COURSE SPECIFICATIONS

Faculty of Pharmacy

Fourth Year – Second Term

2018-2019

CONTENTS:

COURSE SPECIFICATIONS

Hospital Pharmacy and Clinical Pharmacy

Fourth year – secondTerm
2019-2020

Course specification of Hospital and clinical pharmacy

University: Zagazig **Faculty: Pharmacy**

A- Course specifications:

Program (s) on which the course is given: Bachelor of Pharmacy

Major or Minor element of programs: Major

Department offering the program: -------

Department offering the course: Pharmacy Practice Department

Academic year Level: Fourth year/ Second semester

Date of specification approval: January 2020

B- Basic information:

Title: Hospital and clinical pharmacy Code: PP420

Credit Hours: ---

Lectures: 2 hrs/week

Practical: 1 hrs/week

Tutorials: ---

Total: 2.5 hrs/week

C- Professional information:

1-Overall aim of the course

On completion of the course, the student will be able to describe organization and structure of a hospital pharmacy: its facilities and services in inpatient and outpatient pharmacies, medication record, rational drug use, hospital formulary, pharmacy and therapeutic committee, IV admixtures and incompatibilities, parentral nutrition, handling of narcotics, vaccines, biotechnology products, cytotoxics and radiopharmaceuticals, as well as patient safety and risk management.

2- Intended Learning Outcomes of Hospital and clinical pharmacy (ILOs)

A- Knowledge and Understanding	
a1	Outline the organization of a hospital pharmacy and the responsibilities and duties of pharmacists in the hospital pharmacy setting
a2	Define hospital formulary, pharmacy & therapeutic committee and rational drug use
a3	Describe general good dispensing practices of medicines and for special classes of medicines including narcotics, vaccines, biotechnology products, cytotoxics and radiopharmaceuticals
a4	Illustrate different drug related problems and management strategies
B- Professional and Practical skills	
b1	Experience different duties of hospital pharmacist including prescription interpretation, drug preparation in IV unit and drug-drug interaction identification
b2	Handle pharmaceutical preparations safely
b3	Compound different extemporaneous preparations safely and effectively
b4	Perform different pharmaceutical calculations related to preparation of IV admixtures
C- Intellectual skills	
c1	Differentiate between different medication distribution systems
c2	Analyze common hazardous situations contributing to

	different medication related problems
c3	Evaluate different dispensing practices regarding narcotics, biotechnology products, cytotoxics, vaccines and radiopharmaceuticals
D-General and Transferable skills	
d1	Communicate effectively both in oral and written manners
d2	Develop critical thinking , decision making and problem solving abilities
d3	Work effectively in a team

D- Contents:

Week No.	Lecture contents (2 hrs/week)	Practical session (1hr/week)
1	- Orientation to hospital pharmacy	Introduction
2	- Introduction to Hospital pharmacy -Responsibilities of hospital pharmacist	Translating Medication Orders
3	- Pharmacy and therapeutic committee - Hospital formulary	Translating Medication Orders
4	- Hospital drug distribution systems	Extemporaneous compounding
5	- Dispensing Process - Dispensing of biotechnology products	Extemporaneous compounding
6	Dispensing of radiopharmaceuticals	Illustration of required activity: Items of patient interview Illustration of video criteria
Midterm exam		
8	Dispensing of vaccines dispensing of cytotoxics	Dry powders for reconstitution
9	Dispensing of controlled drugs	Parentral admixtures
10	IV admixture and TPN	Practical Preparation to practice (Field practice simulation)
11	Medication errors	Medication errors (Case study)
12	Medication errors (Cont.)	Drug Interactions Checker (internet search & report writing)
13	Pharmacovigilance and adverse drug reactions -Rational drug use	**video/presentation**
14	- Revision	**Practical exam**
15	Final written exam	

E- Teaching and Learning Methods:

- Lectures
- Practical sessions
- Think/pair/share
- Case study
- Field practice simulation

F- Student Assessment methods:

1- Written exams to assess: a1, a2, a3, a4, c1, c2, c3

2- Patient interview & video preparation to assess: b1, d1, d3

3- Practical exams to assess: b1, b2, b3, b4, d2

4- Oral exam to assess: a1, a2, a3, a4, c1, c2, c3, d1, d2

Assessment schedule

Assessment (1): Midterm exam	Week 7
Assessment (2): Final written exam	Week 15
Assessment (3): Patient interview & video preparation	Week 13
Assessment (4): Practical exams	Week 14
Assessment (5): Oral exams	Week 15

Weighting of Assessment

Assessment method	Marks	Percentage
Midterm exam	10	10%
Final written exam	50	50%
Hospital visit report	5	5%
Practical practice & exam	20	20%
Oral exam	15	15%
TOTAL	100	100%

G- Facilities required for teaching and learning:

• For lectures : Black (white) boards, data show, air conditioned classroom

• For practical: Well-equipped labs

• Large volume parenteral, IV supplies, IV antibiotics and corticosteroids, disinfectant, personnel protective supplies

H- List of References:

1- Course Notes: Student book of Hospital and clinical pharmacy approved by pharmacy practice department (2019)

2- Essential Books:

- Mark G. Brunton, Hospital Pharmacy Practice for Technician, Jones & Bartlett Learning, USA, 2015.

- Jackson M, Lowey A. Handbook of extemporaneous preparation. A guide to pharmaceutical compounding. Published by Pharmaceutical Press, 2010.

- Brown TR. Handbook of institutional pharmacy practice.4th edition, American Society of Health System Pharmacists. Bethesda, Maryland, 2006.
- Peggy Piascik Peggy, PiascikVal Adams. Dispensing Biotechnology Products: Handling, Professional Education, and Product Information, 2013

3- Recommended Books:

- Martindale, "The extra pharmacopeia". 31st edn., by James, E.F Reynolds. And Kathleen Parfitt, Royal Pharmaceutical Society, London (2007).
- Non-prescription drugs, Po Alain Li Wan, 2nd ed., Oxford Blackwell Scientific publications (1990).
- Cohen MR. Medication Errors. Causes, Prevention, and Risk Management; 8.1-8.23.

- Holdford DA, Brown TR. Introduction to Hospital & Health System. American Society of Health System Pharmacists. Bethesda, Maryland.

4- Periodicals and websites:

- Aquilina A. The extemporaneous compounding of paediatric medicines at Mater Dei Hospital. Journal of the Malta College of Pharmacy Practice.Issue 19, 28 – 30, 2013.
- Flynn E, Barker KN, Carnahan BJ. National observational study of prescription dispensing accuracy and safety in 50 pharmacies. J Am Pharm Assoc. 2003; 43:191–200.
- Ukens C. Deadly dispensing: an exclusive survey of Rx errors by pharmacists. Drug Topics. March 13, 1997:100–11.
- Strategies for Communicating Effectively with Patients, Volume 2016, Course No. 230.

http://canadianpharmacistsletter.therapeuticresearch.com/ce/ceCourse.asp...

https://www.allaboutcareers.com/careers/job-profile/hospital-pharmacist

https://www.slideshare.net/AbdRhmanGamilgamil/pharmacy-practice-67234967

https://www.drugs.com/drug_interactions.html

www.usp.org/reporting/review/qr66.pdf

https://www.slideshare.net/rameshganpisetti/14ab1t0003-handling-of-radiopharmaceuticals, 2018

Course Coordinator: Dr. Gehan Fathy Attia

Head of Department: Dr. Gehan Fathy Attia

Date: م 2019/ 9 / تم مناقشة و اعتماد توصيف المقرر من مجلس القسم بتاريخ

Matrix I of Hospital and clinical pharmacy course

Course Contents		ILOs of Hospital pharmacy course												
		knowledge and understanding				Professional and practical skills				Intellectual skills		Transferable and general skills		
Lectures		a1	a2	a3	a4	b1	b2	b3	b4	c1	c2	c3	d1	d2	d3
1	Orientation to hospital pharmacy	x													
2	Introduction to Hospital pharmacy -Responsibilities of hospital pharmacist	x													
3	Pharmacy and therapeutic committee - Hospital formulary		x												
4	Hospital drug distribution systems			x						x					
5	Dispensing Process Dispensing of biotechnology products	x		x											
6	Dispensing of radiopharmaceuticals	x		x								x			
7	Dispensing of vaccines Dispensing of cytotoxics	x		x								x			
8	Dispensing of controlled drugs	x		x								x			
9	IV admixtures and TPN	x													
10	Medication errors	x			x						x				

