



Zagazig University
Faculty of Pharmacy
Biochemistry Department

Program and Course Specifications
Master Degree

Master Degree

Program Specification

Program Specification

A- Basic Information

- 1- **Program title:** M.Pharm. Sci. Degree in **Biochemistry**
- 2- **Program type:** Single
- 3- **Faculty/ University:** Faculty of Pharmacy, Zagazig University
- 4- **Department:** Biochemistry
- 5- **Coordinator:** Assis. Prof./ Nahla Younis
- 6- **Date of program specification approval:** 2019
- 7- **Teaching language:** English
8. **External Evaluator:** Prof. Ola Elsayed
9. **Internal Evaluator:** Prof. Huda Elsayed
- 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 Master of Biochemistry provided by **University of Southampton, UK.**

B- Professional Information

1- Program aims:

This Program is designed to extend graduates biochemical knowledge and skills necessary to apply the biochemical sciences to the provision in various settings including research Institutes, private and public hospitals and universities.

The program aims are summarized as follows:

1. Extend graduates knowledge of biochemistry, molecular biology, metabolic pathway and therapeutics.

2. Equip graduates with skills necessary to assess metabolic pathways in relation to human disease.
3. Commit life-long learning by enhancing and developing learning skills
4. Develop communication skills, time management, critical thinking, problem solving and decision making skills.
5. Develop research abilities through preparation of a complete clinical research.

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.

1.1 Graduate attributes:

The master degree of Biochemistry aims at developing the following attributes, upon successful completion of the program.

The graduate will be qualified to:

1. Demonstrate ethical, legal, and civic responsibility as a researcher and member of the discipline.
2. Recall the fundamental knowledge and professional skills for proper application in the field of biochemistry
3. Analyze, evaluate information and solve professional problems
4. Perform experimental research, write and evaluate scientific reports
5. Develop continuous and self learning abilities

6. Demonstrate effective communication, decision making and leadership skills

2-Intended Learning Outcomes (ILOs):

The Program provides excellent opportunities for students to demonstrate knowledge and develop skills appropriate for Biochemistry Master of sciences degree.

2-1- Knowledge and Understanding :

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

- A1-Illustrate basic theories and principles of biochemistry and other relevant aspects including: metabolic pathways, molecular biology, physiology, biotechnology, biostatistics.
- A2- Describe physiological functions of the different body organs in healthy and disease states as well as basics of genetics.
- A3- List pharmacological properties of drugs, mechanism of action, drug-drug interaction, toxic effects and risks and benefits of commonly used drugs.
- A4- Outline basic principles of instrumental analysis.
- A5- Illustrate the mutual role of biochemistry and its therapeutic and clinical applications for better patient outcomes.
- A6- Outline recent research approaches in the field of biochemistry.
- A7- Define ethics of scientific research
- A8-Illustrate basic principles of quality assurance and good laboratory practice in experimental research.
- A9-Outline methods of biostatistical analysis.

2-2 - Intellectual Skills:

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

- B1- Analyze and interpret data obtained from experimental research or published articles.
- B2- Suggest significant solutions for biochemical findings and outcome errors based on academic background
- B3- Integrate knowledge from biochemical pathways for therapeutic management of several diseases.
- B4- Define a research gap, develop research hypotheses and laboratory protocol .
- B5- Identify hazards and risks of experimental research
- B6- Design the appropriate method for different biochemical measurements.
- B7- Decide the best way to conduct experimental model based on the relevance, cost and availability.

2-3 - Professional and Practical Skills:

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

- C1- Perform routine experimental procedures including blood and tissue harvest.
- C2- Conduct different biochemical techniques and measurements.
- C3- Perform statistical analysis to evaluate experimental data.
- C4- Develop writing skills for preparation of published papers.
- C5- Cite relevant published data to support the written work.
- C6- Apply good laboratory practice and safety guidelines in dealing with chemical reagents and biological samples.

2.4 - General and Transferable Skills:

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

- D1- Communicate efficiently and effectively both in writing and orally
- D2- Apply the appropriate information technology.
- D3- Demonstrate self-learning skills for continuous professional development.
- D4- Retrieve information from different resources including online resources, library as well as printed literatures.
- D5- Evaluate performance of others uses specific standards .
- D6- Work effectively as a member of team
- D7- Demonstrate team leadership skills.
- D8- Develop time management, problem solving and decision making skills.

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 Biochemistry provided by University of Southampton, UK.

**Matrix1: Comparison of M. Pharm. Sci. Degree in Biochemistry with the
Graduate attributes developed by NAQAAE**

Attributes of the graduates (ARS, 2009)	Attributes of the graduates (M. Pharm. Sci. Degree in Biochemistry)
1. Apply the specialized knowledge he has acquired in his professional practice	2. Recall the fundamental knowledge and professional skills for proper application in the field of biochemistry
2. Identify and solve professional problems	3. Analyze, evaluate information and solve professional problems
3. Show good communication and leadership skills 5. Take decisions using available information	6. Demonstrate effective communication skills, decision making and leadership skills
4. Use technology effectively in his professional practice 6. Use available resources efficiently	4. Perform experimental research, write and evaluate scientific reports
7. Aware of his role in community service and development 8. Reflect commitment to integrity, credibility and accountability	1. Demonstrate ethical, legal, and civic responsibility as a researcher and member of the discipline.
9. Be a lifelong learner and able to develop himself	5. Develop continuous and self learning abilities

Matrix 2: Comparison of M. Pharm. Sci. Degree in **Biochemistry**
program with the Academic Reference Standard {ARS, 2009}
developed by NAQAAE

	ARS (2009)	Programme ILOs
Knowledge and Understanding	2.1.1- Theories and fundamentals related to the field of learning as well as in related areas.	A1- Illustrate basic theories and principles of biochemistry and other relevant aspects including: metabolic pathways, molecular biology, physiology, biotechnology, biostatistics. A2- Describe physiological functions of the different body organs in healthy and disease states as well as basics of genetics. A3- List pharmacological properties of drugs, mechanism of action, drug-drug interaction, toxic effects and risks and benefits of commonly used drugs. A4- Outline basic principles of instrumental analysis.
	2.1.2- Mutual influence between professional practice and its impact on the environment.	A5- Illustrate the mutual role of biochemistry and its therapeutic and clinical applications for better patient outcomes.
	2.1.3- Scientific developments in the area of specialization.	A6- Outline recent research approaches in the field of biochemistry.

