Zagazig University

Faculty of Pharmacy

Pharmacology and Toxicology Department

Program and Course Specifications

Master and Ph.D.

Degrees

Master Degree

Program Specification

Program Specification

A- Basic Information

1. **Program title:** M. Pharm. Sci Degree in **Pharmacology and Toxicology**
2. **Program type:** Single
3. **Faculty/ University:** Faculty of Pharmacy, Zagazig University
4. **Department:** Pharmacology and Toxicology
5. **Coordinator:** Prof. Dr. Ahmed Fahmy
6. **Date of program specification approval: Sep 2019**
7. **Teaching language:** English
8. **External Evaluator:** Prof. Dr. Sameh EL-Nabtiti
9. **Internal Evaluator:** Prof. Dr. Salah Ghareib
10. **Academic Reference Standards:**

a. The program ILOs were compared to the general guideline for postgraduate studies, 1st Edition, February 2009 issued by (NAQAA) (National Authority for Quality Assurance and Accreditation).

b. The program ILOs were compared to the MSc clinical pharmacology postgraduate programme provided by the University of Aberdeen, UK.

B- Professional Information

1- Program aims:

This program aims to provide the postgraduate students with a solid background and wide array of advanced pharmacology-related disciplines including physiology, molecular biology, biostatistics and drug interactions. In addition, the program aims to prepare the postgraduate student to develop an individualized program of research

through comprehensive training in laboratories and systematic practicing of different pharmacological techniques.

Consistency of the program aims with the mission of Faculty of Pharmacy:

The faculty of Pharmacy, Zagazig University aims to provide the local and regional community with highly qualified, multidisciplinary and professional pharmacists with ethical values and able to participate in the development of drug industry and quality assurance as well as contribute to a distinguished health service to the society. This is achieved through developing and upgrading the academic programs, teaching and learning methods, supporting various student activities, developing the abilities of the staff members, their assistants and administrative members, enhancing the oriented applied and scientific research and providing the continuous pharmaceutical education.

1.1 Graduate attributes:

Modern pharmacology is interdisciplinary and it depends on the integration of biochemistry, physiology, cell biology and molecular biology to explore and understand the effects of drugs. Therefore, the student should acquire the necessary attributes and skills in various aspects of Pharmacology including the following:

1- Outline a broad scientific background on human physiology and molecular biology.
2- Possess the ability to design a good research experiment, write and evaluate scientific reports.
3- Design experimental protocols through critical thinking and results inspection.
4- Analyze and evaluate the results of research experiments and interpret the results of statistical analysis of the experimental data.

5- Follow the ethics and morals of scientific research regarding handling of experimental animals and intellectual property rights.
6- Develop and improve self-learning abilities.
7- Communicate and work effectively in a team.

2-Intended Learning Outcomes (ILOs):

Upon completing the program, postgraduate students will be able to demonstrate knowledge and understanding as well as technical and intellectual skills relevant to **Pharmacology** Master of sciences degree as follows:

2-1- Knowledge and Understanding:

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

A.1-Detect the principles of human body physiology, progression of diseases, potential drug targets in the body, pharmacokinetics, pharmacodynamics, drug interactions, drug-induced diseases and basics of genetics.

A.2-Identify the basics of instrumental analyses and techniques applied for different pharmacological experiments.

A.3- Describe the similarities and differences between statistical tests and learn how to apply them appropriately.

A.4- Define the influence of physiology, pharmacology, drug interactions and toxicology-related problems on society in the field of human health.

A.5-Update the information in the field of pharmacology and related subjects.

A.6- Explain the recent mechanisms of the pathophysiology of different diseases and recognize the recent methods of targeting drugs in certain diseases.

A.7- Explain the principles of moral and medico-legal aspects applied in the practical life related to different areas of pharmacology.

A.8- List risk factors for drug-induced diseases and related preventative strategies

A.9- Outline the different methods of study design and statistical analysis

A.10- Describe the basics of quality assurance to guarantee ideal practice in the field of pharmacology.

A.11-Determine the ethics of handling, care and disposal of experimental animals.

2-2 - Intellectual Skills:

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

B.1- Analyze experimental data statistically, apply statistical tests appropriately, and interpret statistical significance for results from commonly used statistical tests.

B.2- Propose strategies to minimize drug-induced diseases

B.3- Integrate information regarding drug kinetics, dynamics, toxicity and interaction with other drugs to apply a proper therapeutic regimen in different situations related to the profession.

B.4- Withdraw conclusions and observations from different scientific reports

B.5-Apply the most appropriate instrumental technique for DNA and RNA assays.

B.6- Design and manage different experimental protocols in the field of pharmacology and related disciplines.

B.7- Evaluate the toxicity and hazards of therapeutic regimens and how to apply these regimens properly in different pathological conditions

B.8- Suggest alternative and innovative plans to improve the experimental protocols

B.9- Identify decision errors that can occur when using statistical tests and suggest methods to minimize them

B.10- Take professional decisions based on critical thinking and physiological and pharmacological-based evidences

2-3 - Professional and Practical Skills:

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

C.1-Master a wide range of pharmacological techniques either in vivo or in vitro

C.2-Represent and summarize experiment results in a well-organized, written reports.

C.3- Retrieve information regarding drugs and research experiments from different resources.

C.4-Demonstrate a solid ability to assess and use different laboratory skills related to pharmacology.

2-4 - General and Transferable Skills:

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

D.1- Communicate effectively with other colleagues and staff members using verbal, written and expression language.

D.2- Demonstrate competence in the use of information technology broad enough to meet personal, academic and professional needs

D.3- Recognize learning needs and how to fulfill them.

D4- Retrieve information from different resources including online resources, library as well as printed literatures.

D.5- Develop rules and indicators for assessing and criticizing the performance of others.

D.6- Maintain ethics and respect-based relationships with colleagues, professors and other staff members

D.7- Appreciate team working and performing tasks in the group environment.

D.8- Manage time and experimental plan effectively.

D.9- Develop life-long learning skills and professional development activities.

3- Academic Standards:

a. The program ILOs were compared to the general guideline for postgraduate studies, 1st Edition, February 2009 issued by (NAQAA) (National Authority for Quality Assurance and Accreditation).

b. The program ILOs were compared to the MSc Clinical Pharmacology provided by School of Pharmacy & Life Sciences, University of Aberdeen. UK.

Matrix1: Comparison of graduate attributes of Pharmacology and Toxicology M. Pharm. Sci. Degree program with the Academic Reference Standards {ARS, 2009} developed by NAQAAE

Attributes of the graduates (ARS, 2009)	Attributes of the graduates (M. Pharm. Sci. Degree Pharmacology and Toxicology)
1. Apply the specialized knowledge he has acquired in his professional practice	1. Outline a broad scientific background on human physiology and molecular biology.
2. Identify and solve professional problems 5. Take decisions using available information 6. Use available resources efficiently	2. Possess the ability to design a good research experiment, write and evaluate scientific reports. 3. Design experimental protocols through critical thinking and results inspection 4. Analyze and evaluate the results of research experiments and interpret the results of statistical analysis of the experimental data 5. Follow the ethics and morals of scientific research regarding handling of experimental animals and intellectual property rights
4. Show good communication and leadership skills 5. Use technology effectively in his professional practice	7. Communicate and work effectively in a team.
9. Be a lifelong learner and able to develop himself	6. Develop and improve self-learning abilities.

Matrix 2: Comparison between Master degree program ILOs and the Academic Reference Standards (ARS, 2009).

ARS vs. Program ILOs of Masters in Pharmacology		
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-Detect the principles of human body physiology, progression of diseases, potential drug targets in the body, pharmacokinetics, pharmacodynamics, drug interactions, drug-induced diseases and basics of genetics. A.2-Identify the basics of instrumental analyses and techniques applied for different pharmacological experiments . A.3- Describe the similarities and differences between statistical tests and learn how to apply them appropriately.
	2.1.2- Mutual influence between professional practice and its impact on the environment.	A.4- Define the influence of physiology, pharmacology, drug interactions and toxicology-related problems on society in the field of human health.
	2.1.3- Scientific developments in the area of specialization.	A.5-Update the information in the field of pharmacology and related subjects. A.6- Explain the recent mechanisms of the pathophysiology of different diseases and recognize the recent methods of targeting drugs in certain diseases.
	2.1.4- Moral and legal principles for professional practice in the area of specialization.	A.7- Mention the principles of moral and medico-legal aspects applied in the practical life related to different areas of pharmacology.
	2.1.5- Principles and the basics of quality in professional practice in the area of specialization.	A.8- List risk factors for drug-induced diseases and related preventative strategies A.9- Outline the different methods of study design and statistical analysis A.10- Describe the basics of quality assurance to guarantee ideal practice in the field of pharmacology.
	2.1.6- The fundamentals and ethics of scientific research.	A.11-Determine the ethics of handling, care and disposal of experimental animals.

Intellectual Skills	2.2.1- Analyze and evaluate information in the field of specialization and analogies to solve problems	B.1- Analyze experimental data statistically, apply statistical tests appropriately, and interpret statistical significance for results from commonly used statistical tests.
	2.2.2- Solve specified problems in the lack or missing of some information.	B.2- Propose strategies to minimize pathophysiological changes and drug-induced diseases
	2.2.3-Correlate and integrate different pharmaceutical knowledge to solve professional problems.	B.3- Integrate information regarding drug kinetics, dynamics, toxicity, targeting and interaction with other drugs to apply a proper therapeutic regimen in different situations related to the profession .
	2.2.4- Conduct research and write scientific report on research specified topics.	B.4- Withdraw conclusions and observations from different scientific reports B.5-Apply the most appropriate instrumental technique for DNA and RNA assays. B.6- Design and manage different experimental protocols in the field of pharmacology and related disciplines.
	2.2.5- Evaluate and manage risks and potential hazards in professional practices in the area of specialization	B.7- Evaluate the toxicity and hazards of therapeutic regimens and how to apply these regimens properly in different pathological conditions
	2.2.6- Plan to improve performance in the field of specialization.	B.8- Suggest alternative and innovative plans to improve the experimental protocols B.9- Identify decision errors that can occur when using statistical tests and suggest methods to minimize them
	2.2.7- Professional decision-making in the contexts of diverse disciplines.	B.10- Take professional decisions based on critical thinking and physiological and pharmacological-based evidences
Professional and Practical Skills	2.3.1- Master basic and modern professional skills in the area of specialization.	C.1-Master a wide range of pharmacological techniques either in vivo or in vitro
	2.3.2- Write and evaluate professional reports.	C.2-Represent and summarize experiment results in a well-organized, written reports. C.3- Retrieve information regarding drugs and research experiments from different resources .

	2.3.3- Assess methods and tools existing in the area of specialization.	C.4-Demonstrate a solid ability to assess and use different laboratory skills related to pharmacology.
General and Transferable Skills	2.4.1- Communicate effectively.	D.1- Communicate effectively with other colleagues and staff members using verbal, written and expression language.
	2.4.2- Effectively use information technology in professional practices	D.2- Demonstrate competence in the use of information technology broad enough to meet personal, academic and professional needs
	2.4.3- Self-assessment and define his personal learning needs.	D.3- Recognize learning needs and how to fulfill them.
	2.4.4- Use variable sources to get information and knowledge.	D4- Retrieve information from different resources including online resources, library as well as printed literatures.
	2.4.5- Set criteria and parameters to evaluate the performance of others	D.5- Develop rules and indicators for assessing and criticizing the performance of others.
	2.4.6- Work in a team and lead teams carrying out various professional tasks.	D.6- Maintain ethics and respect-based relationships with colleagues, professors and other staff members D.7- Appreciate team working and performing tasks in the group environment.
	2.4.7- Manage time effectively.	D.8- Manage time and experimental plan effectively.
	2.4.8- Continuous and self-learning.	D.9- Develop life-long learning skills and professional development activities.

Matrix 3: Comparison of M. Pharm. Sci. Degree in Pharmacology and Toxicology program with the MSc Clinical Pharmacology provided by School of Pharmacy & Life Sciences, University of Aberdeen. UK.