11	Pharmacovigilance and adverse drug reactions	x			x					x			
12	Rational drug use	x	x							x			
Practical session													
1	Translating Medication Orders					x					x	x	x
2	Extemporaneous compounding					x	x	x			x	x	x
3	Dry powders for reconstitution (Problem solving)					x			x		x	x	x
4	Parentral admixtures (Problem solving)					x			x		x	x	x
5	Practical Preparation to practice					x			x		x	x	x
6	Medication errors (Case study)					x				x	x	x	x
7	Drug Interactions Checker (internet search & report writing)					x				x	x	x	x
8	Patient interview & video preparation					x					x	x	x

Matrix II of Hospital and clinical pharmacy course

National Academic Reference Standards NARS		Program ILOs	Course ILOs	Course contents	Sources	Teaching and learning methods			Weighting of assessment			
						lecture	practical session	case study/ field simulation	written exam	practical exam	oral exam	Midterm exam
2.1	Principles of basic, pharmaceutical, medical, social, behavioral, management, health and environmental sciences as well as pharmacy practice.	A8	a1	- Orientation to hospital pharmacy - Introduction to Hospital pharmacy -Responsibilities of hospital pharmacist	Student book Essential books	x			x		x	x
			a2	Pharmacy and therapeutic committee -Hospital formulary	Student book Essential books	x			x		x	x
2.9	Principles of hospital pharmacy including I.V. admixtures, TPN and drug distribution system,	A20	a3	Hospital drug distribution systems Dispensing of vaccines, biotechnology products, cytotoxics	Student book Essential books	x			x		x	x

				Dispensing of controlled drugs Dispensing of radiopharmaceuticals								
2.14	Principles of clinical pharmacology, pharmacovigilance and the rational use of drugs.	A31	a4	Pharmacovigilance and adverse drug reactions Rational drug use Drug distribution	Student book Essential books	x			x		x	x
3.2	Handle and dispose chemicals and pharmaceutical preparations safely.	B2	b2	Extemporaneous compounding	Practical notes		x	x		x		
3.3	Compound, dispense, label, store and distribute medicines effectively and safely	B4 B5	b1 b3	Translating Medication Orders Extemporaneous compounding Practical Preparation to practice	Practical notes		x	x		x		
3.10	Advise patients and other health care professionals about safe and proper use of medicines	B18	b1	Medication errors Drug Interactions Checker	Practical notes		x	x		x		

	Ex NARs	B21	b4	Dry powders for reconstitution Parentral admixtures	Practical notes		x	x		x		
4.2	Comprehend and apply GLP, GPMP, GSP and GCP guidelines in pharmacy practice.	C5	c1 c3	Hospital drug distribution systems Dispensing of radiopharmaceuticals, biotechnology products, cytotoxics Dispensing of vaccines Dispensing of controlled drugs	Student book practical notes		x		x		x	x
4.11	Assess drug interactions, ADRs and pharmacovigilance	C16	c2	Drug Interactions Checker Medication errors Pharmacovigilance and adverse drug reactions Rational drug use	Student book practical notes		x		x		x	x
5.1	Communicate clearly by verbal and written means	D1	d1	Practical Preparation to practice Patient interview & video preparation	Practical notes			x				

5.3	Work effectively in a team.	D3	d3					x				
5.10	Demonstrate critical thinking, problem-solving and decision-making abilities	D11	d2	Dry powders for reconstitution Parentral admixtures			x	x	x	x		x

---

Course Coordinator: Dr. Gehan Fathy Attia

Head of Department: Dr. Gehan Fathy Attia

Date: م 2019/ 9 / تم مناقشة و اعتماد توصيف المقرر من مجلس القسم بتاريخ

COURSE SPECIFICATIONS

Biotechnology of Natural Product

Fourth year – secondTerm
2018-2019

Course Specification of Biotechnology of Natural Products (2018-2019)

University **: Zagazig** Faculty **: Pharmacy**

A- Course specifications:

- Program (s) on which the course is given: Bachelor of Pharmacy
- Major or Minor element of programs: Major
- Department offering the program : -------
- Department offering the course : Pharmacognosy
- Academic year Level : Fourth /Second term
- Date of specification approval : / / 2018

B- Basic information:

- Title: Biotechnology of Natural Products code: PG 426
- Credit Hours: ---
- Lectures : 2 hrs/week
- Practical : 2 hrs/week
- Tutorials : ---
- Total : 3 hrs/week

C- Professional information:

1- Overall aim of the course:

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

Illustrate the fundamental knowledge about plant tissue culture, biotransformation and genetic engineering.

2- Intended Learning Outcomes (ILOs):

A- Knowledge and Understanding	
a_1	Define plant tissue culture
a_2	Identify techniques of micropropagation, media and their preparation, culture initiation and plant regeneration
a3	Summarize biotransformation principles and approaches based on pathway of secondary metabolites and by using cell culture and plant enzymes
a4	Demonstrate plant genetics principles based on DNA technology including plant genes and enzymes coding
a5	Describe applications of the previously mentioned technology in pharmaceuticals and related fields
a6	Explain plant biotechnology and genetic engineering used for production of biosynthetic enzymes for natural products.
B- Professional and Practical skills	
b_1	Deal with different chemicals in a right and safe way.
b_2	Use different abbreviations and medical terms belonging to tissue culture, biotransformation and plant genetics
b_3	Monitor and control growth of a callus.
b4	Perform DNA extraction and detection.
C- Intellectual skills	
c_1	select the appropriate biochemical pathway for production of active principles in an efficient way.
c_2	Integrate plant cell biology and genetic information to estimate the pharmaceutically active compounds qualitatively.
D- General and Transferable skills	
d_1	Work effectively in a team.
d_2	Acquire computer skills through the use of database, internet and word processing
d_3	Demonstrate critical thinking, decision making and problem solving skills

D- Contents:

Week No.	Lecture contents (2 hrs/lec.)	Practical session (2hrs/lab)
1	- Introduction to plant tissue culture - Plasticity and totipotency. - The culture enlivenment. - Plant cell culture media.	- Lab safety -Introduction to tissue culture techniques.
2	- Plant growth regulators - Culture types - Plant regeneration	- Sterilization for tissue culture. -Demonstration of different equipments used in plant tissue culture lab - Component of tissue cultured media.
3	- Micro propagation	- Micropropagation. -Production of callus from leaves.
4	- Introduction to plant biotransformation - Biotransformation using plant cells and organ culture. - Pathway transformation.	- *In Vitro* culture of carrot root (Production of callus).
5	- Biotransformation using immobilized cell culture. -Genetic engineering approach towards transformation. - Biotransformation using plant enzymes. - Biotransformation of selected secondary metabolites.	-Production of callus from seeds (fenugreek)
6	- Introduction of plant genetics - A natural vehicle for introducing new gene into plant.	-Activity: Study of different metabolic pathways that could be used in biotransformation.
7	**Mid term Exam**	
8	- Horizontal gene transformation - The Ti plasmid and plant genetic engineering	- Introduction of plant molecular biology and biotechnology. -Extraction of strawberry DNA.
9	- The role of organisms in genetic engineering. - Application and purpose of plant genetic engineering	- DNA extraction from leaf.
10	- Genetic engineering of biosynthetic enzymes for natural products - Genetically engineered plant fats	- Electrophoresis of isolated DNA sample.
11	- Production of candidate vaccines in plant tissue. - Genetic markers for plant breeding (DNA polymorphism)	- Detection of food chromosome by PCR.
12	-Authentication of components from a mixture of herbal materials by genetic engineering techniques.	-Group discussion (activity): using genbank to source and identify different genes.
13	- Other purposes of genetic engineering	-Practical exam
14	-Revision and open discussion.	-Practical exam
15	Final Exam	

E- Teaching and Learning Methods:

- Lectures.
- Practical session.
- Self learning and problems solving (Activities (internet search about different topics including tissue culture techniques, DNA extraction…etc, then presenting data as a report and presentation), open discussion).
- Videos for demonstration.

F- Student Assessment Methods:

Written exams to assess : a1, a2, a3, a4, a4, a5, a6 and c1.

Practical exams to assess: b1, b2, b3, b4, c1, c2 and d1.

Oral exam to assess: a1, a2, a3, a4, a5, a6, c1, d1 and d3.

Activities to assess: d1, d2 and d3.