	ARS (2009)	Programme ILOs
Intellectual Skills	2.1.4- Moral and legal principles for professional practice in the area of specialization.	A7- Define ethics of scientific research A8-Illustrate basic principles of quality assurance and good laboratory practice in experimental research. A9-Recognize methods of biostatistical analysis.
	2.1.5- Principles and the basics of quality in professional practice in the area of specialization.	
	2.1.6- The fundamentals and ethics of scientific research.	
	2.2.1- Analyze and evaluate information in the field of specialization and analogies to solve problems	B1- Analyze and interpret data obtained from experimental research or published articles.
	2.2.2- Solve specified problems in the lack or missing of some information.	B2- Suggest significant solutions for biochemical findings and outcome errors based on academic background.
	2.2.3-Correlate and integrate different pharmaceutical knowledge to solve professional problems.	B3- Integrate knowledge from biochemical pathways for therapeutic management of several diseases
	2.2.4- Conduct research and write scientific report on research specified topics.	B4- Define a research gap, develop research hypotheses and laboratory protocol.

	ARS (2009)	Programme ILOs
Professional and Practical Skills	2.2.5- Evaluate and manage risks and potential hazards in professional practices in the area of specialization	B5- Identify hazards and risks of experimental research
	2.2.6- Plan to improve performance in the field of specialization.	B6- Design the appropriate method for different biochemical measurements.
	2.2.7- Professional decision-making in the contexts of diverse disciplines.	B7- Decide the best way to conduct experimental model based on the relevance, cost and availability.
	2.3.1- Master basic and modern professional skills in the area of specialization.	C1- Perform routine experimental procedures including blood and tissue harvest. C2- Conduct different biochemical techniques and measurements. C2- Perform statistical analysis to interpret data.
	2.3.2- Write and evaluate professional reports.	C4- Develop writing skills for preparation of published papers. C5- Cite relevant published data to support the written work.
	2.3.3- Assess methods and tools existing in the area of specialization.	C6- Apply good laboratory practice and safety guidelines in dealing with chemical reagents and biological samples.

	ARS (2009)	Programme ILOs
General and Transferable Skills	2.4.1- Communicate effectively.	D1- Communicate efficiently and effectively both in writing and orally
	2.4.2- Effectively use information technology in professional practices	D2- Apply the appropriate information technology.
	2.4.3- Self-assessment and define his personal learning needs. 2.4.8- Continuous and self learning	D3- Demonstrate self- learning skills for continuous professional development.
	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	D5- Evaluate performance of others using specific standards.
	2.4.6- Work in a team and lead teams carrying out various professional tasks.	D6- Work effectively as a member of team D7- Demonstrate team leadership skills.
	2.4.7- Manage time effectively.	D8- Develop time management, problem solving and decision making skills.

**Matrix 3: Comparison of M. Pharm. Sci. Degree in Biochemistry
program with MSc Biochemistry provided by University of
Southampton, UK.**

MSc Biochemistry University of Southampton, UK.	Program ILOs
Knowledge and understanding	Knowledge and understanding
1- Demonstrate critical awareness of current issues in biochemistry, and comprehensive knowledge and systematic understanding of: the structure and function of biologically important molecules, and how these interact; how genetic information is stored, accessed and used in a cellular context; the role of metabolic pathways in the production of energy and other components essential for cell life and growth; how biotechnology is used in research and medicine;	A1- Illustrate basic theories and principles of biochemistry and other relevant aspects including: metabolic pathways, molecular biology, physiology, biotechnology, biostatistics. A5- Illustrate the mutual role of biochemistry and its therapeutic and clinical applications for better patient outcomes. A6- Outline recent research approaches in the field of biochemistry.
2-Demonstrate knowledge and systematic understanding of the techniques used to study biological macromolecules;	A4- Outline basic principles of instrumental analysis.
3-Demonstrate comprehensive knowledge of the composition and spatial organisation of the cell,	A2- Describe physiological functions of the different body organs in healthy and disease states

including cell division; how cells communicate with each other; the basis of homeostasis and other key physiological processes; how cells become specialised, form tissues and functions within the major organs.	as well as basics of genetics. Partially covered
Not covered	A3- List pharmacological properties of drugs, mechanism of action, drug-drug interaction, toxic effects and risks and benefits of commonly used drugs.
Intellectual and Research skills	Intellectual skills Professional and practical skills
1. formulate and test hypotheses by planning, conducting and reporting a programme of biochemical research in the form of a project, either directly (from your own lab work or data mining), or indirectly through analysis of the work of others;	B4- Define a research gap, develop research hypotheses and laboratory protocol . B6- Design the appropriate method to analyze the biochemical measurements.
2. use a range of biochemical laboratory equipment to conduct experiments;	A8-Illustrate basic principles of quality assurance and good laboratory practice in experimental research. C1- Perform routine experimental procedures including blood and tissue harvest.

	C2- Conduct different biochemical techniques and measurements.
3. use computer software to record and/or analyse biochemical data and determine their importance and validity;	A9-Recognize methods of biostatistical analysis. C3- Perform statistical analysis to interpret data.
4. analyse critically and solve complex biochemical problems;	B2- Suggest significant solutions for biochemical findings and outcome errors based on academic background
5. integrate your biochemical knowledge base with other selected disciplines such as physiology, biology, pharmacology or chemistry;	B3- Integrate knowledge from biochemical pathways to suggest the underlying mechanisms and therapeutic management of several diseases.
6. independently integrate and critically evaluate biochemical data from a wide range of sources, including primary source material in biochemical journals and experimentation;	D4- Retrieve information from different resources including online resources, library as well as printed literatures.
7. demonstrate a systematic understanding of how the boundaries of biochemical knowledge are advanced through research;	B6- Design the appropriate method to analyze the biochemical measurements. B7- Decide the best way to conduct experimental model based on the relevance, cost and availability.
8. assess how your work can have	A7- Define ethics of scientific