School of Pharmacy & Life Sciences, University of Aberdeen. UK.	Program ILOs
1. In-depth and extensive knowledge, understanding and skills at internationally recognized levels in clinical pharmacology 2. A breadth of knowledge, understanding and skills beyond clinical pharmacology 3. An ability to participate in the creation of new knowledge and understanding in clinical pharmacology through research and inquiry 4. A contextual understanding of past and present knowledge and ideas in clinical pharmacology	A.1-Detect the principles of human body physiology, progression of diseases, potential drug targets in the body, pharmacokinetics, pharmacodynamics, drug interactions, drug-induced diseases and basics of genetics. A.2-Identify the basics of instrumental analyses and techniques applied for different pharmacological experiments A.3- Describe the similarities and differences between statistical tests and learn how to apply them appropriately. A.4- Define the influence of physiology, pharmacology, drug interactions and toxicology-related problems on society in the field of human health. A.5-Update the information in the field of pharmacology and related subjects. A.6- Explain the recent mechanisms of the pathophysiology of different diseases and recognize the recent methods of targeting drugs in certain diseases. A.7- Mention the principles of moral and medico-legal aspects applied in the practical life related to different areas of pharmacology. A.8- List risk factors for drug-induced diseases and related preventative strategies A.9- Outline the different methods of study design and statistical analysis

	A.10- Describe the basics of quality assurance to guarantee ideal practice in the field of pharmacology. A.11-Determine the ethics of handling, care and disposal of experimental animals.
5. An intellectual curiosity and a willingness to question accepted wisdom and to be open to new ideas 6. A capacity for independent, conceptual and creative thinking 7. A capacity for problem identification, the collection of evidence, synthesis and dispassionate analysis 8. A capacity for attentive exchange, informed argument and reasoning;	B.1- Analyze experimental data statistically, apply statistical tests appropriately, and interpret statistical significance for results from commonly used statistical tests. B.2- Propose strategies to minimize pathophysiological changes and drug-induced diseases B.3- Integrate information regarding drug kinetics, dynamics, toxicity, targeting and interaction with other drugs to apply a proper therapeutic regimen in different situations related to the profession B.4- Withdraw conclusions and observations from different scientific reports B.5-Apply the most appropriate instrumental technique for DNA and RNA assays. B.6- Design and manage different experimental protocols in the field of pharmacology and related disciplines B.7- Evaluate the toxicity and hazards of therapeutic regimens and how to apply these regimens properly in different pathological conditions B.8- Suggest alternative and innovative plans to improve the experimental protocols

	B.9- Identify decision errors that can occur when using statistical tests and suggest methods to minimize them B.10- Take professional decisions based on critical thinking and physiological and pharmacological-based evidences C.1-Master a wide range of pharmacological techniques either in vivo or in vitro C.2-Represent and summarize experiment results in a well-organized, written reports. C.3- Retrieve information regarding drugs and research experiments from different resources C.4-Demonstrate a solid ability to assess and use different laboratory skills related to pharmacology.
9. An ability to communicate effectively for different purposes and in different contexts;	D.1- Communicate effectively with other colleagues and staff members using verbal, written and expression language
10. An ability to work independently and as part of a team;	D.7- Appreciate team working and performing tasks in the group environment. D.8- Manage time and experimental plan effectively.
11. A diverse set of transferable and generic skills	D.2- Demonstrate competence in the use of information technology broad enough to meet personal, academic and professional needs D4- Retrieve information from different resources including online resources, library as well as printed literatures.
12. An openness to, and an interest in, life-long learning through directed and self-directed study	D.9- Develop life-long learning skills and professional development activities.
13. An awareness of personal strengths and weaknesses 14. A capacity for self-reflection, self-discovery and personal development	D.3- Recognize learning needs and how to fulfill them.

15. An awareness and appreciation of ethical and moral issues 16. An awareness and appreciation of social and cultural diversity 17. An understanding of social and civic responsibilities, and of the rights of individuals and groups 18. A readiness for citizenship in an inclusive society	D.6- Maintain ethics and respect-based relationships with colleagues, professors and other staff members
19. An appreciation of the concepts of enterprise and leadership in all aspects of life	D.5- Develop rules and indicators for assessing and criticizing the performance of others.

4-Curriculum Structure and Contents:

a- Program duration: **2-5** years

b- Program structure:

- The Master's program can be completed in 2-5 years.
- The Faculty of pharmacy implements the credit hour system.
- The program is structured as:

1- Courses: General (1 year) and Special (please see next page)

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:		
M110	Molecular Biology	4	A1, A5, B5, D1, D2, D4, D7, D9
M112	Physiology	2	A1, A4, B10, D1, D4
M111	Biostatistics	2	A3, A9, B9, D1, D2
M102	Instrumental Analysis & chromatography II	4	A2, A10, B8, C4, D2, D6, D7
ME6	Elective course 1 (Drug interaction)	4	A1, A4, B3, D2, D7
ME4 ME7	Elective course 2 Biotechnology Drug induced diseases	 4 4	 A1, A5, B5, D2, D4, D7 A1, B2, D1, D4
	Special Courses:		
Lsp1	Advanced pharmacological techniques	4	A2, B5, D5
Lsp2	Drug targeting	4	A1, A6, B3, D2, D7
Lsp3	Pathophysiology	4	A1, A6, B2, D8
	Thesis	30	A1, A2, A3, A4, A5, A6, A7, A8, A9, A10, A11, B1, B2, B3, B4, B5, B6, B7, B8, B9, B10, C1, C2, C3, C4, D1, D2, D3, D4, D5, D6, D7, D8, D9

The marks for each course = 100 Marks

d. Learning Outcomes in Domains of Teaching Strategies & Assessment Methods:

ILOs	teaching method	assessment method
Knowledge and Understanding Intellectual Skills	Lectures Case study Self-learning	Written and oral Exam
Professional and practical Skill	Case study Problem solving Thesis	Practical Exam Case discussion Rubric
Intellectual Skills General and Transferable Skills	Presentation Thesis	Oral Exam Rubric

5-Program admission requirements:

General Admission Conditions

- The Applicant should finish or being permanently or temporarily exempted from the military service and temporary exemption should be valid for at least one year from the date of beginning of study. (Exceptions apply for demonstrators and assistant lecturers).
- The applicant admission to the M.Sc. program should be no later than ten years from the time of graduation.
- Acquisition of an approval from the Faculty Council following an approval of concerned Departmental Board as well as Graduate Studies and Research Committee recommendation within a maximum of one month for any conditions stated by the concerned Departmental Board.

Admission Conditions for M.Sc. degree

In addition to the general admission conditions stated before, applicants are admitted to M.Sc. degree upon fulfillment of the following:

The applicants should be holders of Bachelor in Pharmaceutical Sciences from any Faculty of Pharmacy with a general grade at least good affiliated to the Egyptian Universities or an equivalent degree granted by any institute recognized by the Supreme Council of Universities.

The Faculty council is allowed, on consent of the concerned Departmental Board as well as Graduate Studies and Research Committee, to accept student for registration of M.Sc. degree if he has got a diploma from one of the Egyptian Universities in one of the pharmaceutical sciences fields, Faculties, or Institutes that are recognized by the Supreme Council of Universities with a general grade of Good regardless his grades in bachelor degree.

Students should fulfill all the admission requirements stated by the concerned Departmental Board (ICDL certificate, local TOEFL certificate with a grade at least 450).

Admission must be done within the period announced by the university.

Candidate thesis discussion isn't before one calendar year from research point registration.

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 M.Sc. degree upon fulfillment of the following requirements:

- Carrying out a deep research in the area of specialization for at least one or two calendar years and at most three years from the time of registration.
- The student must succeed in all courses' examinations.
- Acceptance of the research thesis by the Jury Committee according to statement 104 of universities regulating law.

Cancellation of Registration

The Faculty Board can cancel registration for M. Sc. programs in the following circumstances

- Student's failure to pass the course examinations for two times.
- Student's nonattendance or unsatisfactory progress (at least two annual reports) in research work being reported by the advisors and chief supervisor to the Departmental Board and forwarded to the Graduate Studies and Research Committee recommendation for approval of cancellation.
- 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. Salah Ghareib	Program evaluation Courses evaluation	Program report Courses report
External evaluator: Professor/Dr./Sameh Elnabtiti	Program evaluation Courses evaluation	Program report Courses report
Other methods	Matrix with ARS Questionnaires	The Matrix Results of the questionnaires

Program coordinator

Prof. Dr. Ahmed Fahmy

Head of Department:

Prof. Dr. Mona Fouad

General Courses

Biotechnology

Course Specification of Biotechnology

A- Course specifications:

- **Program on which the course is given:** Master of Pharmaceutical Sciences
- **Major or minor element of programs:** Major
- **Department offering the program:** Pharmacology and toxocology
- **Department offering the course:** Microbiology and Immunology department in conjunction with Biochemistry department
- **Date of specification approval:** 2019

1-Basic Information:

Title: Biotechnology Code: ME4

Credit hours: 4hrs/week Lectures: 4hrs/week

Total: 4hrs/week

2- Overall aims of the course:

On completion of the course, the student will be able to describe the components of biotechnology, the exploitation of gene cloning and recombinant DNA technology in production of useful microbial industrial strains and in monoclonal antibody technology, apply conventional genetic approaches and molecular genetics approaches in biotechnology, explain the bases of molecular genetics, and basic gene cloning strategies and tools and explore the basis of stem cell biotechnology and the regenerative medicine.

3-Intended learning outcomes (ILOS) of Biotechnology:

A- Knowledge and Understanding	
1a	Outline the principles of biotechnology techniques
2a	Explain how to manage and exploit knowledge of DNA cloning, recombinant DNA, and applied technology
3a	Summarize recent medical biotechnology applications.
a4	Identify the principles of stem cell biotechnology and regenerative medicine
B- Intellectual skills	
b1	Express the principles biotechnology in medicine, agriculture and pollution control.
b2	Associate the principles of recombinant DNA technology in gene cloning and assessment of the microbial transformation
b3	Discuss the principles of PCR technology in the assessment of microbial mutation, gene detection, gene sequencing & forensic medicine
D- General and transferable skills	
d1	Use computer skills as internet and power point in the activities.
d2	Gain information from various sources as text books, scientific journals, internet,…etc.
d3	Search on various topics and write reports or term papers.
d4	Work as a member in a team and communicate effectively with the other members of the team

4-Course content of Biotechnology:

Week No.	Lecture content (2 hrs/week) (Microbiology Department)	Lecture content (2 hrs/week) (Biochemistry Department)
1	Introduction to biotechnology	Pharmacokinetics and pharmacodynamics of peptides and protein drugs a- Elimination of protein therapeutics

		b- Distribution of protein therapeutics
2	DNA Recombination: • Naturally occurring genetic recombination • Artificially occurring genetic recombination (in laboratory)	Pharmacokinetics and pharmacodynamics of peptides and protein Drugs c- Protein binding of protein d- Chemical modification of protein therapeutics
3	Requirements for genetic engineering	Hematopoietic Growth Factor a- Chemical description b- Pharmaceutical concerns c- Clinical and practice aspects d- Toxicities
4	Gene Cloning: • General strategy for gene cloning • Obtaining the target genes	INTERLEUKINS a- Interleukins 1-17 b- Introduction and chemical Description – Pharmacology
5	Gene Cloning: • Finding suitable cloning vectors • Joining target gene(s) to vector • Insertion of hybrid (recombinant) DNA into expression host (transformation) and selection of transformant	INTERLEUKINS c- Interferon's alpha , Beta , Gamma d- Pharmaceutical concerns e- Clinical and Practice aspects
6	Applications of genetic engineering **Activity**	INSULIN a- Introduction b- Pharmacology and Formulations c- Pharmaceutical concerns, chemical and physical stabilities

		d- Clinical and practice aspects **Activity**
7	Polymerase chain reaction (PCR) Types of PCR • Traditional PCR • rt PCR • Real time PCR	Growth hormones a- hGH structure , Isolation b- Pharmacology
8	Applications of PCR: 1- gene amplification for: • gene cloning • gene sequencing • gene control drug production 2- diagnosis of microbial infections 3- in forensic medicine	Growth hormones c- Protein manufacture , formulations d- Clinical use
9	Monoclonal antibody (MAb) technology (synthesis of Ab in laboratory): • hybridoma technology • production & selection of Ab • types of genetically engineered MAb (mouse, chemeric, humanized, human) • nomenclature of MAb according to the target and source • Global Marketing pharmaceutically useful MAb	Dispensing Biotechnology products a- Introduction – Storage b- Handling c- Preparations
10	Stem cells technology: • Types of stem cells • Isolation • Culturing	Dispensing Biotechnology products d- Administration e- Outpatient/Homecare use f- Patient assessment

	• Applications of stem cells in regenerative medicine	
11	Advances in vaccine preparation	Biotechnology for pharmaceutical products a- Hormones b- Preparation of vaccines and other biological products
12	Gene sequencing	Biotechnology for pharmaceutical products c- Old , modern Biotechnology d- Applications in Medicine- industry – Agriculture – Ecology
13	Microarray technology	PCR , LCR ,applications in forensic medicine- Mutations- RFLP…..etc
14	Presentation of students activities and open discussion	
15	Written Exam	

5-Teaching and Learning Methods:

- Lectures
- Self learning
- Open discussion and presentations
- Critical thinking

6-Student Assessment methods:

- Written exams to assess: a1, a2, a3, a4, b1, b2, b3
- Oral exam to assess: a1, a2, a3, a4, b1, b2, b3
- Activity to assess: d1, d2, d3, d4

Assessment schedule:

Assessment (1): Activity	Week 6,14
Assessment (2): Written exam	Week 15
Assessment (3): oral exam	Week 15

Weighting of Assessment:

Assessment method	Marks	Percentage
• Activity	10	10 %
• Written exam	75	75 %
• Oral exam	15	15 %
TOTAL	**100**	**100%**

7-References &books:

A- Scientific papers

B- Essential books:

1. Crommelin, D.A.; and Sindeler, R.D. (1997). Pharmaceutical Biotechnology. Hartwood Academic Publishers. The Netherlands.
2. Glick, B.P.; and Pasterternak, J.J. (1994). Molecular Biotechnology-Principles Applications of recombinant DNA. AS Press, Washington, D.C., USA.
3. Thieman, W.J.; Palladino, M.A. (2008). *Introduction to Biotechnology*. Pearson/Benjamin Cummings. ISBN 0-321-49145-9.
4. Higuchi, R., Dollinger, G., Walsh, P.S. & Griffith, R. (1992) Simultaneous amplification and detection of specific DNA sequences. *Biotechnology*, 10, 413–417. [The first description of real-time PCR].

5. VanGuilder, H.D., Vrana, K.E. & Freeman, W.M. (2008) Twenty-five years of quantitative PCR for gene expression analysis. *Biotechniques*, 44, 619–624.