Assessment schedule :

Assessment (1): Mid term Exam	Week 7
Assessment (2): Activity **(researches and reports)**	Week 6 and 12
Assessment (3): Practical exam	Week 13, 14
Assessment (4): Written exams	Week 15
Assessment (5): Oral exams	Week 15

Weighting of Assessment

Assessment method	Marks	Percentage
Mid term Exam	10	10%
Activity	5	5%
Practical exam	20	20%
Written exam	50	50%
Oral exam	15	15%
TOTAL	100	100%

G- Facilities Required for Teaching and Learning:

- For lectures: Black (white) boards, data show.
- For Labs: Chemicals e.g. sod. hypochloride (chlorox), ethanol, glassware, jar with a cap, beaker, sterile petri-dishes, callus initiation medium plates, Para film, aluminum foil, Forceps, digital balances and flame.

H- List of References:

1- Course Notes: Student book of Biotechnology of natural products approved by Pharmacognosy department (2018).

2- Essential Books:

- SRIVASTAVA, Vikas; MEHROTRA, Shakti; MISHRA, Sonal (ed.). Hairy Roots: An Effective Tool of Plant Biotechnology. Springer, 2018.
- ORHAN, Ilkay Erdogan (ed.). Biotechnological production of plant secondary metabolites. Bentham science publishers, 2012.
- CHAWLA, H_S_. Introduction to Plant Biotechnology (3/e). CRC Press, 2011.
- ARORA, Rajesh, et al. (ed.). Medicinal plant biotechnology. CABI, 2010.
- Davis, J. M. Basic Cell Culture. Published by IRL Press, 1994.

- Hammond, J., McGarvey, P. and Yusibov Eds. Plant Biotechnology. Published by Springer, 2000.
- Crommmlin, J. A. and Sindelar, R. D. Pharmaceutical Biotechnology. Published by Taylor and Francis, 2002.
- Schuler, M. A and Zialinski, R. E. Methods in Plant Molecular Biology. Published by Academic Press. Inc., 1989.

2- Recommended Books

- Rajeev K. Varshney, Manish K. Pandey, Annapurna Chitikineni, 'Plant Genetics and Molecular Biology', springer 2018.
- VASIL, Indra K.; THORPE, Trevor A. (ed.). Plant cell and tissue culture. Springer Science & Business Media, 2013.
- ANIS, Mohammad; AHMAD, Naseem (ed.). Plant Tissue Culture: Propagation, Conservation and Crop Improvement. Singapore: Springer, 2016.
- Plant Gene Isolation; Foster, G. D. Twell, D ; John Wiley& Sons (1996)
- Genetics; Weaver, F. R and Hedrick, P. W. 3rd Ed.WCB (1996).
- Biotechnology ; Smith, J. E. 3rd, Cambridge University Press (1996)
- Genetics; P.K. Gupta 3rd.Ed Rakish Kumar (2004) .

4- Periodicals and websites:

- Plant Biotechnology, J. Molecular Biology, Plant Molecular Biology, Plant Cell Physiology, Die Pharmazie; Planta medica, Phytochemistry, J. of Natural Products and Fitoterapia .
- http:// www.elsevier.com/phytochem
- http:// www.elsevier.com/phytomed
- http:// www.wiley.co.uk.
- http:// bioweb@cellbiol.com

Course Coordinator: Prof. Dr. Samih EL Dahmy

Head of Department: Prof. Dr.

Date: / / 2018 تم مناقشة وإعتماد توصيف المقرر من مجلس القسم بتاريخ

Matrix I of Biotechnology of Natural Products Course 2018-2019

Course Contents		ILOs of Botany and Plant Taxonomy Course														
		Knowledge and understanding						Professional and practical skills				Intellectual skills		Transferable and general skills		
		a1	a2	a3	a4	a5	a6	b1	b2	b3	b4	c1	c2	d1	d2	d3
Lectures																
1	- Introduction to plant tissue culture - Plasticity and totipotency. - The culture enlivenment. - Plant cell culture media.	x	x									x				
2	- Plant growth regulators - Culture types - Plant regeneration	x	x									x				
3	- Micro propagation	x	x													
4	- Introduction to plant biotransformation - Biotransformation using plant cells and organ culture. - Pathway transformation.			**x**												
5	- Biotransformation using immobilized cell culture. -Genetic engineering approach towards transformation. - Biotransformation using plant enzymes. - Biotransformation of selected secondary metabolites.			**x**												
6	- Introduction of plant genetics - A natural vehicle for introducing new gene				**x**	**x**	**x**						**x**			

	into plant.															
7	- Horizontal gene transformation - The Ti plasmid and plant genetic engineering				x	x	x						x			
8	- The role of organisms in genetic engineering. - Application and purpose of plant genetic engineering				x	x	x						x			
9	- Genetic engineering of biosynthetic enzymes for natural products - Genetically engineered plant fats				x	x	x						x			
10	- Production of candidate vaccines in plant tissue. - Genetic markers for plant breeding (DNA polymorphism)				x	x	x						x			
11	-Authentication of components from a mixture of herbal materials by genetic engineering techniques.				x	x	x						x			
12	- Other purposes of genetic engineering				x	x	x						x			
Practical																
13	- Lab safety -Introduction to tissue culture techniques.							x	x		x	x				x
14	- Sterilization for tissue culture. -Demonstration of different equipments used in plant tissue culture lab - Component of tissue cultured media.							x	x		x	x				x
15	- Micropropagation. -Production of callus from leaves.							x	x			x				x
16	- *In Vitro* culture of carrot root (Production of callus).							x	x		x	x				x

17	-Production of callus from seeds (fenugreek)		x			x	x				x
18	-Activity: Study of different metabolic pathways that could be used in biotransformation.		x						x	x	x
19	- Introduction of plant molecular biology and biotechnology. -Extraction of strawberry DNA.		x		x	x		x			x
20	- DNA extraction from leaf.		x		x	x		x			x
21	- Electrophoresis of isolated DNA sample.		x		x	x		x			x
22	- Detection of food chromosome by PCR.		x		x	x		x			x
23	-Group discussion (activity): using genbank to source and identify different genes.		x		x			x	x	x	x

Matrix II of Biotechnology of Natural Products Course

National Academic Reference Standards NARS		Program ILOs	Course ILOs	Course contents	Sources	Teaching and learning methods			Weighting of assessment		
						Lecture	Practical session	Self learning	Written exam	Practical exam	Oral exam
2.1	Principles of basic, pharmaceutical, medical, social, behavioral, management,	A2	a1, a2	- Introduction to plant tissue culture - Plasticity and totipotency. - The culture enlivenment. - Plant cell culture media.	Student book	x			x		x
				- Plant growth regulators - Culture types - Plant regeneration	Student book	x		x	x		x
				- Micro propagation	Student book	x		x	x		x
				- Introduction to plant biotransformation	Student book	x	x		x	x	x

2.2	health and environmental sciences as well as pharmacy practice. Physical – chemical properties of various substances used in preparation of medicines including inactive and active ingredients as well as biotechnology and radiolabelled	A10	a3	- Biotransformation using plant cells and organ culture. - Pathway transformation.							
				- Biotransformation using immobilized cell culture. -Genetic engineering approach towards transformation. - Biotransformation using plant enzymes. - Biotransformation of selected secondary metabolites.	Student book and internet	x	x		x	x	x
			a4, a5, a6	- Introduction of plant genetics - A natural vehicle for introducing new gene into plant.	Student book and internet	x	x		x	x	x
				- Horizontal gene transformation - The Ti plasmid and plant genetic engineering	Student book	x		x	x		x
				- The role of organisms in genetic engineering. - Application and purpose of plant genetic engineering	Student book	x	x		x		x
				- Genetic engineering of biosynthetic enzymes for natural products - Genetically	Student book	x	x		x		x

	products.			engineered plant fats							
				- Production of candidate vaccines in plant tissue. - Genetic markers for plant breeding (DNA polymorphism)	Student book and internet	x	x	x	x		x
				-Authentication of components from a mixture of herbal materials by genetic engineering techniques.	Student book and internet	x	x	x	x		x
				- Other purposes of genetic engineering							
3.2	Handle and dispose chemicals and pharmaceutical preparations safely	B2	b1	- Lab safety -Introduction to tissue culture techniques.	Practical notes		x			x	
3.1	Use the proper pharmaceutical and medical terms, abbreviations and symbols in pharmacy practice.	B1	b2	- Sterilization for tissue culture. -Demonstration of different equipments used in plant tissue culture lab - Component of tissue cultured media.	Practical notes		x			x	x
3.4	Extract, isolate,	B7	b3								

	synthesize, purify, identify, and/or standardize active substances from different origins.		b4	- Micropropagation. -Production of callus from leaves.	Practical notes, recommended books		x			x	x
				- *In Vitro* culture of carrot root (Production of callus).	Practical notes, recommended books		x			x	x
				-Production of callus from seeds (fenugreek)	Practical notes, recommended books		x			x	x
4.5	Select the appropriate methods of isolation, synthesis, purification, identification, and standardization of active substances from different origins.	C10	c1, c2	-Activity: Study of different metabolic pathways that could be used in biotransformation.	Practical notes, recommended books		x			x	x
				- Introduction of plant molecular biology and biotechnology. -Extraction of strawberry DNA.	Practical notes, recommended books		x			x	x
				- DNA extraction from leaf.	Practical notes, recommended books		x			x	x
				- Electrophoresis of isolated DNA sample.	Practical notes, recommended books						
				- Detection of food chromosome by PCR.	Practical notes, recommended books		x			x	x
5.3	Work effectively in a team	D3	d1	**-Activity**	Practical notes, recommended			x		x	

					books						
5.4	Use numeracy, calculation and statistical methods as well as information technology tools.	D5	d2	**-Activity**	Practical notes, recommended books			x		x	
5.10	Implement writing and thinking, problem-solving and decision-making abilities.	D11	d3	**-Activity**	Practical notes, recommended books			x		x	