consequences for yourself, others around you, and the general public. For laboratory work, this would mean conducting risk assessments concerning the use of chemicals, animal material and laboratory procedures; for in silico work, understanding and executing data analysis responsibly, using university guidelines on working with public or private datasets, and the secure storage and sharing of data; for work communicating to the public, appreciating the complexities of giving clear and accurate information when discussing scientific subjects.	research B5- Identify hazards and risks of experimental research C6- Apply good laboratory practice and safety guidelines in dealing with chemical reagents and biological samples.
9. demonstrate broad expertise in defined areas of biochemistry at the level of current research in the field;	B6- Design the appropriate method to analyze the biochemical measurements. B4- Define a research gap, develop research hypotheses and laboratory protocol .
10. critically evaluate the data and methodology of current published research in biochemistry and present your conclusions.	B1- Analyze and interpret data obtained from experimental research or published articles. C4- Develop writing skills for

	preparation of published papers. C5- Cite relevant published data to support the written work.
Transferable skills	General and transferable skills
1. communicate/present effectively both verbally and in writing on a range of biochemical topics to both specialised and non-specialised audiences;	D1- Communicate efficiently and effectively both in writing and orally
2. work with, and within, a group towards defined outcomes;	D6- Work effectively as a member of team D7- Demonstrate team leadership skills.
3. use information technology and other resources to find, extract and synthesise information;	D2- Apply the appropriate information technology.
4. solve problems relating to qualitative and quantitative information;	D8- Develop time management, problem solving and decision making skills.
5. learn independently through critical enquiry;	D3- Demonstrate self-learning skills for continuous professional development.
6. demonstrate you have the ability to undertake appropriate further training;	
7. manage resources and time;	D8- Develop time management, problem solving and decision making skills.

4-Curriculum Structure and Contents:

a- Program duration: 3-5 years

b- Program structure:

- The Masters program can be completed in 3-5 years.
- The Faculty of pharmacy implements the credit hour system.
- Each academic year consists of 2 semesters
- Minimum credit hours that can be registered each semester: 8 credit hours
- Maximum credit hours that can be registered each semester: 12 credit hours
- The program is structured as:

1- Courses: General (1 year) and Special

No. of credit hours for program courses:

- General : 20 credit hours(Compulsory: 12, Elective: (2x4) 8)
- Special: (3courses x4 hours) 12 credit hours

2- Thesis: 30 hours

The candidate must complete a research project on an approved topic in: biochemical studies, metabolic abnormalities, and disease specific research. 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/ IELTS (400 units)
- b- Computer course

c- Study plan:

Course Code	Course Title	Credit hours	Program ILOs Covered	Final exam duration
	General Courses:			
M110	Molecular Biology	4	A1, B3, D2, D4	4 hours
M112	Physiology	2	A1, A2, B7, D1, D4	2 hours
M111	Biostatistics	2	A1, A9, B6, D1, D2	2 hours
M102	Instrumental analysis & chromatography II	4	A4, A8, B6, D2, D6, D7	4 hours
ME4	Biotechnology (Elective course)	4	A1, B3, D2, D4, D6, D7	4 hours
ME6	Drug-drug interaction (Elective course)	4	A2, A3, B3, D6, D8	4 hours
ME7	Drug induced disease (Elective course)	4	A2, A3, B3, D1, D4	4 hours
	Special Courses:			
Bsp2	Advanced Biochemistry	4	A1, A5, A6, B3, D2, D4, D6, D7	4 hours
Bsp1	Metabolism of individual tissue	4	A1, A5, B3, D3, D2, D4, D6	4 hours
Bsp3	Integration of metabolism	4	A1, A5, B3, D2, D3, D4	4 hours

	Thesis	30	A1, A2, A5, A6, A7, A9, B1, B2, B4, B5, B6, B7, C1, C2, C3,C4, C5, C6, D1, D2, D3, D4, D5, D6, D7, D8	
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Elective courses: Drug-Drug interaction, Drug induced disease,
Biotechnology

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 400).

Admission has to 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:

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 has to 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 is allowed to 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-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%
F	1	< 60%

7-Failure in Courses:

Students who fail to get 60% (1 point). In this case, students can register the course again and their grades are those obtained on repeating the course with maximum GPA being 3

8-Methods of program evaluation

Evaluator	Method	Sample
Internal evaluator: Prof. Huda El-Sayed	Program evaluation Courses evaluation	Program report Courses report
External evaluator: Prof. Ola Elsayed	Program evaluation Courses evaluation	Program report Courses report
Others methods	Matrix with ARS International Benchmark Questionnaires	100%

Program coordinator: Assis. Prof./ Nahla Younis

Special Courses

Advanced biochemistry

Course specification of Advanced Biochemistry

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

1- Basic information:

Title: Advanced biochemistry

Code: BSp2

Credit hours: 4 hrs

Lectures: 4 hrs/week

Total: 4hrs/week

2-Overall aim of the course:

On completion of the course, the students will be able to outline clinical significance of tumor and inflammatory markers, clinical chemistry of geriatrics and pediatrics as well as the relation between disturbance in body fluids and various health problems.

3. Intended learning outcomes (ILOs) of Advanced Biochemistry:

A-Knowledge and Understanding	
a1	Outline tumor and inflammatory markers with their clinical significance.
a2	Explain the role of drugs in development of some diseases and the use of other drugs in management of certain diseases.
a3	Discuss clinical chemistry of geriatric and pediatric patients.
a4	Recognize the source, physiologic purpose and clinical utility of laboratory measurements for body fluids.
B-Intellectual skills	
b1	Analyze with good interpretation of laboratory measurements for tumor and inflammatory markers and body fluids.
b2	Correlate changes in extreme ages for better management of their health problems.
D- General and transferable skills	
d1	Use computer skills as internet and power point in preparation of course activities.
d2	Gain information from various sources as text books, scientific journals and internet.
d3	Work effectively as a member of a team.

