and tools to support gools.
c4	Consider developments in technology and how to use to enhance learning.
c5	Improve the performance during the practical work.
General and Transferable skills	
d1	Communicate effectively in different forms.

d2	Be competent in the use of computers for data analysis, word-processing, and production of thesis-quality graphics.
d3	Evaluate the performance of others and assist them to develop.
d4	Recognize self-limitations and areas for improvement and seek for continuous learning.
d5	Gather, summarize, and organize information from different sources.
d6	Implement tasks as a member of a team.
d7	Utilize time effectively to achieve goals.

4. Thesis Content:

Steps	Content
1st	• Suggest the possible points/ problems of research that the candidate can work on in the frame of the aim of work and choose proper point related to the problems of the community and surrounding environment. • Collect all available information about this subject by all possible means. • Use internet, journals, books and others thesis to get previous and recent information about the subject understudy. • Design the protocol including the steps of work following the suitable timetable. • Increase the awareness of the recent chemical and analytical techniques that will be used during practical work and determined by the protocol. • Integrate different knowledge (medicinal chemistry, organic chemistry, analytical chemistry ……..) to solve suggested problem. • Continuous evaluation to the thesis outcome according to the schedule.
2nd	• Identify different practical techniques and methods to assess chemical parameters related to the subject under study. • Operate scientific instruments according to instructions. • Evaluate and manage chemical hazards throughout the

	whole practical work. • Organize the experimental work according to the designed protocol (individual, parallel or sequential experiments). • Identify the essentials to good laboratory practice and quality assurance in the wide field of synthesis of a drug with a biological activity / analysis of drugs with different biological activities. • Modify methods and experiments used during practical work. • Understand any legal aspects related to the thesis work especially those related to dealing with chemicals. • Apply ethical recommendations in all aspects of scientific research e.g. citation, publication……..
3rd	• Collect raw data for the tested chemical parameters. • Interpret raw data to get valuable information. • Use new programs for data analysis. • Perform statistical analysis and chemical correlation for the results. • Present and describe the results graphically. • Suggest solution to the problem understudy based on this presented data.
4th	• Communicate with supervisors to discuss results. • Work effectively as a member of a team (e.g. Supervisors, various professionals and Technicians). • Present the results periodically in seminars. • Write scientific reports on the obtained results with conclusive significance. • Discuss obtained results in comparison with pervious literatures. • Suggest possible recommendations based on the outcome of the thesis and decide future plans. • Present the thesis in a written form • Summarize the thesis in an understandable Arabic

	language for non professionals. • Write references in the required form (Thesis, Paper…….). • Demonstrate the thesis in a final power point presentation. • Continue self-learning throughout the experimental work and writing scientific papers.

5- Teaching and Learning Methods:

- Self learning (Activities, Research….)
- Open discussion

6- References:

- Websites: Pubmed, Sciencedirect, Weilyinterscience

Facilities required for:

- **For practical work:** Heaters with magnetic stirrer- UV lamp- Rotary evaporator- Ice machine- Infrared- 1HNMR- Mass Spectrometer- Vacuum pump- UV-VIS spectrophotometer-Water bath-PH meter- Spectrofluorimetry -HPLC

- **Head of Department: Prof. Dr/ Mohamed Baraka**

Program Matrix of PhD degree of Medicinal Chemistry

		Program ILOs																														
		Knowledge and Understanding								Intellectual skills										Professional and practical skills					General and Transferable skills						
		A1	A2	A3	A4	A5	A6	A7	A8	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	C1	C2	C3	C4	C5	D1	D2	D3	D4	D5	D6	D7
Special courses	Drug modeling	x			x						x	x														x			x		
	Qualitative and Quantitative analysis of impurities in pharmaceutical preparation	x			x	x				x																			x		
	Selected topics in drug design		x				x				x	x														x			x		
Thesis		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x