Course Coordinator : Prof. Dr. Samih El-Dahmy
Head of department : Prof. Dr.
Date: / 10 / 2018

COURSE SPECIFICATIONS

Clinical Biochemistry 2

Fourth year – second Term
2018-2019

Course Specificationof Clinical Biochemistry II

University: Zagazig Faculty: Pharmacy

A- Course specifications:

Program(s) on which the course is given: Bachelor of Pharmacy

Major or Minor element of programs: Major

Department offering the program: -------

Department offering the course: Biochemistry department

Academic year/Level: Fourth year/second term

Date of specification approval:

B- Basic information:

Title: Clinical Biochemistry II Code: BC 423

Lectures : 2 hrs/week

Practical: 2 hrs/week

Tutorials: ---

Total: 3 hrs/week

C- Professional information:

1-Overall Aims of the Course:

On completion of the course, students will be able to discuss disorders of some organs, their clinical features and diagnosis. Moreover, they will be able to discuss diagnosis of anemia and to explain urine analysis and the use of molecular biology in diagnostics

2-Intended Learning Outcomes of Clinical Biochemistry II (lLOs):

A- Knowledge and Understanding	
a1	Describe the functions of some organs such as liver, kidney and heart.
a2	Outline disorders of liver, kidney, heart and GIT.
a3	Illustrate the etiology and clinical features of liver, kidney, heart and GIT disorders.
a4	Discuss blood function and diagnosis of anemia.
a5	Explain the importance of urine analysis in diagnosis of diseases.
a6	Describe the use of molecular biology in diagnostics.
a7	Identify the importance of some biomarkers of bone disease.
B- Professional and Practical skills	
b1	Handle chemicals and biological samples safely.
b2	Perform laboratory tests to identify various diseases.
C- Intellectual skills	
c1	Apply good laboratory practice in pharmacy practice.
c2	Assess different analytical methods used for different metabolites and biological samples.
c3	Analyze and interpret quantitative data in a suitable form.
c4	Integrate scientific information from different sources in clinical biochemistry practice.
D- General and Transferable skills	
d1	Develop both written and oral communication.
d2	Evaluate information from different sources to improve professional abilities.
d3	Work effectively as a member of a team.
d4	Write reports and present it.
d5	Develop critical thinking and problem solving abilities.

D- Contents:

Week No.	Lecture (2hrs/week)	Practical session (2 hrs/week)
1	• Organ biology (liver)	• Lab safety rules & liver function test + Determination of total protein .
2	• Organ biology (kidney)	
3	• Organ biology (heart)	• Jaundice +bilirubin
4	• Gastrointestinal tract	
5	• Blood function and composition + activity	• Kidney function tests
6		
7	• Midterm	• Bone disorders
8	• Anemia	
9		• Urine analysis
10	• Urine analysis	
11		• Practical exam 1 (case +sheet)
12	• Genetic testing	• Practical exam 2
13		
14	- Revision & Open discussion	
15	Final exam	

E- Teaching and Learning Methods:

- Lectures
- Practical sessions
- Self learning (Activities, Open discussion...)

F- Student Assessment Methods:

1- Written & periodical exam to assess: a1, a2, a3, a4, a5, a6,a7,c4

2- Activity to assess: d1, d2, d3, d4, d5

3- Practical exam to assess: b1, b2, c1, c2, c3, d1, d2, d3, d4, d5

4- Oral exam to assess: a1, a2, a3, a3, a4, a5, a6, c4, d5

Assessment schedule:

Assessment (1): Midterm exam	Week 7
Assessment (2): Written exam	Week 15
Assessment (3): Oral exam	Week 15
Assessment (4): Practical exam 1,2	Week 11,12
Assessment (5): Activity	Week 6

Weighting of Assessment:

Assessment method	Marks	Percentage
Written exam	50	50%
Midterm exam	10	10%
Activity	5	5%
Practical exam	20	20%
Oral exam	15	15%
TOTAL	100	100%

G- Facilities Required for Teaching and Learning:

- Black (white) board, Data show, Laboratory equipment (spectrophotometer, water bath, centrifuge) and Chemicals.

H- List of References:

1- Course Notes: Student book of Clinical Biochemistry IIapproved by biochemistry department 2018-2019.

- Practical notes of Clinical Biochemistry II approved by biochemistry department 2018-2019.

2- Essential books:

i- Clinical biochemistry and metabolic medicine (8th edition);Martin A crok.(2012).

ii- Clinical biochemistry, lecture notes (9th edition); Simon Walker, Geoffery Beckett, Peter Rae, Peter Ashby (2013).

iii- Clinical biochemistry; fundamental of biomedical science; Nessar Ahmed, Oxford university press (2011).

iv- Clinical biochemistry, an illustrated colour text, (5th edition); Allan Gaw, Micheal j. Murrphy, Rajeev Srivastava, Robert A. Cowan, Denis St. j. O`Reilly (2013).

3- Recommended books:

i- Lippincott's Illustrated Review Biochemistry (fifth edition); Ferrier D.R., Harvey R.A.; Lippincott Williams & Wilkins (2010).

ii- Tietz Fundamentals of Clinical Chemistry Fundamentals (fifth edition) ; Burtis C.A., Ashwood E.R.; W.B. Saunders company (2005).

iii- Essentials of medical biochemistry with clinical cases; BahagavanN.V, Chung-Eun Ha; ElsevierInc. (2011).

4- Periodicals and websites:

https://labtestsonline.org

Indian J. of Clinical Biochemistry

Egyptian J. of biochem. and molecular biology.

Annals of Clinical Biochemistry

Arab J. of Laboratory Medicine,

J. of Cardiovascular diseases.

www.Pubmed.Com
www.sciencedirect.com.

Course Coordinators:

Head of department: Prof. Dr. Sahar Elsweify

Date:

Matrix I of Clinical biochemistry II course

Course Contents		ILOs of clinical biochemistry II course																	
		Knowledge and understanding							Professional and practical skills		Intellectual skills				General and transferable skills				
Lectures		a1	a2	a3	a4	a5	a6	a7	b1	b2	c1	c2	c3	c4	d1	d2	d3	d4	d5
1	Organ biology (liver)	X	x	X									x	x					
2	Organ biology (heart-kidney).	X																	
3			x	X															
4	GIT		x	X															
5	Blood compostion and function + activity				x														
6															x	x	x	x	x
7	Midterm																		
8	Anemia				x	X													
9																			
10	Urine analysis					X							x	x					
11																			
12	Genetic testing							x											
13							x												
14	**Revision and open discussion**																		
Practical sessions																			
1	Lab safety rules & liver function tests								x	x	x	x	X	x					

2	+ determination of total protein							x	X		x	X	x						
3	Jaundice +bilirubin							x	X		x	X	x						
4																			
5	Kidney function tests							x	x		x	X	x	x					
6																x	x	X	
7	Bone disorders								x		x	x	x	x				X	
8								x											
9	Urine analysis													x		x	x		
10								x											
11	Practical exam 1							X	X	X	x	x	x	x	x	x	x	X	
12	Practical exam 2																		

Matrix II of Clinical biochemistry II course

National Academic Reference Standards (NARS)		Program ILOs	Course ILOs	Course contents	Sources	Teaching and learning methods			Method of assessment			
						Lecture	Practical session	Self learning	Written exam	Practical exam	Periodical exam	Oral exam
2.11	Principles of body function in health and disease states as well as basis of genomic and different biochemical pathways regarding their correlation with different diseases.	A24	a1	Organ biology (liver, heart, kidney)	Student book Essential books	X			x		X	X
			a2	GIT	Student book Essential books	X			x		X	X
		A25	a3	Organ biology + GIT.	Student book Essential books	X			x		X	X
		A26	a6 a7	Genetic testing	Student book Essential books	x			x		x	x