4. Course Content of Advanced Biochemistry:

Week number	Lecture contents (4hrs/week)
1	• Metabolic aspects of malignant diseases
2	• Factors induced carcinogenesis (drugs- pollution) • Tumor markers (types and applications)
3	• Tumor markers (detection and frequently ordered tumor markers)
4	• Oxidative stress
5	• Inflammation (sources- causes- mechanism) • Inflammatory markers
6	• Inflammatory markers • Anti-inflammatory drugs
7	• Midterm oral presentations
8	• Clinical chemistry of geriatric patients • Biochemical and physiologic changes of aging
9	• Clinical chemistry results of aging
10	• Clinical chemistry of pediatric patients • Childhood disorders
11	• Case studies
12	• Body fluids - Amniotic fluids- Cerebrospinal fluid
13	• Body fluids - Synovial fluid- Serous fluids
14	• Final term oral presentations
15	• Final exam

5- Teaching and Learning Methods:

- Lectures
- Self-learning activities
- Case study

6- Student Assessment methods:

Written exams assess: a1, a2, a3, a4, b1 and b2
Oral exam assess: a1, a2, a3, a4, b1 and b2
Activity assess: d1, d2 and d3

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:

- Clinical Chemistry: Principles, Techniques, and Correlations (Seventh edition/2013): Michael L Bishop, Edward P Fody, Larry E Schoeff.
- Clinical Chemistry: (eighth edition/2016): William J Marshall, Marta Lapsley, Andrew Day
- Clinical Biochemistry (Fundamentals of Biomedical Science) (second edition/2017): Nessar Ahmed

c- Websites:

- Pubmed
- Sciencedirect
- Wiley-interscience
- Research gate.
- **EKB**

8-Facilities required for teaching and learning:

Black (white) boards, computer, data show, textbooks, internet connection.

- **Course Coordinator: Prof Dr/ Sousou Ibrahim**
- **Date:** 2019 تم اعتماد توصيف المقرر بمجلس قسم الكيمياء الحيوية بتاريخ

Matrix I of Advanced biochemistry										
Course Contents		ILOs of Advanced biochemistry course								
		Knowledge and understanding				Intellectual skills		General and transferable skills		
		a1	a2	a3	a4	b1	b2	d1	d2	d3
1	• Metabolic aspects of malignant diseases	x								
2	• Factors induced carcinogenesis (drugs-pollution) • Tumor markers (types and applications)	x	x			X				
3	• Tumor markers (detection and frequently ordered tumor markers)	x				X				
4	• Oxidative stress	x				X				
5	• Inflammation (sources- causes- mechanism) • Inflammatory markers	x				X				
6	• Inflammatory markers • Anti-inflammatory drugs	x	x			X				
7	• Midterm oral presentations							x	X	X
8	• Clinical chemistry of geriatric patients • Biochemical and physiologic changes of aging			X			X			
9	• Clinical chemistry results of aging			X			x			
10	• Clinical chemistry of pediatric patients • Childhood disorders			X			x			
11	• Case studies							x	X	X
12	• Body fluids - Amniotic fluids- Cerebrospinal fluid				x	X				
13	• Body fluids - Synovial fluid- Serous fluids				x	X				
14	• Final term oral presentations							x	X	x

15	• Final exam	X	x	X	x	X	x			
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Matrix II of Advanced Biochemistry										
ARS		Program ILOs	Course ILOs	Course contents	Sources	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.	A1	a3, a4	• Clinical chemistry of geriatric patients • Biochemical and physiologic changes of aging • Clinical chemistry of pediatric patients • Childhood disorders • Body fluids: - Amniotic fluids- - Cerebrospinal fluid- - Synovial fluid- Serous fluids	Textbooks, Scientific papers and self learning	X	x	x	x	

	2.1.2- Mutual influence between professional practice and its impact on the environment.	A5	a1, a2	• Factors induced carcinogenesis (drugs-pollution...) • Tumor markers (types and applications) • Inflammation (sources-causes- mechanisms...) • Inflammatory markers • Anti-inflammatory drugs	Textbooks, Scientific papers and self learning	X	x	x	x	
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	2.1.3- Scientific developments in the area of specialization.	A6	a1, a3, a4	• Metabolic aspects of malignant diseases • Factors induced carcinogenesis (drugs-pollution...) • Tumor markers (types and applications) • Tumor markers (detection and frequently ordered tumor markers) • Oxidative stress • Inflammation (sources-causes- mechanisms...) • Inflammatory markers • Anti-inflammatory drugs • Clinical chemistry of geriatric patients • Biochemical and physiologic changes of aging • Clinical chemistry results of aging • Clinical chemistry of pediatric patients- Childhood disorders • Body fluids - Amniotic fluids- Cerebrospinal fluid- Synovial fluid- Serous fluids	Textbooks, Scientific papers and self learning	X	x	x	x	
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Intellectual skills	2.2.3-Correlate and integrate different pharmaceutical knowledge to solve professional problems.	B3	b1, b2	• Factors induced carcinogenesis (drugs-pollution...) • Tumor markers (types and applications)- • Tumor markers (detection and frequently ordered tumor markers) • Oxidative stress • Inflammation (sources-causes- mechanisms...) • Inflammatory markers • Anti-inflammatory drugs • Clinical chemistry of geriatric patients • Biochemical and physiologic changes of aging • Clinical chemistry results of aging • Clinical chemistry of pediatric patients- Childhood disorders Body fluids - Amniotic fluids- Cerebrospinal fluid- Synovial fluid- Serous fluids	Textbooks, Scientific papers and self learning	X	x	x	x	
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General and transferable skills	2.4.2- Effectively use information technology in professional practices	D2	d1	Oral presentations- case studies	Textbooks, Scientific papers and self learning	X	x			x
	2.4.4- Use variable sources to get information and knowledge.	D4	d2	Oral presentations- case studies	Textbooks, Scientific papers and self learning	X	x			x
	2.4.6- Work in a team and lead teams carrying out various professional tasks	D6, D7	d3	Oral presentations- case studies	Textbooks, Scientific papers and self learning	X	x			x

Metabolism of individual tissues

Course specification of Metabolism of individual tissues

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: Biochemistry Dept.
- Department offering the course: Biochemistry Dept
- Date of specification approval: 2019

1- Basic information:

Title: Metabolism of individual tissues	Code: BSp1
Lectures: 4 hrs/week	Credit hours: 4 hrs/week
Total: 4 hrs/week	

1- Overall aim of the course:

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

Illustrate principles of tissue metabolism, abnormalities relevant to tissue metabolism. The students will integrate metabolism background to identify clinical problems and interpret scientific results.