C- Suggested books:

1. Biotechnology in health care: an introduction to biopharmaceuticals
2. Ermak G., (2013), Modern Science & Future Medicine (second edition)

D- Websites: pubmed, Science direct, Nejm, Weilyinterscience, EKB

Facilities required for teaching and learning:

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

- **Course Coordinators: Prof. Dr/ Ashraf Ahmed Kadry**
  Prof. Dr/ Mohammed El-Sewedy
- **Head of Department: Prof. Dr/ Nehal El-sayed**
- **Date: 2019 تم اعتماد توصيف المقرر بمجلس القسم لشهر سبتمبر**

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Matrix I of Biotechnology (2019)

Course Contents		ILOs of Biotechnology course										
		Knowledge and Understanding				Intellectual skills			General and transferable skills			
		a 1	a 2	a 3	a 4	b 1	b 2	b 3	d 1	d 2	d 3	d 4
1	Introduction to biotechnology	x										
2	Bioprocess	x										
3	Downstream processing	x										
4	Cell culture - Activity	x				x	x	x				
5	Hybridoma technology	x										
6	Medical biotechnology			x	x							
7	Medicine from cultured cells			x	x							
8	DNA Recombination & Application of genetic engineering		x	x	x							
9	Principle of PCR technology and gene amplification.	x	x				x	x				
10	Applications and advances in PCR			x	x		x	x				
11	Hybridoma technology & Monoclonal antibody(MAb)-technology & Production Nomenclature of MAbs				x							
12	Global Marketing Pharmaceuti			x	x							

	cally useful monoclonal antibodies											
13	Applications and advances in PCR			**x**	**x**		**x**	**x**				
14	• Vaccine preparations • Stem cells technology & • Regenerative medicine. • **Activity** (presentation)			**x**	**x**	**x**	**x**	**x**	**X**	**x**	**x**	**x**

Matrix II of Biotechnology (2019)

ARS		Program ILOs	Course ILOs	Course contents	Sources	Teaching & learning methods		Method of assessment		
						Lecture	Self learning	Written exam	oral exam	Activity
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 principles of human body physiology, progression of diseases, potential drug targets in the body, pharmacokinetics, pharmacodynamics, drug interactions, drug-induced diseases and basics of genetics.	a1- a2- a3-a4	Introduction to biotechnology- Bioprocess- Downstream processing- Cell culture- Hybridoma technology-Medical biotechnology- Medicine from cultured cells- DNA Recombination & Application of genetic engineering - Principle of PCR technology and gene amplification.- Applications and advances in PCR- Hybridoma technology& Monoclonal antibody(MAb)- technology & Production Nomenclature of Mabs- Global Marketing Pharmaceutically useful monoclonal antibodies - Applications and advances in PCR -Vaccine preparations- Stem cells technology & Regenerative medicine.	Textbooks, Scientific papers and self learning	x	X	x	x	
	2.1.3- Scientific developments in the area of specialization.	A.5-Illustrate the updated information in the field of pharmacology and related subjects.	a1- a2- a3-a4		Textbooks, Scientific papers and self learning	x	X	x	x	

Intellectual skills	2.2.4 - Conduct research and write scientific report on research specified topics.	B.5-Apply the most appropriate instrumental technique for DNA and RNA assays.	b1-b2-b3	Medical biotechnology- Medicine from cultured cells- DNA Recombination & Application of genetic engineering - Applications and advances in PCR- Hybridoma technology& Monoclonal antibody(MAb)-technology & Production Nomenclature of Mabs- Global Marketing Pharmaceutically useful monoclonal antibodies - Applications and advances in PCR -Vaccine preparations- Stem cells technology & Regenerative medicine.	Textbooks, Scientific papers and self learning	x	x	x	x	
General and transferable skills	2.4.2- Effectively use information technology in professional practices	D.2- Demonstrate competence in the use of information technology broad enough to meet personal, academic and professional needs	d1 d3	Activity - presentation of reports and open discussion	Textbooks, Scientific papers and self learning	x	x			x
	2.4.4- Use variable sources to get information and knowledge.	D4- Retrieve information from different resources including online resources, library as well as printed literatures.	d2	Activity - presentation of reports and open discussion	Textbooks, Scientific papers and self learning	x	x			x
	2.4.6- Work in a team and lead teams carrying out	D.7- Appreciate team working and performing tasks in	d4	Activity - presentation of reports and open discussion	Textbooks, Scientific					

	various professional tasks.	the group environment.			papers and self learning					

Molecular Biology

Course Specification of Molecular Biology

A- Course specifications:

- Program on which the course is given: Master degree of pharmaceutical science.
- Major or minor Element of program: Major
- Department offering the program : Pharmacology and Toxicology
- Department offering the course: Microbiology and Immunology department in conjunction with Biochemistry department
- Date of specification approval: September 2019

1-Basic information:

Title: Molecular biology Code: M110

Lectures: 4 hrs/ week Credit hrs: 4 hrs

Total: 4 hrs/week

2- Overall aims of the course:

On completion of the course, the students will be able to manifest a comprehensive knowledge on structure and function of DNA, RNA and protein, understand the mechanisms of DNA replication, transcription and protein synthesis, comprehend gene expression and regulation and understand the modern molecular biology techniques.

3-Intended learning outcomes (ILOS) of Molecular biology:

A-Knowledge and Understanding	
a1	List the types structure and function of nucleic acids and proteins
a2	Identify basic processes and control mechanisms involved in replication and repair of DNA
a3	Identify expression of genes and regulation of genetic traits and connection of these processes with genetic diseases
a4	Explain the techniques employed in molecular biology studies
B-Intellectual skills	
b1	Handle information and solve problems related to molecular biology, using oral, written, symbolic, graphical and numerical forms of presentation
b2	Make reasonable judgments by acquiring, combining, and evaluating quantitative and non quantitative information.
b3	Integrate knowledge, handle complexity, and formulate judgments with incomplete or limited information
b4	Interpret and explain data and findings of experiments in molecular biology
D-General and Transferable skills	
d1	Conduct a web-based search to produce reports and presentations
d2	Learn independently and to develop professionally, including the ability to pursue further research where appropriate
d3	Communicate effectively, with colleagues and a wider audience
d4	Work effectively as a part of team
d5	Develop different computer skills

4- Course Content of Molecular Biology

Week No.	Lecture content (4 hrs/week)
1	Introduction and Brief History of Molecular Biology: Transmission genetics, The Molecular Nature of Genes and genome. Introduction to gene function (storing information, replication, mutation)
2	Structure of biological macromolecules: Protein structure, general properties and functions (Primary Structure, Protein Folding, Secondary Structure, Alpha Helix, Beta Sheets, Tertiary Structure, Protein Domains, Quaternary Structure)
3	Structure of biological macromolecules: Nucleic Acids properties, structure and types of Nucleic acid. Physical and chemical of nucleic acids. Nucleic acid as a genetic material.
4	Replication and repair of DNA in prokaryotic organisms (Replication origins and regulation Recombination, rearrangement, chromosome structures),
5	Nucleic acid (genetic material) organization and replication in Eukaryotic cell. Chromatin Structure (histones, nucleosomes) and its Effects on Transcription and gene activity
6	Synthesis of RNA from DNA: Transcription in prokaryotic cells (RNA polymerases, Prokaryotic transcription) and in eukaryotic cells (RNA polymerases, Mechanisms and control of transcription in eukaryotes), and RNA processing in eukaryotes.
7	Synthesis of proteins (Translation of m RNA) in prokaryotic cells, and translation and processing in eukaryotic cells **Activity**
8	Regulation of gene expression in prokaryotes: Operons (Fine Control of Bacterial Transcription, the lac operon, the Major Shifts ara operon, the trp operon, riboswitches, in Bacterial Transcription: sigma factor switches, the RNA

	polymerase encoded in phage T7, infection of E coli by phage λ.
9	DNA-Protein Interactions in Bacteria: the λ family of repressor, the trp repressor, general consideration on protein DNA interaction, DNA binding proteins
10	Molecular Tools for Studying Genes and Gene Activity: molecular separation, labeled tracers, using nucleic acid hybridization, mapping and quantifying nucleic acid transcripts
11	Measuring transcription rate in vivo, assaying DNA protein interaction, finding RNA sequences that interact with other molecules, knockouts.
12	Transposition: bacterial transposons, eukaryotic transposons, rearrangement of immunoglobulin genes. Retrotransposons
13	Bioenergetics and other macromoleucles (lipids, fats, complex carbohydrates and their roles in cell)
14	Regulation and integration of metabolism in prokaryotics Genomics, Proteomics, and Bioinformatics **Activity** (Students presentation and open discussion)
15	**Written Exam**

5- Teaching and learning methods:

- Lectures (overhead project, data show, board)
- Self learning: by assignments
- Open discussion and presentations
- Critical thinking

6- Student assessment methods:

- Written exam assess: a1, a2, a3, a4, b1, b2, b3, b4
- Oral exam assess: a1, a2, a3, a4, b1, b2, b3, b4
- Activity assess: d1, d2, d3, d4, d5

Assessment schedule:

Assessment (1): Activity	Week 7,14
Assessment (2): Written exam	Week 15
Assessment (3): oral exam	Week 15

Weighting of Assessment:

Assessment method	Marks	Percentage
• Activity	10	10 %
• Written exam	75	75 %
• Oral exam	15	15 %
TOTAL	**100**	**100%**

7- References and books:

A- Scientific papers

B -ESSENTIAL BOOKS

1. Weaver, RF (ed). (2012).”Molecular Biology”, 5th Ed, McGraw Hill Companies.USA
2. Watson, J.D., Hopkins, N.H., Roberts, J.W.. Steitz, J.A- and Weiner, A.M. (1987). Molecular biology of the gene. 4th Edn. The Benjanun/cummmgs Publishing Company Inc. NY.
3. Brown, T.A. (1991). Essential Molecular Biology - A Practical approach. Vol-I, Vol - n , Oxford Univ. Press. Oxford.

C -SUGGESTED BOOKS

1. Benjamin, L. (1990). Gene. IV Edn. Oxford Univ. Press, Oxford.
2. David, J., Ulley and Eckstein, F. (1992). Nucleic Acids and Molecular Biology. Vol-6, Springer-verlag Berlin Heidelberg.
3. Desmond, S.T., and Nicholl. (1994). An Introduction to genetic Engineering Cambridge Univ. Press. Cambridge.
4. Freifelder, D. (1990). Microbial genetics. Narosa Pub. Home. India.
5. Gardner, E.J. (1991). Principles of Genetcis. John Wiley and Sons Inc..
.Biology Cell .Thomas D.and ; William C. Earnshaw (2004) ,6. Pollard Philadelphia: Saunders.

7. Lodish, Harvey, Arnold Berk, S. Lawrence Zipursky, Paul Matsudaira, David Baltimore, James Darnell Molecular Cell Biology, 4th ed (2000), New York
8. Watson, JB., Gflnian, M., Witkowshi, J. and Zoller, M. (1992). Recombinant DNA. 2Dd Edn.

D- Websites: pubmed, Sciencedirect, Nejm, Weilyinterscience, EKB

Facilities required for teaching and learning:

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

- **Course Coordinators:**

Prof. Dr. Fathy Mohammed El-Sayed Serry

Prof Dr/ Mohamed Mahmoud El-Seweidy

- **Head of Department: Prof Dr/ Nehal El-sayed**
- **Date: 2019 تم اعتماد توصيف المقرر بمجلس القسم لشهر سبتمبر**

Matrix I of Molecular Biology (2019)														
Course Contents		ILOs of Molecular Biology course												
		Knowledge and Understanding				Intellectual skills				General and transferable skills				
		a1	a2	a3	a4	b1	b2	b3	b4	d1	d2	d3	d4	d5
1	• DNA ,RNA structure, function • Difference between DNA & RNA	X	X											
2	• DNA replication steps	X												
3	• Types of RNA • Genetic code		X											
4	• Protein synthesis • Alteration of nucleotide sequence		X											
5	• Genetic engineering • DNA cloning • Applications of cloning in treatment of diseases -activity			X	X	X	X			X	X	X	X	X
6	• Genomic DNA libraries, c DNA			X				X	X					

	• PCR, LCR and their applications													
7	• RFLP • Linkage of polymorphism with gene mutation • Prenatal diagnosis, Diagnosis of sickle cell disease			X	X	X	X							
8	• Sequencing of DNA (chemical method)	x												
9	• Sequencing of DNA (enzymatic method)	x												
10	• Electrophoresis	x												
11	• Sothern, western and northern blotting	x												
12	• Sequencing of proteins		X											
13	• Synthesis of genes	x												
14	• Monoclonal antibodies activity (presentation)				X		X	x	X	X	X	X	X	X

Matrix II of Molecular Biology (2019)

ARS		Program ILOs	Course ILOs	Course contents	Sources	Teaching and learning methods		Method of assessm		
						Lecture	Self learning	Written exam	oral exam	Ac it
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 principles of human body physiology, progression of diseases, potential drug targets in the body, pharmacokinetics, pharmacodynamics, drug interactions, drug-induced diseases and basics of genetics.	a1- a2- a3- a4	DNA structure, function. DNA replication steps - g DNA libraries, c DNA - Sequencing of DNA (chemical method)- Sequencing of DNA (enzymatic method)- Electrophoresis- Sothern, western and northern blotting- Synthesis of genes- RNA structure, function.- Difference between DNA and RNA- Types of RNA- Genetic code- Protein synthesis- Alteration of nucleotide sequence - Sequencing of proteins- Genetic engineering- DNA cloning- PCR, LCR and their applications- RFLP- Linkage of polymorphism with gene mutation- Applications of cloning in treatment of diseases-	Textbooks, Scientific papers and self learning	x	X	x	x	
						x	X	x	x	
	2.1.3- Scientific developments in the area of specialization.	A.5-Illustrate the updated information in the field of pharmacology and related subjects				x	x	x	x	

				Prenatal diagnosis, Diagnosis of sickle cell disease- Monoclonal antibodies						
Intellectual skills	2.2.4- Conduct research and write scientific report on research specified topics.	B.5-Apply the most appropriate instrumental technique for DNA and RNA assays. .	b1-b2-b3- b4	Genetic engineering- DNA cloning- PCR, LCR and their applications- RFLP- Linkage of polymorphism with gene mutation- Applications of cloning in treatment of diseases- Prenatal diagnosis, Diagnosis of sickle cell disease- Monoclonal antibodies	Textbooks, Scientific papers and self learning	x	x	x	x	
General and transferable	2.4.1- Communicate effectively.	D.1- Communicate effectively with other colleagues and staff members using verbal, written and expression language.	d3	Activity (reports)- open discussion	Textbooks, Scientific papers and self learning	x	x			
	2.4.2- Effectively use information technology in professional practices	D.2- Demonstrate competence in the use of information technology broad enough to meet personal, academic and professional needs	d1 d5	Activity (reports)- open discussion		x	x			

	2.4.4- Use variable sources to get information and knowledge.	D4- Retrieve information from different resources including online resources, library as well as printed literatures.	d1	Activity (reports)- open discussion	x	x				
	2.4.6- Work in a team and lead teams carrying out various professional tasks.	D.7- Appreciate team working and performing tasks in the group environment.	d4	Activity (reports)- open discussion	x	x				
	2.4.8- Continuous and self learning	D.9- Develop life-long learning skills and professional development activities.	d2	Activity (reports)- open discussion	x	x		x		

Instrumental Analysis and Chromatography II

Course specification of Instrumental Analysis and Chromatography II

A- Course specifications:

- Program on which the course is given: Master's of Pharmaceutical Sciences
- Major or Minor element of program: Major
- Department offering the program: Pharmacology and Toxicology
- Department offering the course: Analytical Chemistry.
- Date of specification approval: 2019

1- Basic information:

M102 Title: Instrumental Analysis II Code: M102
Lectures: 4 hrs/week Credit hours: 4 hrs/ week
Total: 4 hrs/ week

2- Overall aim of the course:

On completion of the course; the students should be able to outline the basic and applications of different instrumental techniques, describe theories, operation, pharmaceutical and biological applications of instrumental techniques.