2.12	Etiology, epidemiology, laboratory diagnosis and clinical features of different diseases and their pharmaco-therapeutic approaches	A27	a4	Blood function + composition	Student book Essential books	X			x			X
		A28	a5	Urine analysis	Student book Essential books	X			x			X
			a6 a7	Genetic testing	Student book Essential books	x			x			X
3.2	Handle and dispose chemicals and pharmaceutical preparations safely	B2	b1	Lab safety rules & liver function tests + determination of total protein	Practical notes		X			x		
	Program ILOs ExceedingNARS	B12	b2	liver function tests + determination of total protein	Practical notes		X			x		

4.2	Comprehend and apply GLP,GPMP, GSP and GCP guidelines in pharmacy practice	C5	c1	Lab safety rules & liver function tests + determination of total protein	Practical notes		X			x		
		C3	c2	Kidney function tests, bone disorders, urine analysis	Practical notes		X			x		
4.13	Analyze and interpret experimental results as well as published literature	C18	c3	Kidney function tests, bone disorders, urine analysis	Practical notes		X			x		

4.14	Analyze and evaluate evidence-based information needed in pharmacy practice	C19	c4	Kidney function tests, bone disorders, urine analysis	Student book, essential books	X			x		x	X
5.1	Communicate clearly by verbal and written means	D1	d1	Lab safety rules & liver function tests +determination of total protein Kidney function tests, bone disorders, urine analysis	Practical notes Recommended books Internet		X	x		x		
5.2	Retrieve and evaluate information from different sources to improve professional competencies	D2	d2	Activity (Case study- Report)	Recommended books Internet		X	x		x		

5.3	Work effectively in a team	D3	d3	Activity (Case study- Report)	Recommended books Internet		X	x		x		
5.9	Implement writing and presentation skills	D10	d4	Activity (Case study- Report)	Recommended books Internet		X	x		x		
5.10	Implement writing and thinking, problem- solving and decision-making abilities.	D11	d5	Revision- open discussion	Student book Essential books Recommended books Internet	X		x				x
				Activity (Case study- Report)	Recommended books Internet		x	x		x		

COURSE SPECIFICATIONS

Bioassay 2

Fourth year – secondTerm
2018-2019

Course Specification of Bioassay-2

University: **Zagazig** Faculty: **Pharmacy**

A- Course specifications:

Program(s) on which the course is given: Bachelor of Pharmacy
Major or Minor element of programs: Major
Department offering the program: -------
Department offering the course: Pharmacology & Toxicology Department
Academic year/Level: Fourth year /Second term
Date of specification approval: November 2018

B- Basic information:

Title: Bioassay (2) Code: PT426
Credit Hours: ---
Lectures: 2 hrs/week
Practical: 2 hrs/week
Tutorials: ---
Total: 3 hrs/week

C- Professional information:

1-Overall Aims of the Course:

1. On completion of the course, the student will be able to:
2. Explain the distribution of total body fluid.
3. Define osmolality and osmolarity and correlate them to electrolyte disorders.
4. Illustrate symptoms and treatments of electrolyte disorders.
5. Discuss endocrine disorders including: Thyroid, Pituitary, Adrenal gland disorders as well as estrogens and androgens disorders.
6. Define obesity and list its causes and treatments.
7. Illustrate Polycystic ovary syndrome and its treatments
8. Define diabetes and list its types as well as identify its treatments.

2-Intended Learning Outcomes of Bioassay-2 course

A- Knowledge and Understanding	
a1	Explain the distribution of body fluids
a2	Define osmolality and osmolarity
a3	Illustrate etiology and clinical features of electrolyte and endocrine disorders
a4	Illustrate diagnosis of endocrine electrolyte and endocrine disorders
a5	Identify pharmacotherapeutic approaches of electrolyte and endocrine disorders
B- Professional and Practical skills	
b1	Choose the appropriate methods of bioassay based on the nature of the bioactive compound
b2	Construct proper research methodology on pathologic patient cases and analyze results
C- Intellectual skills	
c1	Calculate osmolarity of different body fluids in health and disease states as well as pharmaceutical preparations.
c2	Deduce the proper drug for management of electrolytes and endocrine disorders
c3	Correlate each bioactive compound to the proper method of standardization.
D- General and Transferable skills	
d1	Write and present reports in a professional manner.
d2	Develop critical thinking, and problem-solving skills.

D- Contents:

Week No.	Lecture (2hrs/week)	Practical session (2hrs/week)
1	Distribution of total body fluid IV fluids	Enzyme linked immunosorbent assay technique
2	Osmolality and osmolarity Hypertonic saline	Enzyme linked immunosorbent assay technique
3	Hyponateremia and hypo-osmolar states	Polymerase chain reaction technique
4	Hypernateremia and hyper-osmolar states	Polymerase chain reaction technique
5	Potassium disorders	Western blot technique
6	Disorders of Mg++ Disorders of Ca++ Disorders of phosphorus	Western blot technique
7	Periodic exam	Periodic Exam
8	Thyroid disorders	Radioimmuno-assay technique
9	Pituitary gland disorders	Radioimmuno-assay technique
10	Adrenal gland disorders	Biological Assay of hormones & activity assessment
11	Estrogens and androgens	Biological Assay of hormones & activity assessment
12	Obesity	Practical exam
13	Polycystic ovary syndrome	Practical exam
14	Diabetes mellitus	
15	Final exam	

E- Teaching and Learning Methods:

- Lectures
- Practical sessions
- Problem solving (solving various cases of electrolytes and endocrine disorders)

F- Student Assessment Methods:

1- Written exam (periodic, final) to assess a1, a2, a3, a4, a5, c1, c2, c3.

2- Activity (group assignment) to assess d1, d2

3- Practical exam to assess b1, b2.

4- Oral exam to assess a1, a2, a3, a4, a5, c1, c2, c3.

Assessment schedule:

Assessment (1): Periodic exam	Week 7
Assessment (2): Activity	Week 10,11
Assessment (3): Practical exam	Week 12,13
Assessment (4): Final written exam	Week 15
Assessment (5): Oral exams	Week 15

Weighting of Assessment:

Assessment method	Marks	Percentage
Periodic exam	10	10%
Activity	5	5%
Practical exam	20	20%
Final written exam	50	50%
Oral exam	15	15%
TOTAL	100	100%

G- Facilities Required for Teaching and Learning:

- Black (white) board, Data show.

H- List of References:

1- Course Notes: Student book of bioassay 2 approved by the Pharmacology department.
Practical notes of bioassay 2 approved by the Pharmacology department

2- Essential books:

Bioassay Techniques for Drug Development; Atta-ur-Raham, Iqbal Choudhary M. and Thomson W.J.; Hardwood academic (2001)

3- Recommended books:

Lippincott illustrated reviews-pharmacology (six edition, 2009).

4- Periodicals and websites:

http://canadianpharmacistsletter.therapeuticresearch.com/ce/ceCourse.asp

---

Course Coordinator: Prof. Dr. Mona Fouad

Head of Department: Prof. Dr. Mona Fouad

Date: 2018/11/26 م تم مناقشة و اعتماد توصيف المقرر من مجلس القسم بتاريخ

Matrix I of Bioassay-2 course

Course Contents		ILOs of Biochemistry 1 course											
		Knowledge and understanding					Professional and practical skills		Intellectual skills			General and transferable skills	
Lectures		a1	a2	a3	a4	a5	b1	b2	c1	c2	c3	d1	d2
1	Distribution of total body fluid IV fluids	x											
2	Osmolality and osmolarity Hypertonic saline		x						x				
3	Hyponateremia and hypo-osmolar states		x	x	x	x				x			
4	Hypernateremia and hyper-osmolar states		x	x	x	x				x			
5	Potassium disorders			x	x	x				x			
6	Disorders of Mg++ Disorders of Ca++ Disorders of phosphorus			x	x	x				x			
7	Thyroid disorders			x	x	x				x			
8	Pituitary gland disorders			x	x	x				x			
9	Adrenal gland disorders			x	x	x				x			
10	Estrogens and androgens			x	x	x				x			