3. Intended learning outcome s (ILOs) of Metabolism of individual tissues:

A- Knowledge and Understanding	
a1	Outline control mechanisms of metabolism.
a2	Describe metabolic roles and pathways in different organs.
a3	Identify the correlation between environmental changes and metabolism.
a4	Illustrate up to date diagnosis of metabolic disorders.
B- Intellectual skills	
b1	Integrate metabolic background to determine metabolic abnormalities.
b2	Correlate the knowledge of different biochemical aspects to solve health problems.
D- General and transferable skills	
d1	Use computer skills as internet and power point in course activities.
d2	Gain information from various sources as text books, scientific journals, internet.....
d3	Work effectively as a member of a team.
d4	Develop self learning skills

4. Course Content of Metabolism of individual tissues

Week number	Lecture contents (4hrs/week)
1	High energy compounds.
2	• Major metabolic control mechanisms. - Control of enzyme levels. - Control of enzyme activity. • Activity
3	• Major metabolic control mechanisms. - Compartmentation. - Hormonal regulation.
4	• Receptors in the tissues.
5	• Metabolic roles of organs - Liver - Kidney
6	• Metabolic roles of organs - Brain – Heart
7	• Metabolic roles of organs - Adipose tissue - Locomotor system (muscle- bone)
8	• Abnormalities in these tissues.
9	• Abnormalities in these tissues.
10	• Biochemical and non biochemical diagnosis of metabolic abnormalities.

11	• Open discussion for some case studies.
12	• Activity (presentation of review articles)
13	• Metabolic effect of smoking and malnutrition.
14	• Effect of environment on metabolism. - Heavy metals - Radiation - Insecticides
15	• Final exam

5- Teaching and Learning Methods:

- Lectures
- Self learning
- Case study

6- Student Assessment methods:

Written exams assess: a1, a2, a3, a4, b1, b2

Oral exam assess: a1, a2, a3, a4, b1, b2, d4

Activity assess: d1, d2, d3, d4

Assessment schedule:

Assessment (1): Activity	Week 2-12
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:

Lippincott's illustrated reviews: Biochemistry 5th edition 2011 by Richard A. Harvey and Denise R. Ferrier, Lippincott Williams & Wilkins, a Wolters Kluwer businessm, Philadelphia.

Biochemistry, 2nd edition, Mathews, van Holde.

Biochemistry, fifth edition, 2002, Jereny M. Berg, John L. Tymoczko, Lubert Stryer.

C- Suggested books: Fundamentals of biochemistry upgrade edition, 2002, Donald Voet, Judith G. Voet, Charlotte W. Pratt.

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

Facilities required for teaching and learning:

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

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- **Course Coordinators:** Prof Dr/ Rawia Sarhan
 - **Date:** 2019 تم اعتماد توصيف المقرر بمجلس قسم الكيمياء الحيوية بتاريخ:

Matrix I of Metabolism of individual tissues											
Course Contents		ILOs of Metabolism of individual tissues course									
		Knowledge and understanding				Intellectual skills		General and Transferable skills			
		a1	a2	a3	a4	b1	b2	d1	d2	d3	d4
1	High energy compounds.	X									
2	- Major metabolic control mechanisms. - Control of enzyme levels. - Control of enzyme activity. - Activity	X						X	X	X	X
3	- Major metabolic control mechanisms. - Compartmentation. - Hormonal regulation.	X									
4	Receptors in the tissues.	X									
5	- Metabolic roles of organs - Liver – Kidney		X								
6	- Metabolic roles of organs - Brain – Heart		X								
7	Metabolic roles of organs		X								

	- Adipose tissue - Locomotor system (muscle- bone)										
8	• Abnormalities in this tissues.					x					
9	• Abnormalities in this tissues.					x					
10	• Biochemical and non biochemical diagnosis of metabolic abnormalities.				x		x				
11	• Open discussion for some case studies.			x							
12	• Activity (presentation of review articles)							X	X	X	X
13	• Metabolic effect of smoking and malnutrition.						x				
14	• Effect of environment on metabolism. - Heavy metals - Radiation - Insecticides			X			x				
15	• final exam	X	X	X	x	x	x				

Matrix II of Metabolism of individual tissues

ARS		Program ILOs	Course ILOs	Course contents	Sources	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.	A1	a1, a2, a3	High energy compounds Major metabolic control mechanisms (Control of enzyme levels-Control of enzyme activity- Compartmentation- Hormonal regulation)- Receptors in the tissues- Metabolic roles of organs - Liver - Kidney- Brain- Heart- Adipose tissue- Locomotor system (Muscle-bone))	Textbooks, Scientific papers and self learning	X	x	x	x	
	2.1.2- Mutual influence between professional practice and its impact on the environment.	A5	a4	Biochemical and non biochemical diagnosis	Textbooks, Scientific papers and self learning	X	x	x	x	
Intellectual skills	2.2.3-Correlate and integrate different pharmaceutical knowledge to solve professional problems.	B3	b1, b2	Biochemical and non biochemical diagnosis- Metabolic effect of smoking and malnutrition- Effect of environment on metabolism (Heavy metals- Radiation- Insecticides)	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	Activities and presentation of review articles	Textbooks, Scientific papers and self learning	X	x			x
	2.4.4- Use variable sources to get information and knowledge.	D4	d2	Activities and presentation of review articles	Textbooks, Scientific papers and self learning	X	x			x
	2.4.6- Work in a team and lead teams carrying out various professional tasks	D6	d3	Activities and presentation of review articles	Textbooks, Scientific papers and self learning	X	x			x
	2.4.8- Continuous and self learning	D3	d4	Activities and presentation of review articles	Textbooks, Scientific papers and self learning	X	x			x

Integration of metabolism

Course specifications:

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

Title: Integration of metabolism Code: BSp3
Credit hours: 4 hrs/week
Lectures: 4 hrs/week
Total: 4hrs/week

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

Illustrate interconnected metabolic pathways, principles of metabolic adaptation, Link between metabolic pathways and abnormalities that may arise and possible interactions between different nutrients and drugs and prevention strategies.