3. Intended learning outcome s (ILOs):

A- Knowledge and Understanding	
a1	Outline the basis, theory and operation of the different instrumental techniques of analysis.
a2	Describe different pharmaceutical and biological applications of instrumental techniques.
B- Intellectual skills	

b_1	Select the most appropriate instrumental technique used for pharmaceutical and biological assay.
b_2	Integrate the knowledge gained by studying different instrumental techniques in designing analytical system for analytes of complex nature
D- General and Transferable skills	
d1	Acquire Computer skills such as preparation of scientific presentations and collecting information through different data-bases.
d2	Work successfully as a productive member of the team
d3	Improve scientific brain storming capabilities and cooperate with other team members

4. Course Contents:

Week No.	Content
1	**Instrumental Analysis:** *Introduction *Principles
2	**[Ultraviolet (UV)and Visible spectrophotometry** *Theory *Instrumentations
3	**[Infrared (IR) spectroscopy].** *Theory *Instrumentations
4	**Applications of UV and IR**
5	**Nuclear magnetic resonance (NMR).** *Theory **Instrumentations
6	**Mass-spectrometry (MS)** *Theory *Pharmaceutical and biological applications.
7	**Applications of NMR and MS**

8	**Electrochemistry** **Conductometry, Potentiometry.** *Theory *Pharmaceutical and biological applications.
9	**Chromatography:** *Introduction *Classification
10	**Quantitative and Qualitative Chromatographic techniques** *Basis *Pharmaceutical and biological applications
11	**HPLC** *Basis *Types Isocratic flow and gradient elution Particle size, Pore size, Pump pressure, detectors and applications
12	**Gas Chromatography** *Basis *Pharmaceutical and biological applications *Detectors
13	Student activities
14	**Revision and Open discussion**
15	**Written exam**

5- Teaching and Learning Methods:

- Lectures
- Self learning
- Student scientific presentation.
- Homework assignments
- Internet based search
- Problem solving

6-Student Assessment methods:

Written exams to assess: a1, a2, b1, b2

Oral exam to assess a1, a2, b1 and b2

Activity to assess d1, d2 and d3

Assessment schedule:

Assessment (1): Activity	Week 13
Assessment (2): Written exam	Week 15
Assessment (3): oral exam	Week 15

Weighting of Assessment:

Assessment method	Time	Marks
Written exam	Week 15	75
Oral Exam	Week 15	15
Activity	Week 13	10

7- References and books:

A-Scientific papers

B- Essential books:

- Modern Analytical Chemistry, David Harvey, McGraw-Hill Companies, first edition, 2002.
- Principles of Instrumental Analysis, Douglas A. Skoog, F. James Holler, Crouch Thomson Brooks/Cole, 2007
- Handbook of instrumental techniques of analytical chemistry, Frank A. Settle, Prentice Hall PTR, 1997.

C- Suggested books:

- British Pharmacopoeia, HM Stationery Office, London, UK, PA, 2007,
- Martindale: The Complete Drug Reference, Pharmaceutical Press; 35 edition (2007) .

Websites and journals:

- www.rsc.org
- www.sciencedirect.com

- www.pubmed.com
- www.medline.com
- www.ekb.eg/
- Guidance for Industry: Q2B of Analytical Procedures; Methodololgy: International Conference of Harmonization (ICH). Nov. 1996 (http:/ www.fda.gov/eder/guidance /1320fnl.pdf).
- Journal of Chromatography A and B, Separation sciences, Analytical and Bioanalytical Chemistry, Bioanalysis, Analytical letters.

8-Facilities required for teaching and learning:

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

For search and self learning: Faculty and University libraries

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- **Course Coordinators:**

Prof Dr / Hisham Ezzat

Prof Dr/ Magda Elhenawee

- **Head of Department:**

Prof Dr/ Magda Elhenawee

Date: تم اعتماد توصيف المقرر في مجلس القسم بتاريخ 9 / 2019

Matrix I of Instrumental Analysis and Chromatography II								
	Course Contents	ILOs of Instrumental Analysis and Chromatography II course						
		Knowledge and understanding		Intellectual skills		General and Transferable skills		
		a1	a2	b1	b2	d1	d2	d3
1	**Instrumental Analysis:** *Introduction *Principles	x						
2	**[Ultraviolet (UV)and Visible spectrophotometry** *Theory *Instrumentations	x	x	x				
3	**[Infrared (IR) spectroscopy].** *Theory *Instrumentations	x	x	x				
4	**Applications of UV and IR**	x	x	x				
5	**Nuclear magnetic resonance (NMR).** *Theory **Instrumentations	x	x	x				
6	**Mass-spectrometry (MS)** *Theory *Pharmaceutical and biological applications.	x	x	x				
7	**Applications of NMR and MS**	x	x	x				
8	**Electrochemistry Conductometry, Potentiometry.** *Theory *Pharmaceutical and biological applications.	x	x	x				
9	**Chromatography:** *Introduction *Classification	x						
10	**Quantitative and Qualitative Chromatographic techniques**	x	x	x				

	*Basis *Pharmaceutical and biological applications							
11	**HPLC** *Basis *Types Isocratic flow and gradient elution Particle size, Pore size, Pump pressure, detectors and applications	x						
12	**Gas Chromatography** *Basis *Pharmaceutical and biological applications * Detectors	x						
13	Student activities			x	x	x	x	x
14	**Revision and Open discussion**	x	x	x	x	x	x	x

Matrix II of Instrumental Analysis & Chromatography II										
ARS		Program ILOs	Course ILOs	Course contents	Source	Teaching and learning methods		Method of assessment		
						Lecture	Self learning	Written exam	Oral Exam	Activity
Knowledge and Understanding	2.1.1- Theories and fundamentals related to the field of learning as well as in related areas.	A2	a1	Instrumental Analysis-- UV-visible spectrophotometry, Fluorometry--IR--- NMR-- Conductometry, Potentiometry--MS-- --- chromatography--- HPLC, GC, applications	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.	A10	a2	Applications of UV-visible spectrophotometry, electrochemistry and chromatography.	Textbooks, Scientific papers and self learning	x	X	X	x	

Intellectual skills	2.2.6- Plan to improve performance in the field of specialization.	B8	b1-b2	Instrumental Analysis-- UV-visible spectrophotometry, Fluorometry--IR--- NMR-- Conductometry, Potentiometry--MS- - --- chromatography--- HPLC, GC, applications	Textbooks, Scientific papers and self learning	x	X	X	x	
General and Transferable Skills	2.4.2- Effectively use information technology in professional practices	D2	d1	Activity	Textbook, Scientific papers and self learning		X			x
	2.4.6- Work in a team and lead teams	D7	d2	Activity	Textbook Scientific papers and		X			x

	carrying out various professional tasks.	D7	d3		self learning					

Physiology

Course specification of Physiology

A- Course specifications:

- Program on which the course is given: Master of Pharmaceutical Sciences
- Major or Minor element of program: Major
- Department offering the program: pharmacology Dept.
- Department offering the course: Pharmacology Dept.
- Date of specification approval: 2019

1- Basic information:

Title: **Physiology** Code: M112
Lectures: 2 hrs/week Credit hours: 2 hrs/week
Total: 2hrs/week

2- Overall aim of the course:

On completion of the course, the students will be able to build up comprehensive knowledge on the overall human physiological functions of the different body organs in healthy and disease states.

3. Intended learning outcome s (ILOs) of Physiology:

Knowledge and Understanding	
a1	Describe the mechanical, physical, and biochemical functions of humans in good health, their organs, and the cells of which they are composed.
a2	Illustrate the interrelationships between physiology and the society in the field of human health.
Intellectual skills	
b1	Use literature and scientific evidences to take decisions concerning physiological problems
General and Transferable skills	
d1	Communicate effectively in oral and written forms.
d2	Retrieve information from different resources

4. Course Content of Physiology:

Week number	Lecture contents (2hrs/week)
1	Nerve & Muscle
2	Autonomic Nervous System 1 (Sympathetic nervous system)
3	Autonomic Nervous System 2 (Parasympathetic nervous system)
4	Cardiovascular System 1 (Structure, functions and properties of the heart)
5	Cardiovascular System 2 (Heart rate, cardiac output and blood pressure)
6	Central Nervous System 1 (Structure of brain and spinal cord)
7	Central Nervous System 2 (Reflexes and pain)
8	Kidney (Structure, function and urine formation)
9	Respiratory System (Structure and functions of the lung, mechanism of breathing) Activity (Review article- Presentation)

10	GIT (Functions of gastric secretions and Neurohormonal regulation)
11	Endocrine System 1 (Hypothalamus, thyroid, parathyroid glands)
12	Endocrine System 2 (Adrenal gland and endocrine pancreas)
13	Blood physiology (Functions of blood cells and clotting mechanisms)
14	Membrane physiology (Structure and functions)
15	final exam

5- Teaching and Learning Methods:

- Lectures
- Self learning
- Case study

6- Student Assessment methods:

- Written exam to assess: a1, a2, b1.
- Oral exam to assess: a1, a2, b1, d1 and d2.
- Activity to assess: d1, d2

Assessment schedule:

Assessment (1): Activity	Week 9
Assessment (2): Written exam	Week 15
Assessment (3): oral exam	Week 15

Weighting of Assessment:

Assessment method	Marks	Percentage
• Activity	10	10 %
• Written exam	75	75 %
• oral exam	15	15 %
TOTAL	**100**	**100%**

7- References and books:

A-Scientific papers

B- Essential books:

- Linda S. Costanzo (2007). Board Review Series: Physiology. Lippincott Williams & Wilkins. 4th ed
- Guyton physiology (2006) Arthur C. Guyton, John E. Hall, 11th edition Elsevier Inc.
- Clinical physiology (2005) An Examination Primer Ahis Banerjee, Cambridge University Press.

Facilities required for teaching and learning:

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

- **Course Coordinator: Prof. / Hany El-Bassossy**

Matrix I of Physiology course						
Week number	Course Contents	Knowledge and understanding		Intellectual skills	General & Transferable skills	
		a1	**a2**	**b1**	**d1**	**d2**
1	Nerve & Muscle	X	X	X		
2	Autonomic Nervous System 1	X	X	X		
3	Autonomic Nervous System 2	X	X	X		
4	Cardiovascular System 1	X	X	X		
5	Cardiovascular System 2	X	X	X		
6	Central Nervous System 1	X	X	X		
7	Central Nervous System 2	X	X	X		
8	Kidney	X	X	X		
9	Respiratory System- Activity	X	X	X	x	X
10	GIT	X	X	X		
11	Endocrine System 1	X	X	X		
12	Endocrine System 2	X	X	X		
13	Blood physiology	X	X	X		
14	Membrane physiology	X	X	X		

Matrix II of Physiology

ARS		Program ILOs	Course ILOs	Course content	Source	Teaching and learning methods	
						Lectures	Self-learning
Knowledge and Understanding	2.1.1- Theories and fundamentals related to the field of learning as well as in related areas.	A1 A4	a1, a2	All the topics	Scientific papers, text books and Internet	X	X
Intellectual Skills	2.2.7- Professional decision-making in the contexts of diverse disciplines.	B10	b2	All the topics	Scientific papers, text books and Internet	X	X
General & Transferable skills	2.4.1- Communicate effectively.	D1	d1	Activity	Scientific papers, text books and Internet	X	X
	2.4.4- Use variable sources to get information and knowledge.	D4	d2	Activity	Scientific papers, text books and Internet	X	X

Biostatistics

Course specification of Biostatistics

A- Course specifications:

- Program on which the course is given: Pharmaceutical Sciences
- Major or Minor element of program: Major
- Department offering the program: pharmacology Dept
  Department offering the course: Pharmacology Dept.

- Date of specification approval: 2019

1- Basic information:

Title: **Biostatistics** Code: M111
Lectures: 2 hrs/week Credit hours: 2 hrs/week
Total: 2hrs/week

2- Overall aim of the course:

On completion of the course, the students will be able to design a good research experiment, statistically analyze the results of research experiments, and interpret the results of statistical analysis of experimental data using statistical computer programs.