11	Obesity			x	x	x				x			
12	Polycystic ovary syndrome			x	x	x				x			
13	Diabetes mellitus			x	x	x				x			
Practical sessions													
14	Enzyme linked immunosorbent assay technique						x	x			x		
15	Polymerase chain reaction technique						x	x			x		
16	Western blot technique						x	x			x		
17	Polymerase chain reaction technique						x	x			x		
18	Radioimmuno-assay technique						x	x			x		
19	Biological Assay of hormones						x	x			x		
20	Activity									x	x	x	x

Matrix II of Bioassay-2 course											
National Academic Reference Standards (NARS)		**Program ILOs**	**Course ILOs**	**Course contents**	**Sources**	**Teaching and learning methods**			**Method of assessment**		
						Lecture	Practical session	Self learning	Written exam	Practical exam	Oral exam
2.11	Principles of body function in health and disease states as well as basis of genomic and different biochemical pathways regarding their correlation with different diseases.	A24	a1	Distribution of total body fluid & IV fluids	Student book	x			x		x
			a2	Osmolality and osmolarity & Hypertonic saline	Student book	x			x		x

2.12	Etiology, epidemiology, laboratory diagnosis and clinical features of different diseases and their pharmacotherapeutic approaches	A27	a3	electrolyte disorders endocrine disorders	Student book	x			x		x
		A28	a4	electrolyte disorders endocrine disorders	Student book	x			x		x
		A29	a5	electrolyte disorders endocrine disorders	Student book	x			x		x
2.17	Methods of biostatistical analysis and pharmaceutical calculations.	A36	a2	Osmolality and osmolarity	Student book	x			x		x
3.4	Extract, isolate, synthesize, purify, identify, and /or standardize active substances from different origins	B7	b1	Enzyme linked immunosorbent assay technique	Practical book		x			x	
				Polymerase chain reaction technique	Practical book		x			x	
				Western blot technique	Practical book		x			x	
				Radioimmuno-assay technique	Practical book		x			x	
				Biological Assay of hormones	Practical book		x			x	

3.11	Conduct research studies and analyze the results	B19	b2	Enzyme linked immunosorbent assay technique	Practical book		x	x		x	
				Polymerase chain reaction technique	Practical book		x	x		x	
				Western blot technique	Practical book		x	x		x	
				Radioimmuno-assay technique	Practical book		x	x		x	
				Biological Assay of hormones	Practical book		x	x		x	
4.5	Select the appropriate methods of isolation, synthesis, purification, identification, and standardization of active substances from different origins	C10	c3	Enzyme linked immunosorbent assay technique	Practical book		x			x	
				Polymerase chain reaction technique							
				Western blot technique							
				Polymerase chain reaction technique							
				Radioimmuno-assay technique							
				Biological Assay of hormones							
4.9	Utilize the pharmacological	C14	c2	electrolytes and endocrine disorder	Student book	x			x		x

	basis of therapeutics in the proper selection and use of drugs in various disease conditions										
	Ex NARs	B21	c1	Osmolality and osmolarity	Student book	x			x		x
5.9	Implement writing and presentation skills	D10	d1		Practical book Internet websites			x		x	
5.10	Implement writing and thinking, problem- solving and decision- making abilities.	D11	d2		Activity			x		x	

COURSE SPECIFICATIONS

Toxicology 2

Fourth year – secondTerm
2018-2019

Course specification of Toxicology-2

University: Zagazig Faculty: Pharmacy

A- Course specifications:

Program (s) on which the course is given: Bachelor of Pharmacy

Major or Minor element of programs: Major

Department offering the course: Pharmacology & Toxicology Department

Academic year Level: Fourth year/ semester 2

Date of specification approval: Jan 2019

B- Basic information:

Title: Toxicology-2 Code: PT427

Credit Hours: ---

Lectures: 2hrs/week

Practical: 2 hrs/week

Tutorials: ---

Total: 3 hrs/week

C- Professional information:

1-Overall aim of the course

On completion of the course, the student will be able to explain the mechanism of toxicity, target organ and treatment with different drug groups as well as teratogenic states of different drugs.

2- Intended Learning Outcomes of Toxicology-2 (ILOs)

A- Knowledge and Understanding	
a1	Describe common teratogenic states and the risk of drug use during pregnancy and breast feeding.
a2	Mention the clinical features and management of abuse of some drugs
a3	Discuss the mechanism of action and side effects of several drug groups as well as different drug-drug interactions.
a4	Define toxic profile of drugs and other xenobiotics
a5	Illustrate first aid measures regarding drug toxicity and emergency conditions.
B- Professional and Practical skills	
b1	Handle and dispose chemicals safely.
b2	Assess toxicity profiles of some xenobiotics.
b3	Demonstrate first aid measures in laboratory settings.
C- Intellectual skills	
c1	Suggest proper drug during pregnancy based on knowledge of drug toxic profile
c2	Evaluate prescribed drugs for drug-drug interactions or drug-induced disease
D-General and Transferable skills	
d1	Work effectively as a member of teamwork
d2	Develop critical thinking , decision making and problem solving abilities

D- Contents:

Week No.	Lecture contents (2 hrs/week)	Practical session (2hrs/week)
1	- Introduction to anti-microbial drugs	First aid measures
2	- Antiviral drugs part 1(Herpes, CMV)	case study of antiviral drugs (aciclovir,efavirenz).
3	- Antiviral drugs part 2(HIV, influenza)	Case study of antiviral drugs (lamivudine) Activity cases
4	- Cancer chemotherapy(DNA alkylating drugs, Topoisomerase inhibitors)	case study of anti cancer drugs
5	- Cancer chemotherapy (anthracyclinedrugs,vincaalkaloids,Platinum compounds)	Teratogenicity(Antihypertensive drugs, antiepliptic drugs)
6	- Antiprotozoal drugs and Anthelmentics	case study of antiprotozoal drugs activity cases
7	**Midterm exam**	
8	- Teratogenicitypart1(Antihypertensive drugs, antiepliptic,Anticoagulant)	Teratogenicity(Anticoagulant drugs,Vitamin A, methotrexate)
9	- Teratogenicity part 2 (Pregnancy: Therapeutic Considerations)	case study of antimicrobial agents (penicillins&cephlosporins)
10	- Antimicrobial agents(Antifolate)	case study of antimicrobial agents (flouroquinolones&linzolid) Activity cases
11	- Antimicrobial agents(cell wall synthesis inhibitors)	case study of antimicrobial agents &antifungal(Sulfonamides, Trimethoprim,fluconazole)
12	- Antimicrobial agents(protein synthesis inhibitors)	case study of antimicrobial agents &antifungal(Rifampin,ketoconazole)
13	-Antifungal quinolones and urinary tract antiseptics)	- **Practical exam 1**
14	-Antimicrobial therapy(antimycobacterial drugs -Antifungal & open discussion	- **Practical exam 2**
15	-Written exam	

E- Teaching and Learning Methods:

- Lectures
- Practical sessions
- Think/pair/share
- Case study
- Role play / demonstrative videos

F- Student Assessment methods:

1- Written exams to assess: a1, a2, a3, a4, a5

2- case study to assess: c1, c2, d1, d2

3- Practical exams to assess: b1, b2, b3

4- Oral exam to assess: a1, a2, a3, a4, a5

Assessment schedule

Assessment (1): Midterm exam	Week 7
Assessment (2): Activities	Week 3,6 ,10
Assessment (3): Practical exam	Week 13,14
Assessment (4): Final written exam	Week 15
Assessment (5): Oral exams	Week 15

Weighting of Assessment

Assessment method	Marks	Percentage
Midterm exam	10	10%
Activity in labs	5	5%
Practical practice & exam	20	20%
Final written exam	50	50%
Oral exam	15	15%
TOTAL	100	100%

G- Facilities required for teaching and learning:

• For lectures: Black (white) boards, data show, air conditioned classroom

• For practical: Well-equipped labs and chemicals.

H- List of References:

1- Course Notes: Student book of Toxicology (2) approved by Toxicology and Pharmacology department (2019)

- Practical notes of Toxicology (2) approved by Toxicology and Pharmacology department (2019)

2- Essential Books:

i- Goodman & Gilman's: The pharmacological basis of therapeutics (tenth edition); Hardman, Limbird, Gillman; McGraw-Hill Companies USA.
ii- The Basic Science of Poison (fifth edition); Klassen C.; McGraw-Hill Companies USA.
iii- Illustrated Toxicology: with study questions; Gupta, Meric (2018).

3- Recommended Books:

i- Integrated Pharmacology; Curtis, Suiter, Walker, Hottman; Mosby, London, UK.
ii- Poisoning & Drug overdose (seventh edition); Olson, IK (2019).
iii- Fundamental of toxicology.