3. Intended learning outcomes (ILOs) of Integration of metabolism

A-Knowledge and Understanding	
a1	Illustrate interconnected pathways of metabolism.
a2	Identify the regulation of metabolic pathways.
a3	Demonstrate metabolic changes during fed/ fasting cycle and diseases.
a4	Describe nutritional aspects of different diseases.
B-Intellectual skills	
b1	Solve some health problems based on academic knowledge.
b2	Analyze and interpret biochemical data related to metabolic changes during fed/ fasting cycle and diseases.
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 and internet.
d3	Develop self learning capabilities

4. Course Content of Integration of metabolism

Week number	Lecture contents (4hrs/week)
1	• Overview of the major metabolic pathways
2	• Interconnected pathways
3	• Fed fasting cycle
4	• Effect of hormones on individual metabolic pathways
5	• Fuel choice during exercise
6	• Ethanol alters metabolism
7	• Activity (Report and presentation)
8	• Obesity
9	• Case studies on obesity
10	• Diabetes mellitus
11	• Nutrition: nutritional consideration for specified individuals
12	• Nutrition: Drug - nutrient interaction
13	• Nutrition: Diet linked diseases + case studies
14	• Final term oral presentation
15	• Final exam

5- Teaching and Learning Methods:

- Lectures
- Self-learning activities.
- Case study

6- Student Assessment methods:

Written exams assess: a1, a2, a3, a4, b1, b2

Oral exam assess: a1, a2, a3, a4, b1, b2

Activity assess: d1, d2 and d3

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:**

- Jeremy M. Berg, John L. Tymoczko and Lubert Stryer. Biochemistry, 7th edition, 2012.
- Richard A. Harvey and Denise R. Ferrier: Lippincott's illustrated reviews: Biochemistry 7th edition 2017
- Ingrid Kohlstadt, Advancing Medicine with Food and Nutrients 2nd edition, 2012.

c- Websites:

- Pubmed
- Sciencedirect
- Wiley-interscience
- Research gate.
- EKB

8-Facilities required for teaching and learning:

Black (white) boards, computer, data show, textbooks, internet connection.

- **Course Coordinator: Prof Dr/ Hoda El-Saied**
- **Date:** 2019 تم اعتماد توصيف المقرر بمجلس قسم الكيمياء الحيوية بتاريخ

Matrix I of Integration of Metabolism										
Course Contents		ILOs of Integration of Metabolism course								
		Knowledge and understanding				Intellectual skills		General and transferable skills		
		a1	a2	a3	a4	b1	b2	d1	d2	d3
1	• Overview of the major metabolic pathways	X								
2	• Interconnected pathways	X								
3	• Fed fasting cycle			x			X			
4	• Effect of hormones on individual metabolic pathways		x							
5	• Fuel choice during exercise		x							
6	• Ethanol alters metabolism		x							
7	• Activity (review article)							X	x	X
8	Obesity			x			x			
9	Obesity and case study			x		x	X			
10	Diabetes mellitus			x						
11	• Nutrition: nutritional consideration for specified individuals				x	x				
12	• Nutrition: Drug- nutrient interaction				x					
13	• Nutrition: Diet linked diseases + case studies				x	x				
14	• Final term oral presentation							X	x	X
15	• Final exam	X	x	x	x	x	X			

Matrix II of Integration of metabolism

ARS		Program ILOs	Course ILOs	Course contents	Sources	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.	A1	a1- a2- a3	Overview of the major metabolic pathways- Interconnected pathways- Effect of hormones on individual metabolic pathways- Fuel choice during exercise- Ethanol alters metabolism - Fed fasting cycle- Obesity- Obesity and case studies- Diabetes mellitus	Textbooks, Scientific papers and self learning	x	X	x	x	
	2.1.2- Mutual influence between professional practice and its impact on the environment.	A5	a4	Nutrition: nutritional consideration for specified individuals- Drug - nutrient interaction- Diet linked diseases + case studies	Textbooks, Scientific papers and self learning	x	x	x	x	

Intellectual skills	2.2.3-Correlate and integrate different pharmaceutical knowledge to solve professional problems.	B3	b1, b2	Fed fasting cycle- Case studies on obesity, diabetes and diet linked diseases	Textbooks, Scientific papers and self learning	x	X	x	x	
	2.4.2- Effectively use information technology in professional practices	D2	d1	Activities and presentation of review articles	Textbooks, Scientific papers and self learning	x	X			x
	2.4.4- Use variable sources to get information and knowledge.	D4	d2	Activities and presentation of review articles	Textbooks, Scientific papers and self learning	x	X			x
	2.4.3- Self-assessment and define his personal learning needs.	D3	d3	Activities and presentation of review articles	Textbooks, Scientific papers and self learning	x	X			x

General Courses

Physiology

Course specification of Physiology

A- Course specifications:

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

1- Basic information:

Title: **Physiology**
Lectures: 2 hrs/week
Total: 2hrs/week

Code: M112
Credit hours: 2 hrs/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.

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- **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		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 A2	a1, a2	All the topics	Scientific papers, text books and Internet	X	X	X	X	
Intellectual Skills	2.2.7- Professional decision-making in the contexts of diverse disciplines.	B7	b2	All the topics	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
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Biostatistics

Course specification of Biostatistics

A- Course specifications:

- Program on which the course is given: Pharmaceutical Sciences (Biochemistry)
- Major or Minor element of program: Major
- Department offering the program: Biochemistry 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.
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- **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 Understanding	2.1.1- Theories and fundamentals related to the field of learning as well as in related areas.	A1	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.	B6	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 skills	2.4.2- Effectively use information technology in professional practices	D2	d2	Activities- Revision	Scientific papers, text books and Internet	X	x		x	x
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Drug interaction

Course Specification of Drug interaction

A- Course specifications:

- Program (s) on which the course is given: Pharmaceutical Sciences (Biochemistry)
- Major or Minor element of program: Major
- Department offering the program: Biochemistry
- Department offering the course: Pharmacology
- Date of specification approval: 2019

B- Basic information:

Title: Drug interaction
Credit Hours:

Code: -ME6

- Lectures : 4 hrs/week
- Practical:---
- Tutorials: ---
- Total: 4 hrs/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 critical thinking and decision making
d2	Work effectively as a member of a team

D- Contents:

Week No.	Lecture (2 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 : Churchill 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](https://pubmed.ncbi.nlm.nih.gov/)
- 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.	A2 A3	a1 a2 a3	All topics	Scientific papers, text books and Internet	x	x	x	x	
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 Disease

Course specification of Drug-Induced Diseases

A- Course specifications:

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

1- Basic information:

Title: **Drug Induced Diseases**

Lectures: 4 hrs/week

Total: 4hrs/week

Code: ME7

Credit hours: 4 hrs/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.
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- **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.	A2 A3	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	2.2.3- Correlate and integrate different pharmaceutical knowledge to solve professional problems.	B3	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
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Instrumental Analysis & Chromatography II

Course specification of Instrumental Analysis & chromatography II

A- Course specifications:

- Program on which the course is given: Master of Pharmaceutical Sciences (Biochemistry)
- Major or Minor element of program: Major
- Department offering the program: Biochemistry Dept
- Department offering the course: Analytical Chemistry.
- Date of specification approval: 2019

2- Basic information:

Title: Instrumental Analysis	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 will be able to outline the basis and applications of instrumental analysis and 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 different instrumental techniques of analysis.
a2	Describe different pharmaceutical and biological applications of instrumental techniques.
B- Intellectual skills	
b₁	Select the most appropriate instrumental technique in pharmaceutical and biological assay.
b₂	Integrate knowledge gained from different instrumental techniques in designing analytical system for analytes of complex nature
D- General and Transferable skills	
d₁	Acquire Computer skills like preparing presentations and collecting information through different data-bases.
d₂	Work effectively as a member of team
d₃	Demonstrate leadership capability

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	Student activities
15	final exam

5- Teaching and Learning Methods:

- Lectures
- Self learning
- Student scientific presentation.
- Course 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 (1): Activity	Week 8
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:

- 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
- [EKB](#)
- Guidance for Industry: Q2B of Analytical Procedures; Methodology: International Conference of Harmonization (ICH). Nov. 1996 ([http:// www.fda.gov/eder/guidance /1320fnl.pdf](http://www.fda.gov/eder/guidance/1320fnl.pdf)).
- Journal of Chromatography A and B, Separation sciences, Analytical and Bioanalytical Chemistry, Bioanalysis, Analytical letters.

Facilities required for teaching and learning:

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

Course Coordinators: Prof Dr/ Hisham Ezzat

Matrix I of Instrumental Analysis & chromatography II								
Course Contents		ILOs						
		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 *Basis	X	x	x				

	*Pharmaceutical and biological applications							
1 1	HPLC *Basis *Types Isocratic flow and gradient elution Particle size, Pore size, Pump pressure, detectors and applications	x						
1 2	Gas Chromatography *Basis *Pharmaceutical and biological applications * Detectors	x						
1 3	Student activities			x	x	x	x	x
1 4	Student activities			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.	A4	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.	A8	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.	B6	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 carrying out various professional tasks.	D6	d2	Activity	Textbook Scientific papers and self learning		X			X
		D7	d3							

Biotechnology

Course Specification of Biotechnology

A- Course specifications:

- **Program on which the course is given:** Master of Pharmaceutical Sciences (Biochemistry)
- **Major or minor element of programs:** Major
- **Department offering the program:** Biochemistry
- **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	
a1	Outline the principles of biotechnology techniques
a2	Explain how to manage and exploit knowledge of DNA cloning, recombinant DNA, and applied technology
a3	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	Relate 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	Develop computer skills as internet and power point in the activities.
d2	Gain information from various sources as text books, scientific journals, internet,...etc.
d3	Work effectively as a team member

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	INTERLEUKINS c- Interferon's alpha , Beta , Gamma d- Pharmaceutical concerns e- Clinical and Practice aspects

	selection of transformant	
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, chimeric, humanized, human) • nomenclature of MAb	Dispensing Biotechnology products a- Introduction – Storage b- Handling c- Preparations

	according to the target and source • Global Marketing pharmaceutically useful MAb	
10	Stem cells technology: • Types of stem cells • Isolation • Culturing • Applications of stem cells in regenerative medicine	Dispensing Biotechnology products d- Administration e- Outpatient/Homecare use f- Patient assessment
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	Final 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

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, Wileyinterscience

Facilities required for teaching and learning:

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

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- **Course Coordinators: Prof. Dr/ Ashraf Ahmed Kadry**

Prof. Dr/ Mohammed El-Sewedy

- **Date:** 2019 تم اعتماد توصيف المقرر بمجلس القسم

Matrix I of Biotechnology												
Course Contents		ILOs of Biotechnology course										
		Knowledge and Understanding				Intellectual skills			General and transferable skills			
		a1	a2	a3	a4	b1	b2	b3	d1	d2	d3	
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 Pharmaceutically useful monoclonal antibodies			x	x							
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										
ARS		Program ILOs	Course ILOs	Course contents	Sources	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.	A1	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	

	2.2.3-Correlate and integrate different pharmaceutical knowledge to solve professional problems.	B3	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	
	2.4.2- Effectively use information technology in professional practices	D2	d1	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	d2	Activity - presentation of reports and open discussion						
	2.4.6- Work in a team and lead teams carrying out various professional tasks.	D6 D7	d3	Activity - presentation of reports and open discussion		x	X		x	x

Molecular biology

Course specification of Molecular Biology

Course Specification:

- Program on which the course is given: Master degree of pharmaceutical science (Biochemistry)
- Major or minor Element of program: Major
- Department offering the program : Biochemistry department
- Department offering the course: Biochemistry department in conjunction with Microbiology department
- Date of specification approval: 2019

1-Basic information:

Title: Molecular biology

Code: M110

Lectures: 4 hrs/ week

Credit hrs: 4 hrs

Total: 4 hrs/week

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 on a topic related to molecular biology 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 ara Major Shifts in operon, the trp operon, riboswitches, 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 macromolecules (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 Benjamin/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. 2^{Dd} 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