3. Intended learning outcome s (ILOs) of Biostatistics:

Knowledge and Understanding	
a1	Identify the fundamentals and principles of Biostatistics.
a2	List the different methods of statistical analysis.
Intellectual skills	
b1	Analyze statistically and interpret data obtained from pharmacological experiments in different forms.
b2	Assess the types of decision errors that can occur during using statistical tests.
General and Transferable skills	
d1	Communicate effectively with others
d2	Develop IT skills

4. Course Content of Biostatistics:

Week number	Lecture contents (2hrs/week)
1	Computer-aided general Principle of biostatistics 1
2	Computer-aided General Principle of biostatistics 2
3	Computer-aided Presentation of data
4	Computer-aided Descriptive statistics
5	Computer-aided Measures of central tendency
6	Computer-aided Measures of variability
7	Computer-aided Normal frequency distribution curve
8	Probability
9	Comparing of two means **Activity**
10	Comparing of more than two means
11	Chi square test
12	Computer-aided Regression and correlation analysis

13	Complex analysis
14	Criteria of good experimental design
15	final exam

5- Teaching and Learning Methods:

- Lectures
- Self learning
- Computer statistical program training
- Open discussion

6- Student Assessment methods:

- Written exam to assess: a1, a2, b1 and b2.
- Oral exam to assess: a1, a2, b1, b2 and d1.
- Activity to assess: d1, d2

Assessment schedule:

Assessment (1): Activity	Week 9
Assessment (2): Written exam	Week 15
Assessment (3): oral exam	Week 15

Weighting of Assessment:

Assessment method	Marks	Percentage
• Activity	10	10 %
• Written exam	75	75 %
• oral exam	15	15 %
TOTAL	**100**	**100%**

1- References and books:

A-Scientific papers

B- Essential books:

- Danial W (1995). Biostatistics: A foundation for analysis in health science. (6th ed.) New York: John Wipij & sensing

C- Electronic resources

- Dom Spina (2003) Statistics Workshop distance learning material. British Pharmacological Society University of Manchester

Facilities required for teaching and learning:

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

- **Course Coordinators: Prof. Hany Elbassosy**

Matrix I of Biostatistics course

Week number	Course Contents	Knowledge & understanding		Intellectual skills		General & Transfer able skills	
		a1	**a2**	**b1**	**b2**	**d1**	**d2**
1	General principle of biostatistics 1	x	x				
2	General principle of biostatistics 2		x				
3	Presentation of data	x		X			
4	Descriptive statistics	x		X			x
5	Measures of central tendency	x					x
6	Measures of variability	x					x
7	Normal frequency distribution curve	x		X			x
8	Probability	x		X			x
9	Comparing of two means- Activity	x	x	X		X	x
10	Comparing of more than two means	x	x	X			x
11	Chi square test	x	x	X			x
12	Regression and correlation analysis	x	x	X			x
13	Complex analysis		x	X			x
14	Criteria of good experimental design				x		

Matrix II of Biostatistics

ARS		Program ILOs	Course ILOs	Course content	Source	Teaching and learning methods		Method of Assessment		
						Lectures	Self learning	Written exam	Oral exam	Activity
Knowledge and	2.1.1- Theories and fundamentals related to the field of learning as well as in related areas.	A3	a1	General principle of biostatistics 1- Presentation of data - Descriptive statistics - Measures of central tendency - Measures of variability - Normal frequency distribution curve - Probability - Comparing of two means - Comparing of more than two means - Chi square test - Regression and correlation analysis	Scientific papers, text books and Internet	X	X	x	x	

	2.1.5- Principles and the basics of quality in professional practice in the area of specialization.	A9	a2	General principle of biostatistics 1 - General principle of biostatistics 2	Scientific papers, text books and Internet	X	x	x	x	
Intellectual Skills	2.2.6- Plan to improve performance in the field of specialization.	B9	b1 b2	Presentation of data - Descriptive statistics - Normal frequency distribution curve - Probability - Comparing of two means - Comparing of more than two means - Chi square test - Regression and correlation analysis - Complex analysis Criteria of good experimental design	Scientific papers, text books and Internet	X	x	x	x	
	2.4.1- Communicate effectively.	D1	d1	Activities- Revision	Scientific papers, text books and Internet	x	x		x	x

General & Transferable	2.4.2- Effectively use information technology in professional practices	D2	d2	Activities- Revision	Scientific papers, text books and Internet	X	x		x	x

Drug interaction

Course Specification of Drug interaction

A- Course specifications:

- Program (s) on which the course is given: Master of Pharmaceutical Sciences
- Major or Minor element of program: Major

Department offering the program: pharmacology

Department offering the course: Pharmacology

Date of specification approval: 2019

B- Basic information:

Title: Drug interaction Code: -**ME6**

Credit Hours:

- Lectures : 4hrs/week
- Practical:---
- Tutorials: ---
- Total: 4hrs/week

C- Professional information:

1-Overall Aims of the Course:

On completion of the course, students will be able to describe the mechanisms of drug interactions , understand the clinical significance of interactions between drugs and demonstrate how to manage different types of drug interactions

2-Intended Learning Outcomes of Drug Interaction (ILOs):

Knowledge and Understanding	
a1	Describe the basic mechanisms of drug interactions
a2	Outline the clinical significance of drug interactions
a3	Enumerate the general methods for the management of drug interactions
Intellectual skills	
b1	Differentiate between adverse and beneficial interactions of drugs
b2	Suggest novel methods for the management of drug interactions
Transferable and general skills	
d1	Demonstrate time management skills
d2	Work effectively as a member of a team

D- Contents:

Week No.	Lecture (4 hrs/week)
1	Overview of drug interactions
2	Mechanisms of drug interactions
3	Management of drug interactions
4	-Drug-food and drug-herb interaction
5	- Drug interaction of antibiotics
6	- Drug interaction of CVS acting agents
7	case presentation (activity)
8	- Drug interaction of respiratory system –acting agents
9	- Drug interaction of CNS acting agents
10	- Drug interaction of CVS acting agents
11	- Drug interaction of GI tract acting agents
12	- Drug interaction of agents used for kidney disorders
13	- Drug interaction of endocrine system- acting agents
14	- Drug interaction of agents used for obesity and anemia
15	final exam

E- Teaching and Learning Methods:

- Lectures
- Self learning
- Open discussion

F- Student Assessment Methods:

1. Written exam to assess: a1, a2, a3, b1, b2, d1
2. Oral exam to assess: a1, a2, a3, b1, b2, d1
3. Activity a1, a2, a3, d1, d2

Assessment schedule:

Assessment (1): Activity	Week 7
Assessment (2): Written exam	Week 15
Assessment (4): Oral exam	Week 15

Weighting of Assessment

Assessment method	Marks	Percentage
Written exam	75	75%
Oral exam	15	15%
Activity	10	10%
TOTAL	100	100%

G- Facilities Required for Teaching and Learning:

Black (white) board, Data show.

H- List of References:

1- Essential books:

i- Richard A. Harvey, Michelle A. Clark, Lippincott's Illustrated Reviews Pharmacology 5th ed. Lippincott Williams & Wilkins, 2012

2- Recommended books:

i- H.P. Rang, M.M.Dale, J.M. Ritter& R.J. Flower ed. RANG & DALE Pharmacology 6th 2008 Churchill 2. Livingstone Elsevier London.

ii- Katzung, B.G., ed. Basic and Clinical Pharmacology. 9th ed. New York : McGraw Hill, 2006.

iii- Bennet P.N., and M.J. Brown, eds. Clinical Pharmacology. 10th ed. London : Churchil Livingstone, 2006.

iv- Hardman J.G., L.E. Limbrid, and A.G. Gilman, eds. Goodman & Gilman's the Pharmacological Basis of Therapeutics. 10th ed. New York : McGraw Hill, 2006.

v- Luellmann H., L. Hein, K. Mohr, and D. Bieger. Color Atlas of Pharmacology. 3rd ed. Stuttgart : Thieme, 2005.

vi- Brenner,G.M.andSteven,C.W.., Pharmacology,3rd ed.,2010

3- Periodicals and websites:

- British J Pharmacol,
- European J Pharmacol,
- Pharmacology,
- Pharmacology and Toxicology)
- Pubmed.com
- www.medconsult.com/www.pharmanet.com

Course Coordinators: **Ass.Prof. / Shaimaa El-Shazly**

Matrix I of Drug interaction course								
Course contents		ILOs for drug interaction course						
		knowledge & understanding			intellectual skills		Transferable and general skills	
Lectures		a1	a2	a3	b1	b2	d1	d2
1	Overview of drug interactions		x					
2	Mechanisms of drug interactions	x						
3	Management of drug interactions			x				
4	Drug-food interactions	x	x	x			x	
5	Drug-smoking interactions	x	x	x			x	
6	Drug-environment interactions	x	x	x			x	
7	Drug interactions of anti-infective agents	x	x	x			x	
8	Drug interactions of cardiovascular acting agents	x	x	x			x	
9	Drug interactions of CVS acting agents	x	x	x			x	
10	Drug interactions of CNS acting agents	x	x	x			x	
11	Drug interactions of endocrine acting agents	x	x	x				
12	Case studies				x	x	x	X
13	Case studies				x	x	x	X

		Matrix II of Drug interaction course								
Academic Reference Standards (ARS)		Program ILOs	Course ILOs	Course contents	Source	Teaching & learning methods		Method of assessment		
						Lecture	Self learning	Written exam	Oral exam	Activity
2.1.1	Theories and fundamentals related to the field of learning as well as in related areas.	A1	a1 a2 a3	All topics	Scientific papers, text books and Internet	x	x	x	x	
2.1.2	Mutual influence between professional practice and its impact on the environment.	A4								
2.2.3	Correlate and integrate different pharmaceutical knowledge to solve professional problems.	B3	b1, b2	Case study	Scientific papers, text books and Internet	x		x	x	
2.4.7	Manage time effectively	D8	d1	Case study	Scientific papers, text books and Internet	x			x	x

2.4.6	Work in a team and lead teams carrying out various professional tasks.	D6	d2	Case study	Scientific papers, text books and Internet	x			x	x

Drug-Induced Diseas

Course specification of Drug-Induced Diseases

A- Course specifications:

- Program on which the course is given: Master of Pharmaceutical Sciences
- Major or Minor element of program: Major
- Department offering the program: pharmacology Dept
- Department offering the course: Pharmacology Dept.
- Date of specification approval: 2019

1- Basic information:

Title: **Drug Induced Diseases** Code: ME7
Lectures: 4 hrs/week Credit hours: 4 hrs/week
Total: 4hrs/week

2- Overall aim of the course:

On completion of the course, the students will be able to define the mechanisms, symptoms and diagnosis of drug-induced diseases and possible preventative methods.

3. Intended learning outcome s (ILOs) of Drug Induced Disease:

Knowledge and Understanding	
a1	Explain the basics of drug kinetics, dynamics and adverse effects
a2	Identify common diseases induced by drugs and the associated risk factors.
Intellectual skills	
b1	Suggest possible ways to protect against or minimize some common drug-induced diseases.
b2	Specify the hazards of therapeutic regimens and how to properly select suitable regimens in different pathological conditions.
General and Transferable skills	
d1	Communicate effectively with others
d2	Retrieve information from different resources

4. Course Content of Drug Induced Disease:

1	Introduction to drug induced-diseases
2	Drug-induced hepatotoxicity (Toxic response of the liver and mechanism of toxicity)
3	Drug-induced hepatotoxicity (Diagnosis and management)
4	Drug-induced nephrotoxicity (Toxic response of the kidney and mechanism of toxicity)
5	Drug-induced nephrotoxicity (Diagnosis and management)
6	Drug-induced CVS diseases (Toxic response of the heart and vascular system)
7	Drug-induced CVS diseases (Mechanism of toxicity)
8	Drug-induced CVS diseases (Diagnosis and treatment)
9	Activity
10	Drug-induced CNS diseases (Structure and functions of brain blood barrier, toxic response of brain and spinal cord)

11	Drug-induced CNS diseases (Mechanism of toxicity)
12	Drug-induced CNS diseases (Diagnosis and treatment)
13	Presentations
14	Open discussion & revision
15	Final exam

5- Teaching and Learning Methods:

- Lectures
- Self learning
- Open discussion

6- Student Assessment methods:

- Written exam to assess: a1, a2, b1 and b2.
- Oral exam to assess: a1, a2, b1, b2, d1 and d2.
- Activity to assess: d1 and d2.

Assessment schedule:

Assessment (1): Activity	Week 9
Assessment (2): Written exam	Week 15
Assessment (3): oral exam	Week 15

Weighting of Assessment:

Assessment method	Marks	Percentage
• Activity	10	10 %
• Written exam	75	75 %
• oral exam	15	15 %
TOTAL	**100**	**100%**

7- References and books:

A-Scientific papers

B- Essential books:

- Basic and clinical Pharmacology; 10th Edition, Kantzung B.G McGraw Hill Medical Publishing Division 2007.
- Drug-Induced Diseases: Prevention, Detection, and Management, 2nd Edition, Tisdale J. and Miller D. American Society of Health-System Pharmacists 2010.