4- Periodicals and websites:

Aquilina A. The extemporaneous compounding of paediatric medicines at Mater Dei Hospital. Journal of the Malta College of Pharmacy Practice.Issue.

http://canadianpharmacistsletter.therapeuticresearch.com/ce/ceCourse.asp...

Course Coordinator: Prof.Dr. Salah Gharieb

Head of Department: Prof.Dr. Mona Fouad

Date:2019/ / تم مناقشة و اعتماد توصيف المقرر من مجلس القسم بتاريخ

Matrix I of Toxicology 2 course

Course Contents		ILOs of Toxicology 2 course											
		knowledge and understanding					Professional and practical skills			Intellectual skills		Transferable and general skills	
Lectures		a1	a2	a3	a4	a5	b1	b2	b3	c1	c2	d1	d2
1	- Introduction to anti microbial		x	x	x								
2	- Antiviral drugs		x	x	x								
3	- Antiprotozoal drugs		x	x	x								
4	- Cancer chemotherapy(DNA alkylating drugs, Topoisomerase inhibitors)		x	x	x								
5	- Cancer chemotherapy (anthracyclinedrugs,vincaalkaloids,Platinum compounds)		x	x	x								
6	Midterm		x	x	x								
7	- Teratogenicity part1(Antihypertensive drugs, antiepliptic,Anticoagulant)	x		x									
8	- Teratogenicity part 2 (Pregnancy: Therapeutic Considerations)	x		x									
9	- Antimicrobial agents(Antifolate)			x	x								

10	- Antimicrobial agents(cell wall synthesis inhibitors)		x	x										
11	- Antimicrobial agents(protein synthesis inhibitors)		x	x	x									
12	-Antifungal quinolones and urinary tract antiseptics)		x	x	x									
13	-Antimicrobial therapy(antimycobacterial drugs		x	x	x									
14	-Antifungal		x	x	x									
	Practical session													
1	First aid measures &					x	x	x	x		x	x	x	
2	case study of antiviral drugs (aciclovir,efavirenz).						x	x			x	x	x	
3	case study of antiviral drugs (lamivudine)						x	x			x	x	x	
4	case study of anti cancer drugs						x	x			x	x	x	
5	Teratogenicity(Antihypertensive drugs, antiepliptic drugs Anticoagulant drugs,Vitamin A, methotrexate))						x	x		x				
6														
7	Case study of antiprotozoal drugs						x	x			x	x	X	

8	Teratogenicity(Anticoagulant drugs,Vitamin A, methotrexate)						x	x			x	x	X	
9	case study of antimicrobial agents (flouroquinolones&linzolid						x	x			x	x	X	
10	case study of antimicrobial agents &antifungal(Sulfonamides, Trimethoprim,fluconazole)						x	x			x	x	X	
11	case study of antimicrobial agents (penicillins&cephlosporins)						x	x			x	x	X	
12	antifungal(Rifampin,ketoconazole case study						x	x			x	x	X	x

Matrix II of Toxicology 2course

National Academic Reference Standards NARS		Program ILOs	Course ILOs	Course contents	Sources	Teaching and learning methods			Weighting of assessment			
						lecture	practical session	case study/ think-pair-share	written exam	practical exam	oral exam	Midterm exam
2.1	Principles of basic, pharmaceutical, medical, social, behavioral, management, health and environmental sciences as well as pharmacy practice.	A7	a5	- First aid measures - Cancer chemotherapy -Teratogenicity -Antimicrobial agents	Student book Essential books	x			x		x	x
2.16	Toxic profile of drugs and other xenobiotics including sources, identification, symptoms, management control and first aid measures.	A33, A34	a1, a2,a3, a4, a5	- First aid measures - Cancer chemotherapy -Teratogenicity -Antimicrobial agents	Student book Essential books	x			x		x	x
3.2	Handle and dispose chemicals and pharmaceutical	B2	b1	First aid measures & case study of	Practical notes		x			x		

	preparations safely.			antiviral drugs (aciclovir,efaviren z). case study of antiviral drugs (lamivudine) case study of anti cancer drugs Teratogenicity(Ant ihypertensive drugs, antiepliptic drugs Anticoagulant drugs,Vitamin A, methotrexate)) Case study of antiprotozoal drugs								
3.7	3.7 Assess toxicity profiles of different xenobiotics and detect poisons in biological specimens	B13 B14	B2 B3	First aid measures & case study of antiviral drugs (aciclovir,efaviren z). case study of antiviral drugs (lamivudine) case study of anti cancer drugs Teratogenicity(Ant ihypertensive drugs, antiepliptic drugs Anticoagulant	Practical notes Practical notes		x x	X x		x x		

				drugs,Vitamin A, methotrexate)) Case study of antiprotozoal drugs								
4.9	Utilize the pharmacological basis of therapeutics in the proper selection and use of drugs in various disease conditions.	C14	c1 c2	- Cancer chemotherapy -Teratogenicity -Antimicrobial agents	Practical notes		x	X				
4.11	Assess drug interactions, ADRs and pharmacovigilance.	C16	c1 c2	- Cancer chemotherapy -Teratogenicity -Antimicrobial agents	Practical notes		x	X				
5.3	Work effectively in a team.	D3	d1	- First aid measures - Cancer chemotherapy -Teratogenicity -Antimicrobial agents	case study/ think-pair-share		x	X				
5.10	Implement writing and thinking, problem- solving and decision-making abilities.	D11	d2	- First aid measures - Cancer chemotherapy -Teratogenicity -Antimicrobial agents	case study/ think-pair-share		x	X				

Course Coordinator: Prof.Dr. Salah Gharieb

Head of Department: Prof.Dr. Mona Fouad

Date: تم مناقشة و اعتماد توصيف المقرر من مجلس القسم بتاريخ / / م

COURSE SPECIFICATIONS

Medicinal Chemistry-4

Fourth year – secondTerm
2018-2019

Course specification of Medicinal Chemistry-4

University: Zagazig **Faculty: Pharmacy**

A- Course specifications:

Program (s) on which the course is given: Bachelor of Pharmacy

Major or Minor element of programs: Major

Department offering the course: Medicinal chemistry department

Academic year Level: Fourth year/ semester 2

Date of specification approval: 26-11- 2018

B- Basic information:

Title: Medicinal Chemistry-4 Code: MC423

Credit Hours: ---

Lectures: 2hrs/week

Practical: 2 hrs/week

Tutorials: ---

Total: 3 hrs/week

C- Professional information:

1-Overall aim of the course

On completion of the course, students will be able to outline synthesis, estimation, mechanism of action, structure-activity relationships, adverse reactions & specific medicinal uses of steroids, antihistaminic & anti -ulcer drugs& vitamins as well as drug design and metabolism.

2-Intended Learning Outcomes of Medicinal Chemistry (4) (lLOs):

A- Knowledge and Understanding	
a1	Illustrate proper analytical methods for assay of hormones, antihistaminic drugs, anti-ulcers & vitamins.
a2	Define the basis of drug design, drug development & drug latentiation.
a3	Describe suitable methods for synthesis of hormones, antihistaminic drugs, anti-ulcers & vitamins.
a4	Explain drug metabolism & pathway of the drug in the body.
a5	Describe calculation of different physicochemical parameters of drugs.
B- Professional and Practical skills	
b1	Apply colorimeter methods for measuring light absorption in UV-VIS region.
b2	Analyze the results obtained from colorimetric assay of drugs.
C- Intellectual skills	
c1	Apply GLP guidelines in handling chemicals & laboratory equipments (colorimeter).
c2	Select the most appropriate quantitative and qualitative methodology for assay of different pharmaceutical preparations.
D- General and Transferable skills	
d1	Work effectively as apart of team with the students in the lab during experiments.
d2	Adopt safety guidelines during lab work.
d3	Implement writing lab reports and present it.
d4	Implement writing and thinking, problem solving and decision making skills

D- Contents:

Week No.	Lecture (2hrs/week)	Practical session (2hrs/week)
1	**Steroidal hormones** -Nomenclature of Steroids -Female sex hormones (estrogenic agents) -Nonsteroidal anti-estrogenic agents -aromatase inhibitor	-measurement of light absorption in UV-Visible region (Beerr-Lambert,s law)
2	-Female sex hormones (progesterone derivatives), oral contraceptives -Androgens& anti-androgenic agents	-Determination of λ max of a colored solution and study of the factors affecting the optimization of the method
3	-Anabolic Agents -Mineralocorticoids and Glucocorticoids	-Colorimetric assay of pyridoxine.
4	-Drug Metabolism -Functionalization reaction (phase I)	-Colorimetric assay of sulfacetamide
5	-Conjugation reactions (phase II)	-Colorimetric assay of sod. Salicylate. Activity (Reports)
6	Midterm exam	Week off for midterm exam
7	-Factors affecting drug metabolism) -Introduction in Drug design	Colorimetric assay of dexamethasone
8	-Development of drugs -Drug Latentiation	Assay of Vitamin C
9	-Physicochemical factors & Drug receptor-interaction	Colorimetric assay of Vitamin C
10	-Antihistaminics (H1-antagonists)	Colorimetric assay of Iron containing capsules. Activity (case study).
11	-Antiulcer Drugs (H2-antagonists,proton pump inhibitors & prostaglandins)	Colorimetric assay of Vitamin A
12	-Vitamins Lipid-soluble vitamins (A,D,E&K)	Colorimetric assay of Vitamin E
13	-Water-soluble vitamins (vitamin B_1,B_2,B_3)	-Practical exam
14	-Folic acid , Vitamin B_{12} &Vitamin C	-Practical exam
15	-final written exam	

E- Teaching and Learning Methods:

- Lectures
- Practical sessions
- Self -learning (Internet, report writing)
- Case study.