تم الاعتماد من مجلس القسم بتاريخ 2019

Matrix I of Molecular Biology (2019)														
Course Contents		ILOs of Molecular Biology course												
		Knowledge and Understanding				Intellectual skills				General and transferable skills				
		a 1	a 2	a 3	a 4	b 1	b 2	b 3	b 4	d 1	d 2	d 3	d 4	d 5
1	• DNA ,RNA structure, function	X	X											
	• Difference between DNA & RNA													
2	• DNA replication steps	X												
3	• Types of RNA		X											
	• Genetic code													
4	• Protein synthesis		X											
	• Alteration of nucleotide sequence													
5	• Genetic engineering									X				
	• DNA cloning													
	• Applications of cloning in treatment of diseases			X	X	X	X				X	X	X	X
	-activity													
6	• Genomic DNA libraries, c DNA			X				X	X					
	• PCR, LCR and their applications													
7	• RFLP													
	• Linkage of polymorphism with gene mutation			X	X	X	X							
	• Prenatal diagnosis, Diagnosis of sickle cell disease													

8	• Sequencing of DNA (chemical method)	X												
9	• Sequencing of DNA (enzymatic method)	X												
10	• Electrophoresis	X												
11	• Southern, 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

Matrix II of Molecular Biology										
NARS		Program ILOs	Course ILOs	Course contents	Sources	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.	A1	a1- a2- a3- a4	DNA structure, function. DNA replication steps - Genomic 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-Prenatal diagnosis, Diagnosis of sickle cell disease- Monoclonal antibodies	Textbooks, Scientific papers and self learning	X	x	x	x	

Intellectual skills	2.2.3-Correlate and integrate different pharmaceutical knowledge to solve professional problems.	B3	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 skills	2.4.2- Effectively use information technology in professional practices	D2	d1-d5	Activity (reports)- open discussion	Textbooks, Scientific papers and self learning	x	x			X
	2.4.4- Use variable sources to get information and knowledge.	D4	d2	Activity (reports)- open discussion	Textbooks, Scientific papers and self learning	x	x			X
	2.4.6- Work in a team and lead teams carrying out various professional tasks.	D.6-	d3	Activity (reports)- open discussion		x	x			x
	2.4.8- Continuous and self learning	D.8-	d4	Activity (reports)- open discussion		x	x		x	X

Thesis Specification

Thesis of Master Degree

A- Thesis specifications:

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

1- Basic information:

Title: Master Thesis in Biochemistry

Credit hours: 30 hrs

2- Overall aim of the thesis:

After being accepted by the Faculty authority, the candidate has to recall the research plan of the University and the Faculty to select the research area which he/she is going to fit with

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

- Design a robust study to answer the research question
- Identify and perform different techniques and methods used in the experimental work according to the designed protocol
- Collect all the data needed to answer the research question using the developed study design
- Analyze the results of the study in the light of prior knowledge
- Draw conclusions driven from the research findings.

3- Intended learning outcome's (ILOs):

Knowledge and Understanding	
a1	Outline theoretical and principles of Biochemistry related to main objectives of the thesis
a2	Determine the problem the thesis will handle in correlation with the community and surrounding environment
a3	Explain clearly the principles of Biochemistry
a4	Understand 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	Solve problems related to practical work by obtained quantitative data from the practical work
b2	Discuss professional problems and suggest solutions relay on standard guidelines
b3	Combine required specialties to manage the subject under study
b4	Integrate scientific results and write report following conducting research
b5	Manage risks and hazards related to professional practical area
b6	Design a laboratory protocol for the work
b7	Decide what to do with full responsibility in scientific research
Professional and practical skills	
c1	Apply different techniques related to practical thesis work.
c2	Use and evaluate practical data to write report
c3	Apply various data collection tools involved in the protocol

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
1 st	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. Integrate different knowledge (pharmacotherapy guidelines, medication safety, biostatistics,) to solve suggested problem. Continuous evaluation to the thesis outcome according to the

	schedule.
2 nd	Identify different practical techniques and methods to collect data related to the subject under study. 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 treatment protocols according to guidelines Perform lab analysis, x-ray, gene analysis when required Apply ethical recommendations during dealing with humans/ experimental animals. Understand any legal aspects related to the thesis work.
3 rd	Collect raw data including patients demographic data, tested parameters, others Interpret raw data to get valuable information. Perform statistical analysis for the results. Present and describe the results graphically. Suggest solution to the problem understudy based on this presented data.
4 th	- Communicate with supervisors to discuss results Work effectively as a member of a team (e.g. Supervisors, various professionals and Technicians, patients). 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.
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5- Teaching and Learning Methods:

- Self learning (Activities, Research....)
- Lab work
- Seminar
- reporting
- Critical thinking
- Solving problem
- Open discussion

6- References:

Lau AH. Glomerulonephritis. In: DiPiro JT, Talbert RL, Yee GC, et al., eds. Pharmacotherapy: A Pathophysiologic Approach, 9th ed. New York: McGraw-Hill, 2014:705-28.

Facilities required for:

1. Zagazig University Hospital
2. **For practical work:** U.V spectrophotometer, centrifuge, PCR, ELISA, Electrophoresis

تم إعتماده بمجلس القسم بتاريخ 2019

Master of Biochemistry																																
Program Courses		Program intended learning outcomes																														
		Knowledge and understanding									Intellectual skills							Professional & Practical skills						General and transferable skills								
		A1	A2	A3	A4	A5	A6	A7	A8	A9	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	C5	C6	D1	D2	D3	D4	D5	D6	D7	D8	
General courses	Molecular biology	√											√													√		√				
	Physiology	√	√														√								√			√				
	Biostatistics	√							√						√										√	√						
	Instrumental analysis & chromatography II				√				√						√										√					√	√	
	Drug interaction		√	√									√																	√		√
	Drug induced disease			√	√								√												√			√				
	Biotechnology	√											√													√		√		√	√	
Special courses	Advanced biochemistry	√				√	√					√															√	√		√	√	
	Integration of metabolism	√				√						√													√	√	√		√			
	Metabolism of individual tissues	√				√						√													√	√	√					
Thesis		√	√			√	√	√		√	√		√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	