Facilities required for teaching and learning:

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

- **Course Coordinators: Prof. Dr. Ahmed Fahmy**

Matrix I of Drug Induced Disease course

Week number	Course Contents	Knowledge and understanding		Intellectual skills		General & Transferable skills	
		a1	a2	b1	b2	d1	d2
1	Introduction to drug induced-diseases	X					
2	Drug-induced hepatotoxicity (Toxic response of the liver and mechanism of toxicity)	X					
3	Drug-induced hepatotoxicity (Diagnosis and management)	X			X		
4	Drug-induced nephrotoxicity (Toxic response of the kidney and mechanism of toxicity)	X			X		
5	Drug-induced nephrotoxicity (Diagnosis and management)	X					
6	Drug-induced CVS diseases (Toxic response of the heart and vascular system)		X	X			
7	Drug-induced CVS diseases (Mechanism of toxicity)		X	X			
8	Drug-induced CVS diseases (Diagnosis and treatment)		X	X			
9	Activity		X	X		x	X
10	Drug-induced CNS diseases (Structure and functions of brain blood barrier, toxic response of brain and spinal cord)		X	X			
11	Drug-induced CNS diseases (Mechanism of toxicity)		X	X			
12	Drug-induced CNS diseases (Diagnosis and treatment)		X	X			
13	Presentations	X	X	X	X		
14	Open discussion & revision	X	X	X	X	x	X

Matrix II of Drug Induced Disease

ARS		Program ILOs	Course ILOs	Course content	Source	Teaching and learning methods		Method of Assessment		
						Lectures	Self-learning	Written exam	Oral exam	Activity
Knowledge and Understanding	2.1.1- Theories and fundamentals related to the field of learning as well as in related areas.	A1	a1 a2	Introduction to drug-induced disease Drug-induced hepatotoxicity 1 Drug-induced nephrotoxicity 1 Drug-induced 1 CVS toxicity Drug-induced 1 CNS toxicity	Scientific papers, text books and Internet	X	X	X	X	
Intellectual skills	2.2.2. Solve specified problems in the lack or missing of some information	B2	b1, b2	Drug-induced hepatotoxicity 2 Drug-induced nephrotoxicity 2 Drug-induced 3 CVS toxicity Drug-induced 3 CNS toxicity	Scientific papers, text books and Internet	X	X	X	X	

General & Transferable skills	2.4.1- Communicate effectively.	D1.	d1	Activity	Scientific papers, text books and Internet	X	X		X	X
	2.4.4- Use variable sources to get information and knowledge.	D4.	d2	Activity	Scientific papers, text books and Internet	X	X		X	X

Thesis Specification

Thesis of Master Degree

A- Thesis specifications:

- **Program on which the course is given:** Master of Pharmaceutical sciences (Pharmacology)
- **Major or Minor element of program:** Major
- **Department offering the program:** Pharmacology Dept.
- **Department offering the thesis:** Pharmacology Dept.
- **Date of specification approval:** Sept. 2019

1- Basic information:

Title: Master Thesis in Pharmacology
Credit hours: 30 hrs

2- Overall aim of the thesis:

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

- Design a scientific study to solve a scientific problem
- Collect all the previously published data to cover the scope of the problem
- Identify and perform different techniques and methods used in the experimental work according to the designed protocol
- Analyze the results of the study and interpret the obtained data
- Draw conclusions about the contribution to knowledge made by the study and evaluate whether these conclusions solve the scientific problem.

3- Intended learning outcome's (ILOs):

Knowledge and Understanding	
a1	Describe all required pharmacological knowledge related to main objectives of the thesis.
a2	Select the point of the thesis according to the problems present in the community.
a3	Update the information in the specified area of the work.
a4	Define any legal aspects related to the thesis work.
a5	Demonstrate GLP and quality assurance related to practical work of the thesis.
a6	Identify and apply scientific experimental ethics.
Intellectual skills	
b1	Analyze and interpret the experimental data in a suitable form to solve the suggested problem.
b2	Integrate all required knowledge to solve problems that may rise during practical work.
b3	Conduct a research project and write scientific reports.
b4	Manage risks and hazards related to professional practical area.
b5	Design a laboratory protocol for the work.
b6	Make decisions related to recent and future studies.
Professional and practical skills	
c1	Perform practical experiments related to the point understudy.
c2	Report the work in a written report.
c3	Asses used methods, tools and instruments in pharmacological research.
General and Transferable skills	
d1	Communicate effectively with all people related to the work.
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 pharmacological techniques that will be used during practical work and determined by the protocol. • Integrate different knowledge including (basic pharmacology, clinical pharmacology, and pathophysiology of diseases, biochemical basis, major concepts in anatomy and physiology, biostatistics, chemical analysis…….) to solve suggested problem. • Continuous evaluation to the thesis outcome according to the schedule.
2nd	• Master a wide range of pharmacological techniques either in vivo or in vitro.

	• Record vital data either by invasive or non-invasive techniques e.g. blood pressure, ECG…… • Perform basic surgical and anesthetic skills on experimental animals. • Identify pharmacological actions and toxicological profile of active principles. • Induction of some diseases in experimental animals (obesity, diabetes…….) • Separate biological samples and tissues (e.g. blood, plasma, csf, urine, kidney, liver……). • Operate scientific instruments according to instructions. • Evaluate and manage hazards (chemical and biological) throughout the whole practical work. • Organize the experimental work according to the designed protocol (either individual, parallel or sequential experiments) • Apply ethical recommendations during dealing with humans/ experimental animals. • Discuss any legal aspects related to the thesis work.
3rd	• Collect raw data from the designed model. • Interpret raw data to get valuable information. • Perform statistical analysis and biological 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 and with patients to collect case history and samples. • 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. • 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 and case studies
- Lab meetings
- Seminars
- Lab reports

6- References:

- Websites: Pubmed, Science direct, Weily interscience, high wire press, Ovid, Scopus.

Facilities required for:

1. **For practical work:** Western blot- ELISA plate reader- RT PCR- Fluorescent microscope- Spectroflorometer- Cryostat- Noninvasive blood pressure recorder

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Program Matrix of Master degree of Pharmacology and Toxicology 2018-2019

		Program ILOS																																		
		A1	A2	A3	A4	A5	A6	A7	A8	A9	A10	A11	B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	C1	C2	C3	C4	D1	D2	D3	D4	D5	D6	D7	D8	D9		
General courses	Molecular Biology	X				X											X													X			X		X		
	Physiology	X			X																	X					X			X							
	Biostatistics			X						X											X						X	X									
	Instrumental analysis		X								X									X						X		X			X	X					
	Biotechnology	X				X											X											X		X			X				
	Drug induced diseases	X												X													X			X							
	Drug interaction	X			X										X													X					X				
Special courses	Drug targeting	X					X							X														X					X				
	Advanced pharmacological techniques		X														X														X						
	Pathophysiology	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	X	X	X	**x**		

PhD Degree

Program Specification

Program Specification

A- Basic Information

1. **Program title:** PhD. Pharm. Sci Degree in **Pharmacology**
2. **Program type:** Single
3. **Faculty/ University:** Faculty of Pharmacy, Zagazig University
4. **Department:** Pharmacology and Toxicology
5. **Coordinator:** Prof. Dr. Ahmed Fahmy
6. **Date of program specification approval:** Sept. 2019
7. **Language of study:** English
8. **External Evaluator:** Prof. Dr. Sameh EL-Nabtiti
9. **Internal Evaluator:** Prof. Dr. Salah Ghareib
10. **Academic Reference Standards:**

a. The program ILOs were compared to the general guideline for postgraduate studies, 1st Edition, February 2009 issued by (NAQAA) (National Authority for Quality Assurance and Accreditation).

b. The program ILOs were compared to the PhD. Pharmaceutical Sciences, Specialization Pharmacology provided by College of Pharmacy and Health Sciences, Saint John's University, USA.

B- Professional Information

1- Program aims:

The Pharmacology PhD's program prepares the postgraduates to work in a multidisciplinary profession such as research institutes, private and public medical laboratories, universities, National Quality Control Centers (foods & drugs) and Ministry of Health.

Consistency of the program aims with the mission of Faculty of Pharmacy:

The faculty of Pharmacy, Zagazig University aims to provide the local and regional community with highly qualified, multidisciplinary and professional pharmacists with ethical values and able to participate in the development of drug industry and quality assurance as well as contribute to a distinguished health service to the society. This is achieved through developing and upgrading the academic programs, teaching and learning methods, supporting various student activities, developing the abilities of the staff members, their assistants and administrative members, enhancing the oriented applied and scientific research and providing the continuous pharmaceutical education.

PhD Graduate Attributes:

They should acquire the necessary attributes & skills in various Pharmacology aspects including the following:

1- Discuss in detail management of chronic diseases
2- Recognize the importance of herbs and natural products and their ability to treat different diseases
3- Mention the application of advanced techniques and trends in pharmacology
4- Evaluate the obtained information from different sources related to pharmacology
5- Have the experience to establish and/ or modify some of the procedures used in pharmacology
6- Respect Moral and ethical principles for professional practice in the area of specialty

7- Analyze, evaluate information and solve professional problem
8- Communicate and work effectively in a team

2-Intended Learning Outcomes (ILOs):

The Program aimed to provide excellent opportunities for post graduate students to demonstrate knowledge and understanding qualities and develop skills appropriate for **Pharmacology** PhD of sciences degree.

2-1- Knowledge and Understanding:

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

A.1-Describe theoretical concepts and recent advances in the field of pharmacology, pharmacology of natural products and management of chronic diseases.

A.2-Outline in detail the pathophysiology of chronic diseases and related topics

A.3- Discuss advanced trends in Pharmacology and their appropriate applications within the field of study

A.4- Illustrate basic principles of quality assurance in pharmacological researches.

A.5- Describe the impact of Pharmacology of natural products and related sciences on human health and society.

A.6- Illustrate the influence of chronic disease on the health of individuals in society and ways of their management

A.7- Outline the ethical guideline in reporting data, citing literature and publishing a scientific report in international journals.

2-2 - Intellectual Skills:

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

B.1-Interpret and evaluate the suitability, accuracy, and reliability of information from different sources.

B.2-Select proper methods of management of chronic diseases using drugs and/or natural products.

B3. Integrate accumulated knowledge and skills in pharmacological research to suggest solutions for research and professional problems.

B.4. Design and carry out an original research project .

B5. Write up original research in the style of published research or a paper.

B.6. Select appropriate tests for detecting patients at risk for specific diseases or in the early stage of disease.

B.7. Improve the performance in the field of pharmacology through modifying the process or procedure used and organize a plan to improve the management of diseases using natural products.

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- Carry out all laboratory procedures and techniques required in the field of study.

C.2- Write and critically evaluate professional reports.

C.3- Evaluate the suitability of methods and instruments used during research.

C4- Use research tools and equipment relevant to pharmacological research including, ELSIA, PCR, Western blotting, Immunohistochemistry and others with application of good laboratory practice

C5- Elaborate different strategies to enhance practical work

2-4 - General and Transferable Skills:

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

D.1- Adopt verbal and non-verbal communication

D.2-Be competent in the use of computers for data analysis, word-processing, and production of thesis-quality graphics.

D.3- Interact effectively with professional colleagues and assist in their learning and professional development

D.4-Recognize self-limitations and areas for improvement and seek for continuous learning.

D.5-Gather, summarizes, and organizes information from different sources.

D.6-Share experiences with members of the team and encourage participation.

D.7- Direct scientific meetings and to manage time effectively

3- Academic Standards:

a. The program ILOs were compared to the general guideline for postgraduate studies, 1st Edition, February 2009 issued by (NAQAA) (National Authority for Quality Assurance and Accreditation).

b. The program ILOs were compared to the PhD. Pharmaceutical Sciences, Specialization Pharmacology provided by College of Pharmacy and Health Sciences, Saint John's University, USA.

Matrix1: Comparison of graduate attributes of Pharmacology and Toxicology PhD. program with the Academic Reference Standards {ARS, 2009} developed by NAQAAE

Attributes of the graduates (ARS, 2009)	Attributes of the graduates (PhD. Degree in Pharmacology and Toxicology)
1.Apply the specialized knowledge he has acquired in his professional practice	1. Discuss in detail management of chronic diseases 2. Recognize the importance of herbs and natural products and their ability to treat different diseases 3. Mention the application of advanced techniques and trends in pharmacology
2. Identify and solve professional problems 4. Use technology effectively in his professional practice 6. Use available resources efficiently	5. Have the experience to establish and/ or modify some of the procedures used in pharmacology 7. Analyze, evaluate information and solve professional problems
5. Take decisions using available information	4. Evaluate the obtained information from different sources related to pharmacology
3.Show good communication and leadership skills	8. Communicate and work effectively in a team

7. Aware of his role in community service and development	6. Respect Moral and ethical principles for professional practice in the area of specialty

Matrix 2: Comparison between PhD degree program ILOs and the Academic Reference Standards

ARS vs. Program ILOs of PhD in Pharmacology		
	ARS	Program ILOs
Knowledge and Understanding	2.1.1- Fundamentals and in-depth knowledge and basic theories in the field of specialty and the closely related areas of pharmaceutical sciences.	A.1-Describe theoretical concepts and recent advances in the field of pharmacology, pharmacology of natural products and management of chronic diseases. A.2- Outline in detail the pathophysiology of chronic diseases and related topics
	2.1.2- Fundamentals, methods, techniques, tools and ethics of scientific research.	A.3- Discuss advanced trends in Pharmacology and their appropriate applications within the field of study
	2.1.3- The ethical and legal principles in pharmacy and academic practices.	A.4- Outline the ethical guideline in reporting data, citing literature and publishing a scientific reports in international journals.
	2.1.4- The principles and bases of quality assurance in professional practice in the field of specialization.	A.5- Illustrate basic principles of quality assurance in pharmacological researches.
	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.6- Describe the impact of Pharmacology of natural products and related sciences on human health and society. A.7- Illustrate the influence of chronic disease on the health of individuals in society and ways of their management. A.8- Describe the impact of new trends of pharmacology (Biased agonist and gene therapy).

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-Interpret and evaluate the suitability, accuracy, and reliability of information from different sources.
	2.2.2- Propose solutions to specified problems in the light of the available data (information).	B.2-Select proper methods of management of chronic diseases using drugs and/or natural products.
	2.2.3- Conduct research studies that add to the current knowledge.	B3. Integrate accumulated knowledge and skills in pharmacological research to suggest solutions for research and professional problems.
	2.2.4- Formulate scientific papers.	B.4. Design and carry out an original research project . B5. Write up original research in the style of published research or a paper.
	2.2.5- Asses hazards and risks in professional practice in his \ her areas of specialization.	B.6. Select appropriate tests for detecting patients at risk for specific diseases or in the early stage of disease.
	2.2.6- Plan to improve performance in the pharmaceutical area of interest.	B.7. Improve the performance in the field of pharmacology through modifying the process or procedure used and organize a plan to improve the management of diseases using natural products.
	2.2.7- Take Professional decisions and bears responsibility in wide array of pharmaceutical fields.	B3. Integrate accumulated knowledge and skills in pharmacological research to suggest solutions for research and professional problems.
	2.2.8- Be creative and innovative.	
	2.2.9- Manage discussions and arguments based on evidence and logic.	
Professional and Practical Skills	2.3.1- Master basic and modern professional skills in the area of specialization.	C.1- Carry out all laboratory procedures and techniques required in the field of study.
	2.3.2- Write and critically evaluate professional reports.	C.2- Write and critically evaluate professional reports.

	2.3.3- Evaluate and develop methods and tools existing in the area of specialization.	C.3- Evaluate the suitability of methods and instruments used during research.
	2.3.4- Properly use technological means in abetter professional practice.	C4- Use research tools and equipment relevant to pharmacological research including, ELSIA, PCR, Western blotting, Immunohistochemistry and others with application of good laboratory practice
	2.3.5- Plan to improve professional practice and to improve the performance of other scholars.	C5- Elaborate different strategies to enhance practical work
General and Transferable Skills	2.4.1- Effective Communication in its different forms.	D.1- Adopt verbal and non-verbal communication
	2.4.2- Effective use of information technologies to improve professional practices.	D.2-Be competent in the use of computers for data analysis, word-processing, and production of thesis-quality graphics
	2.4.3- Help others to learn and evaluate their performance.	D.3- Interact effectively with professional colleagues and assist in their learning and professional development
	2.4.4- Self-assessment and continuous learning.	D.4-Recognize self-limitations and areas for improvement and seek for continuous learning
	2.4.5- Use various sources to get information and knowledge.	D.5-Gather, summarizes, and organizes information from different sources
	2.4.6- Work as a member and lead a team of workers.	D.6-Share experiences with members of the team and encourage participation
	2.4.7- Direct scientific meetings and to manage time effectively.	D.7- Direct scientific meetings and to manage time effectively

Matrix 3: Comparison of **ILOS of** Pharmacology and Toxicology PhD. program with the PhD. Pharmaceutical Sciences, Specialization Pharmacology program provided by College of Pharmacy and Health Sciences, Saint John's University, USA

College of Pharmacy and Health Sciences, Saint John's University, USA	**Program ILOs**
1. Demonstrate basic knowledge of biomedical sciences (Pharmacology) 2. Demonstrate competency in the biomedical sciences (Pharmacology)	A.1-Describe theoretical concepts and recent advances in the field of pharmacology, pharmacology of natural products and management of chronic diseases. A.2- Outline in detail the pathophysiology of chronic diseases and related topics A.3- Discuss advanced trends in Pharmacology and their appropriate applications within the field of study A.5- Illustrate basic principles of quality assurance in pharmacological researches A.6- Describe the impact of Pharmacology of natural products and related sciences on human health and society. A.7- Illustrate the influence of chronic disease on the health of individuals in society and ways of their management. A.8- Describe the impact of new trends of pharmacology (Biased agonist and gene therapy).
3. Illustrate and apply the ethical principles of a laboratory professional	A.4- Outline the ethical guideline in reporting data, citing literature and publishing a scientific report in international journals.

4. Demonstrate effective oral and written skills	B5. Write up original research in the style of published research or a paper. C.2- Write and critically evaluate professional reports. D.1- Adopt verbal and non-verbal communication D.2-Be competent in the use of computers for data analysis, word-processing, and production of thesis-quality graphics D.3- Interact effectively with professional colleagues and assist in their learning and professional development D.6-Share experiences with members of the team and encourage participation D.7- Direct scientific meetings and to manage time effectively
5. Satisfy the objectives of the professional	B.1-Interpret and evaluate the suitability, accuracy, and reliability of information from different sources. B.2-Select proper methods of management of chronic diseases using drugs and/or natural products. B3. Integrate accumulated knowledge and skills in pharmacological research to suggest solutions for research and professional problems. B.7. Improve the performance in the field of pharmacology through modifying the process or procedure used and organize a plan to improve the management of diseases using natural products. D.4-Recognize self-limitations and areas for improvement and seek for continuous learning

	D.5-Gather, summarizes, and organizes information from different sources
6. Demonstrate accuracy and precision in the performance of laboratory analyses	B.4. Design and carry out an original research project. B.6. Select appropriate tests for detecting patients at risk for specific diseases or in the early stage of disease. C.1- Carry out all laboratory procedures and techniques required in the field of study. C.3- Evaluate the suitability of methods and instruments used during research. C4- Use research tools and equipment relevant to pharmacological research including, ELSIA, PCR, Western blotting, Immunohistochemistry and others with application of good laboratory practice C5- Elaborate different strategies to enhance practical work

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:		
Lsp4	Advanced trends in pharmacology	4	A.1, A.3, A.8, B.1, B.7, D.4, D.5
Lsp5	Management of chronic diseases	4	A.1, A.7, B.1, B.2, D.1, D.5
Lsp6	Pharmacology of natural products	4	A.1, A.6, B.2, B.7 D.2, D.6
	Thesis	30	A.1, A.2, A.3, A4, A.5, A.6, A7, A8, B.1, B.2, B.3, B.4, B.5, B.6, B.7, C.1, C.2, C.3, C.4, C.5, D.1, D.2, D.3, D.4, D.5, D.6, D.7

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 must 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 can 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. Salah Ghareib	Program evaluation Courses evaluation	Program report Courses report
External evaluator: Professor Dr. Sameh Elnabtiti	Program evaluation Courses evaluation	Program report Courses report
Other methods	Matrix with ARS Questionnaires	The Matrix Results of the questionnaires

Program coordinator

Prof. Dr. Ahmed Fahmy

Head of Department:

Prof. Dr. Mona Fouad

Management of Chronic Diseases

Course specification of Management of Chronic Diseases

A- Course specifications:

- Program on which the course is given: PhD in Pharmaceutical Sciences
- Major or Minor element of program: Major
- Department offering the program: Pharmacology Dept.
- Department offering the course: Pharmacology Dept.
- Date of specification approval: 2019

1- Basic information:

Lsp5 Code: Title: **Management of Chronic Diseases**
Lectures: 4 hrs/week Credit hours: 4 hrs/week
Total: 4hrs/week

2- Overall aim of the course:

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

- Discuss in detail chronic diseases.
- Manage chronic diseases by all possible means.

3. Intended learning outcome s (ILOs) of Management of Chronic Diseases:

Knowledge and Understanding	
a1	Describe the principles of chronic diseases and related topics.
a2	Mention the influence of chronic diseases on the health of individuals in society and ways of their management
Intellectual skills	
b1	Analyze and evaluate data regarding symptoms and signs of chronic diseases in order to identify different diseases.
b2	Select proper methods of management of chronic diseases according to available information about the disease.
General and Transferable skills	

d1	Develop verbal and non-verbal communication.
d2	Gather, summarize, and organize information from different sources.

4. Course Content of Management of Chronic Diseases:

Week number	Lecture contents (4hrs/week)
1	Management of Metabolic syndrome-1
2	Management of Metabolic syndrome-2
3	Management of Metabolic syndrome-3
4	Management of Metabolic syndrome-4
5	Management of Metabolic syndrome-5
6	Management of Metabolic syndrome-6
7	Activity
8	Management of cardiovascular disorders-1
9	Management of cardiovascular disorders-2
10	Management of cardiovascular disorders-3
11	Management of cardiovascular disorders-4
12	Management of cardiovascular disorders-5
13	Management of cardiovascular disorders-6
14	Activity
15	Final exam

5- Teaching and Learning Methods:

- Lectures
- Self-learning
- Open discussion

6- Student Assessment methods:

- Written exam to assess: a1, a2, b1 and b2.
- Oral exam to assess: a1, a2, b1, b2.
- Activity to assess: d1 and d2

Assessment schedule:

Assessment (1): Activity	Week 7 and 14
Assessment (2): Written exam	Week 15
Assessment (3): oral exam	Week 15

Weighting of Assessment:

Assessment method	Marks	Percentage
• Activity	10	10 %
• Written exam	75	75 %
• oral exam	15	15 %
TOTAL	**100**	**100%**

7- References and books:

A-Scientific papers

B- Essential books:

- Laurence L. Brunton, Bruce A. Chabner, Björn C. KnollmanninGoodman and Gilman's: The pharmacological basics of therapeutics. McGraw-Hill Professional; 12 edition (December 20, 2010)
- Basic & Clinical Pharmacology. Katzung B, Masters S and Trevor A (eds.). 12th Edition McGraw-Hill, Appleton & Lange, San Mateo, CA
- Textbook of therapeutics: Drug and disease management. Helms R, Quan D, Herfindal E and Gourley D (eds.).
- Egyptian knowledge bank (EKB).
- Pubmed.

Facilities required for teaching and learning:

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

Course coordinator : Prof. Dr. Mohammed Abd EL-Aal

Head of department: Prof.Dr. Mona Fouad

- **Date:**

Matrix I of Management of Chronic Diseases course							
Week number	Course Contents	Knowledge and understanding		Intellectual skills		General & Transferable skills	
		a1	**a2**	**b1**	**b2**	**d1**	**d2**
1	Management of Metabolic syndrome-1	X	X	X	X		
2	Management of Metabolic syndrome-2	X	X	X	X		
3	Management of Metabolic syndrome-3	X	X	X	X		
4	Management of Metabolic syndrome-4	X	X	X	X		
5	Management of Metabolic syndrome-5	X	X	X	X		
6	Management of Metabolic syndrome-6	X	X	X	X		
7	Activity					X	X
8	Management of cardiovascular disorders-1	X	X	X	X		
9	Management of cardiovascular disorders-2	X	X	X	X		
10	Management of cardiovascular disorders-3	X	X	X	X		
11	Management of cardiovascular disorders-4	X	X	X	X		
12	Management of cardiovascular disorders-5	X	X	X	X		
13	Management of cardiovascular disorders-6	X	X	X	X		
14	Activity					X	X
15	Final exam	X	X	X	X		

Matrix II of Management of Chronic Diseases

ARS		Program ILOs	Course ILOs	Course content	Source	Teaching and learning methods		Method of Assessment		
						Lectures	Self-learning	Written exam	Oral exam	Activity
Knowledge and Understanding	2.1.1- Fundamentals and in-depth knowledge and basic theories in the field of specialty and the closely related areas of pharmaceutical sciences.	A.1-Describe theoretical concepts and recent advances in the field of pharmacology, pharmacology of natural products and management of chronic diseases.	a1	Management of metabolic syndrome and cardiovascular disorders	Scientific papers, text books and Internet	x	X	x	X	
	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.7- Illustrate the influence of chronic disease on the health of individuals in society and ways of their management.	a2	Management of metabolic syndrome and cardiovascular disorders	Scientific papers, text books and Internet	x	x	x	X	

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-Interpret and evaluate the suitability, accuracy, and reliability of information from different sources.	b1	Management of metabolic syndrome and cardiovascular disorders	Scientific papers, text books and Internet	x	x	x	X	
	2.2.2- Propose solutions to specified problems in the light of the available data (information).	B.2-Select proper methods of management of chronic diseases using drugs and/or natural products.	b2	Management of metabolic syndrome and cardiovascular disorders	Scientific papers, text books and Internet	x	x	x	X	
General & Transferable	2.4.1- Effective Communication in its different forms.	D.1-Adopt verbal and non-verbal communication.	d1	Activity	Scientific papers, text books and Internet		x			x
	2.4.5- Use various sources to get information and knowledge.	D.5-Gather, summarize, and organize information from different sources.	d2	Activity	Scientific papers, text books and Internet		x			x

Pharmacology of Natural Products

Course specification of Pharmacology of Natural Products

A- Course specifications:

- Program on which the course is given: PhD in Pharmaceutical Sciences (Pharmacology and toxicology)
- Major or Minor element of program: Major
- Department offering the program: Pharmacology and toxicology Dept.
- Department offering the course: Pharmacology and toxicology Dept.
- Date of specification approval: 2019

1- Basic information:

Title: **Pharmacology of Natural Products** Code: LSP6
Lectures: 4 hrs/week Credit hours: 4 hrs/week
Total: 4hrs/week

2- Overall aim of the course:

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

- Understand the importance of herbs and natural products.
- Figure out the ability of herbs and natural products to treat different diseases.

3. Intended learning outcome s (ILOs) of Pharmacology of Natural Products:

Knowledge and Understanding	
a1	Illustrate principles of pharmacology of natural products.
a2	Demonstrate the mechanism of action of different types of natural products.
Intellectual skills	
b1	Select the right treatments of specified diseases using natural products.
b2	Organize a plan to improve the performance in the field of pharmacology through modifying the process or procedure used.

General and Transferable skills	
d1	Use new technology tools in learning and research
d2	Utilize team work skill in practice

4. Course Content of Pharmacology of Natural Products:

Week number	Lecture contents (4hrs/week)
1	Anti-diabetic natural products-1
2	Anti-diabetic natural products-2
3	Anti-hypertensive natural products-1
4	Anti-hypertensive natural products-2
5	Anti-inflammatory natural products-1
6	Anti-inflammatory natural products-2
7	Anti-cancer natural products-1
8	Anti-cancer natural products-2
9	Anti-depressants natural products-1 Activity
10	Anti-depressants natural products-2
11	Analgesic natural products-1
12	Analgesic natural products-2
13	Diuretic natural products
14	Cardiotonic natural products and hepato-protective natural products
15	Final exam

5- Teaching and Learning Methods:

- Lectures
- Self-learning
- Open discussion

6- Student Assessment methods:

- Written exam to assess: a1, a2, b1 and b2.
- Oral exam to assess: a1, a2, b1 and b2.
- Activity to assess: d1 and d2

Assessment schedule:

Assessment (1): Activity	Week 9
Assessment (2): Written exam	Week 15
Assessment (3): oral exam	Week 15

Weighting of Assessment:

Assessment method	Marks	Percentage
• Activity	10	10 %
• Written exam	75	75 %
• oral exam	15	15 %
TOTAL	**100**	**100%**

7- References and books:

A- Review articles of highly appreciated Pharmacology Journals

B- Essential books:

1-Comprehensive natural products II, David J. Newman, Gordon M. Cragg, volume 2, 2010

2-Mann, J.; Davidson, RS; Hobbs, JB; Banthorpe, DV; Harborne, JB Book Natural products: their chemistry. "LongmanScientific&Technical, Harlow, UK,1994.

C- Websites

- Egyptian knowledge bank (EKB)
- Pubmed

Facilities required for teaching and learning:

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

- **Course coordinator**
- **Prof. Dr. Ahmed Fahmy**
- **Head of Department**

  Prof. Dr. Mona Fouad
- **Date: -**

Matrix I of Pharmacology of Natural Products course

Week number	Course Contents	Knowledge and understanding		Intellectual skills		General & Transferable skills	
		a1	**a2**	**b1**	**b2**	**d1**	**d2**
1	Anti-diabetic natural products-1	X	x	X	x		
2	Anti-diabetic natural products-2	X	x	X	x		
3	Anti-hypertensive natural products-1	X	x	X	x		
4	Anti-hypertensive natural products-2	X	x	X	x		
5	Anti-inflammatory natural products-1	X	x	X	x		
6	Anti-inflammatory natural products-2	X	x	X	x		
7	Anti-cancer natural products-1	X	x	X	x		
8	Anti-cancer natural products-2	X	x	X	x		
9	Anti-depressants natural products-1-Activity	X	x	X	x	x	X
10	Anti-depressants natural products-2	X	x	X	x		
11	Analgesic natural products-1	X	x	X	x		
12	Analgesic natural products-2	X	x	X	x		
13	Diuretic natural products	X	x	X	x		
14	Cardiotonic natural products and hepato-potective natural products	X	x	X	x		
15	Final exam	X	x	X	x		

Matrix II of Pharmacology of Natural Products

ARS		Program ILOs	Course ILOs	Course content	Source	Teaching and learning methods		Method of Assessment		
						Lectures	Self-learning	Written exam	Oral exam	Activity
Knowledge and Understanding	2.1.1- Fundamentals and in-depth knowledge and basic theories in the field of specialty and the closely related areas of pharmaceutical sciences.	A.1-Describe theoretical concepts and recent advances in the field of pharmacology, pharmacology of natural products and management of chronic diseases.	a1	Anti- diabetic natural products- Anti-hypertensive natural products- Anti-inflammatory natural products- Anti- cancer natural products- Anti- depressant natural products- Diuretic natural products- cardio tonic natural products- Hepatoprotective natural products	Scientific papers, text books and Internet	X	x	X	x	

	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.6- Describe the impact of Pharmacology of natural products and related sciences on human health and society	a2	Anti- diabetic natural products- Anti-inflammatory natural products 1- Anti-depressant natural products 2	Scientific papers, text books and Internet	X	x	X	x	
Intellectual Skills	2.2.2- Propose solutions to specified problems in the light of the available data (information) .	B.2-Select proper methods of management of chronic diseases using drugs and/or natural products.	b1	Anti-inflammatory natural products 2- Anti-depressant natural products- Hepatoprotective natural products	Scientific papers, text books and Internet	X	x	X	x	
	2.2.6- Plan to improve performance in the pharmaceutical area of interest.	B.7. Improve the performance in the field of pharmacology through modifying the process or procedure used	b2	Analgesic natural products	Scientific papers, text books and Internet	X	x	X	x	

		and organize a plan to improve the management of diseases using natural products.								
General & Transferable Skills	2.4.2- Effective use of information technologies to improve professional practices.	D.2-Be competent in the use of computers for data analysis, word-processing, and production of thesis-quality graphics.	d1	Activity	Scientific papers, text books and Internet		X			x
	2.4.6- Work as a member and lead a team of workers	D.6-Share experiences with members of the team and encourage participation	d2	Activity	Scientific papers, text books and Internet		X			x

Advanced Trends in Pharmacology

Course specification of Advanced Trends in Pharmacology

A- Course specifications:

- Program on which the course is given: PhD in Pharmaceutical Sciences (Pharmacology and toxicology)
- Major or Minor element of program: Major
- Department offering the program: Pharmacology and toxicology Dept.
- Department offering the course: Pharmacology and toxicology Dept.
- Date of specification approval: 2019

1- Basic information:

Lsp4 Code: Title: **Advanced Trends in Pharmacology**
Lectures: 4 hrs/week Credit hours: 4 hrs/week
Total: 4hrs/week

2- Overall aim of the course:

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

1- Outline the new pharmacological tools against different diseases.
2- Identify the therapeutic benefits of new pharmacological tools over traditional tools.
3- Apply the new pharmacological tools on the challenging diseases.

3. Intended learning outcome s (ILOs) of Advanced Trends in Pharmacology:

Knowledge and Understanding	
a1	Describe recent trends in pharmacology including biased agonists and gene therapy.
a2	Mention the application of advanced techniques and trends in pharmacology (biased agonists and gene therapy).
a3	Discuss the impact of the new pharmacological interventions on human health and society
Intellectual skills	

b1	Evaluate information from different sources related to biased agonists and gene therapy.
b2	Design experimental studies in the field of biased agonists and gene therapy.
General and Transferable skills	
d1	Recognize self-limitations and areas for improvement and seek for continuous learning.
d2	Gather, summarizes, and organizes information for different sources.

4. Course Content of Advanced Trends in Pharmacology:

Week number	Lecture contents (4hrs/week)
1	Biased agonists -1
2	Biased agonists -2
3	Biased agonists -3
4	Biased agonists -4
5	Biased agonists -5
6	Biased agonists -6
7	Biased agonists -7 **, Activity**
8	Gene therapy -1
9	Gene therapy -2
10	Gene therapy -3
11	Gene therapy -4
12	Gene therapy -5
13	Gene therapy -6
14	Gene therapy -7
15	Final exam

5- Teaching and Learning Methods:

- Lectures
- Self-learning
- Open discussion

6- Student Assessment methods:

- Written exam to assess: a1, a2, a3, b1 and b2
- Oral exam to assess: a1, a2, a3, b1and b2
- Activity to assess: d1 and d2

Assessment schedule:

Assessment (1): Activity	Week 7
Assessment (2): Written exam	Week 15
Assessment (3): oral exam	Week 15

Weighting of Assessment:

Assessment method	Marks	Percentage
• Activity	10	10 %
• Written exam	75	75 %
• oral exam	15	15 %
• **Total**	100	100%

7- References and books:

A-Review articles of highly appreciated Pharmacology Journals

B- Essential books:

Manual of pharmacology and therapeutics: Goodman & Gilman's, 2008, McGraw-Hill.

C- Websites

- Egyptian knowledge bank (EKB)
- Pubmed

Facilities required for teaching and learning:

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

• Course coordinator

Prof. Dr/ Ahmed Fahmy

• Head of department:

Prof. Dr/ Mona Fouad

Date: -

Matrix I of Advanced Trends in Pharmacology course								
Week number	Course Contents	Knowledge and understanding			Intellectual skills		General & Transferable skills	
		a1	**a2**	**a3**	**b1**	**b2**	**d1**	**d2**
1	Biased agonists - 1	x	x	x	x	x		
2	Biased agonists - 2	x	x	x	x	x		
3	Biased agonists - 3	x	x	x	x	x		
4	Biased agonists - 4	x	x	x	x	x		
5	Biased agonists - 5	x	x	x	x	x		
6	Biased agonists - 6	x	x	x	x	x		
7	Biased agonists - 7 **Activity**	x	x	x	x	x	X	X
8	Gene therapy -1	x	x	x	x	x		
9	Gene therapy -2	x	x	x	x	x		
10	Gene therapy -3	x	x	x	x	x		
11	Gene therapy -4	x	x	x	x	x		
12	Gene therapy -5	x	x	x	x	x		
13	Gene therapy -6	x	x	x	x	x		
14	Gene therapy -7	x	x	x	x	x		
15	Final exam	x	x	x	x	x		

Matrix II of Advanced Trends in Pharmacology

ARS		Program ILOs	Course ILOs	Course content	Source	Teaching and learning methods		Method of Assessment		
						Lectures	Self-learning	Written exam	Oral exam	Activity
Knowledge and Understanding	2.1.1- Fundamentals and in-depth knowledge and basic theories in the field of specialty and the closely related areas of pharmaceutical sciences.	A.1-Describe theoretical concepts and recent advances in the field of pharmacology, pharmacology of natural products and management of chronic diseases.	a1	Biased agonists and gene therapy	Scientific papers, text books and Internet	X	X	x	X	
	2.1.2- Fundamentals, methods, techniques, tools and ethics of scientific research.	A.3- Discuss advanced trends in Pharmacology and their appropriate applications within the field of study.	a2	Biased agonists and gene therapy	Scientific papers, text books and Internet	X	X	x	X	

	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-Describe the impact of new trends of pharmacology (Biased agonist and gene therapy).	a3	Biased agonists and gene therapy	Scientific papers, text books and Internet	X	X	x	X	
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-Interpret and evaluate the suitability, accuracy, and reliability of information from different sources.	b1	Biased agonists and gene therapy	Scientific papers, text books and Internet	X	X	x	X	
	2.2.6- Plan to improve performance in the pharmaceutical area of interest.	B.7. Improve the performance in the field of pharmacology through modifying the process or procedure used and organize a plan to improve the management of diseases using natural products.	b2	Biased agonists and gene therapy	Scientific papers, text books and Internet	X	X	x	X	

General and Transferable Skills	2.4.4- Self-assessment and continuous learning.	D.4-Recognize self-limitations and areas for improvement and seek for continuous learning.	d1	Activity	Scientific papers, text books and Internet		X			x
	2.4.5- Use various sources to get information and knowledge.	D.5-Gather, summarizes, and organizes information from different sources.	d2	Activity	Scientific papers, text books and Internet		X			x

Thesis Specification

Thesis Specification of PhD Degree

A- Course specifications:

- **Program on which the course is given:** PhD of Pharmaceutical sciences (Pharmacology)
- **Major or Minor element of program:** Major
- **Department offering the program:** Pharmacology and Toxicology Dept.
- **Department offering the thesis:** Pharmacology and Toxicology Dept.
- **Date of specification approval:** Sept. 2019

1- Basic information:

Title: PhD Thesis in Pharmacology
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
- Deign a research plan
- Derive and present the results of the study from the data collected
- Analyze the results of the study in the light of prior knowledge
- 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
- Determine the scope of the future studies in his/her field

3- Intended learning outcome's (ILOs):

Knowledge and Understanding	
a1	Illustrate fundamentals and advanced knowledge in the field of pharmacology that help to better Discuss 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	Define and apply quality bases during practical work.
a5	Describe the purpose of the research work and its impact on the community and human health.
Intellectual skills	
b1	Interpret and evaluate the suitability, accuracy, and reliability of information obtained from the thesis.
b2	Propose a solution to the point understudy depending on available data.
b3	Plan the research to add to the area of study.
b4	Develop writing skills such as clarity and presenting results to formulate scientific papers.
b5	Manage risks and hazards related to professional practical area.
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	Construct coherent arguments and articulate ideas clearly to a range of audiences, formally and informally through a variety of techniques.
Professional and practical skills	
c1	Perform practical experiments related to the point understudy.
c2	Report the work in a written report.
c3	Asses used methods, tools and instruments in pharmacological research.
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 pharmacological techniques that will be used during practical work and determined by the protocol. • Integrate different knowledge including (basic pharmacology, clinical pharmacology, and pathophysiology of diseases, biochemical basis, major concepts in anatomy and physiology, biostatistics, chemical analysis…….) to solve suggested problem. • Continuous evaluation to the thesis outcome according to the schedule.
2nd	• Master a wide range of pharmacological techniques either in vivo or in vitro.

	• Record vital data either by invasive or non-invasive techniques e.g. blood pressure, ECG…… • Perform basic surgical and anesthetic skills on experimental animals. • Identify pharmacological actions and toxicological profile of active principles. • Induction of some diseases in experimental animals (obesity, diabetes…….) • Separate biological samples and tissues (e.g. blood, plasma, csf, urine, kidney, liver……). • Operate scientific instruments according to instructions. • Evaluate and manage hazards (chemical and biological) throughout the whole practical work. • Organize the experimental work according to the designed protocol (either individual, parallel or sequential experiments) • Modify methods and experiments used during practical work. • Apply ethical recommendations during dealing with humans/ experimental animals. • Discuss any legal aspects related to the thesis work.
3rd	• Collect raw data from the designed model. • Interpret raw data to get valuable information. • Perform statistical analysis and biological 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 and with patients to collect case history and samples. • 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. • 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 and case studies
- Lab meeting
- Seminar
- Present report

6- References:

- **Websites:** Pubmed, Science direct, Weilyinterscience, High wire press, Scopus, Ovid.

Facilities required for:

2. **For practical work:** RT PCR- Fluorescent microscope- Spectroflorometer- Cryostat- Non-invasive blood pressure recorder, Four channel Lab Chart 7, Langendorff apparatus

		PhD of Pharmacology and Toxicology																								
Program Courses			**Program intended learning outcomes**																							
		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**	**C1**	**C2**	**C3**	**C4**	**C5**	**D1**	**D2**	**D3**	**D4**	**D5**	**D6**	**D7**
Special courses	**Advanced trends in pharmacology**	√		√					√	√						√									√	√		
	Management of chronic diseases	√						√		√	√											√				√		
	Pharmacology of natural products	√					√				√					√							√				√	
Thesis		√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√