F- Student Assessment Methods:

1- Written exam to assess a1, a2, a3, a4, a5, c2

2- Activity to assess d1, d3

3- Practical exam to assess b1, b2, c1, c2, d2, d3, d4

4- Oral exam to assess a1, a1, a3, a4, a5, c2

Assessment schedule:

Assessment (1): final Written exam	Week 15
Assessment (2): mid-term exam	Week 7
Assessment (3): Activity**(case study)**	Week 5,10
Assessment (4): Practical exams	Week 13,14
Assessment (5): Oral exam	Week 15

Weighting of Assessment:

Assessment method	Marks	Percentage
Final written exam	50	50%
Mid term exam	10	10%
Activities	5	5%
Practical exam	20	20%
Oral exam	15	15%
TOTAL	100	100%

G- Facilities Required for Teaching and Learning:

- Black (white) board, Data show, laboratory equipment and chemicals.

H- List of References:

1- Course Notes:

- Practical notes of Medicinal chemistry (4) approved by medicinal chemistry department 2019.

2- Essential Books:

-Wilson & Griswold's Textbook of Organic: Medicinal and Pharmaceutical Chemistry; Wilson, Charles Owens; Beale, John Marlowe; Block, John H.; Block, John H.; Griswold, Ole; Wiley-Interscience (2011).

-Foye's Principles of Medicinal Chemistry; Williams, David A., William O. Foye, and Thomas L. Lemke; Lippincott Williams and Wilkins (2016).

-B.p. &U.S Pharmacopia (1988-2017)

3- Recommended books

i- An Introduction to Medicinal Chemistry; Patrick, Graham L, Oxford (2017)

4- Periodicals, Web Sites, etc

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

- **Course Coordinator: Prof. Dr. Samy Megahed**
- **Head of department:Prof.Dr. Kamel A. Metwally**
- **Date: تـم مناقشـة واعتمـاد توصـيف المقـرر مـن مجلـس القسـم المقـرر بتـاريخ**

26-11-2018

Matrix I of Medicinal chemistry4 Course

Course Contents		ILOs of Medicinal chemistry 4 course												
		Knowledge and understanding					Professional and practical skills		Intellectual skills		General and transferable skills			
Lectures		a1	a2	a3	a4	a5	b1	b2	c1	c2	d1	d2	d3	D4
1	**Steroidal hormones** -Nomenclature of Steroids -Female sex hormones (estrogenic agents) -Nonsteroidal anti-estrogenic agents -aromatase inhibitor	x		x						x				
2	-Female sex hormones (progesterone derivatives), oral contraceptives -Androgens& anti-androgenic agents	x		x						x				
3	-Anabolic Agents -Mineralocorticoids and Glucocorticoids	x		x						x				
4	Drug metabolism,phaseI(functionalization reaction)				x									
5	Conjugation reaction(phaseII). Factors affecting drug metabolism.				x									
6	Introduction in drug design, development of drugs, drug latentiation		x											
7	Development of drugs Drug Latentiation		x											

8	Physicochemical factors&Drug-Receptor interaction					x									
9	Antihistaminics(H1-antagonist)	x		x						x					
10	Antiulcer drugs(H2-antagonist,proton pump inhibitor,prostaglandins)	x		x						x					
11	Vitamins;lipid-soluble vitamins(A,D,E&K)	x		x						x					
12	water-soluble vitamins(vitamin B1,B2&B3)	x		x						x					
13	Folic acid,Vitamin B12&Vitamin C	x		x						x					
Practical sessions															
1	Measurment of light absorption in UV-Visible region (Beer-Lambert`s law)						x		x		x	x			
2	Determination of lamda max of a coloured solution &study of factors affecting the optimization of the method.						x		x		x	x			
3	Colorimetric assay of cortisone,sulfacetamide,procaine,captopril,saliclylic acid,Patoprazole,Iron containing capsules (Fefol)®							x		x	x	x			
4	Assay of prescription No.1(Diphenhydramine hydrochloride,zinc sulphate) Assay of prescription No.2(Vitamin C & calcium gluconate)							x		x	x	x			
5	Activities										x		x	x	

Matrix II of Medicinal chemistry 4 course

National Academic Reference Standards (NARS)		Program ILOs	Course ILOs	Course contents	Sources	Teaching and learning methods			Methods of assessment		
						Lecture	Practical session	Reports & case study	Written exam	Practical exam	Oral exam
2.3	Principles of different analytic techniques using GLP guidelines and validation procedures.	A11	a1	Hormones	student book	x			x		X
				Antihistaminics , Antiulcer Drugs	student book	x			x		X
				Vitamins	student book	x			x		X
2.5	Principles of drug design, development and synthesis	A14	a2	Introduction in Drug design Development of drugs Drug Latentiation	student book	x			x		X
									x		X
		A15	a3	Hormones	student book	x			x		X
				Antihistaminics , Antiulcer Drugs	student book	x			x		X

				Vitamins	student book	x			x		X
2.8	Principles of pharmacokinetics and biopharmaceutics with applications in therapeutic drug monitoring, dose modification and bioequivalence studies.	A19	a4	Drug Metabolism, Functionalization reaction,	student book,essential books	x			x		X
				Conjugation reactions,Factors affecting drug metabolism	student book	x			x		X
2.17	Methods of biostatistical analysis and pharmaceutical calculations	A36	a5	Physicochemical factors & Drug receptor-interaction	student book	x			x		X
3.8	Apply techniques used in operating pharmaceutical equipment and	B15	b1	Measurment of light absorption in UV-Visible region(Beer-Lambert`s law)	Practical notebook		x			x	

	instruments			Determination of lamda max of a coloured solution &study of factors affecting the optimization of the method.	Practical notes		x			x	
3.1 1	Conduct research studies and analyze the results	B19	b2	Colorimetric assay of dexamethasone	Practical notes		x			x	
				Colorimetric assay of sulfacetamide	Practical notes		x			x	
				Colorimetric assay of vit C	Practical notes		x			x	
				Colorimetric assay of Vit E	Practical notes		x			x	
				Colorimetric assay of saliclylic acid	Practical notes		x			x	
				Assay of prescription No.1 Diphenhydramine hydrochloride,zinc sulphate	Practical notes		x			x	
				Assay of vit C	Practical notes		x			x	
				Assay of prescription No.2 Vitamin C & calcium gluconate	Practical notes		x			x	
				Assay of iron containing capsules	Practical		x			x	

					notes						
4.2	Comprehend and apply GLP,GPMP, GSP and GCP guidelines in pharmacy practice	C3	c1	Measurment of light absorption in UV-Visible region(Beer-Lambert`s law)	Practical notes		x			x	
				Determination of lamda max of a colored solution and study of the factors affecting the optimization of the method	Practical notes		x			x	
4.3	Apply qualitative and quantitative analytical and biological methods for QC and assay of raw materials as well as pharmaceutical preparations	C6	c2	Colorimetric assay of dexamethasone	Practical notes		x			x	
				Colorimetric assay of sulfacetamide	Practical notes		x			x	
				Assay of Vitamin C	Practical notes		x			x	
				Colorimetric assay of Vitamin C	Practical notes		x			x	
				Colorimetric assay of sodium saliclylate	Practical notes		x			x	
				Assay of prescription No.1 Diphenhydramine hydrochloride,zinc sulphate	Practical notes		x			x	
				Colorimetric assay of Vitamin E	Practical notes		x			x	
				Assay of prescription No.2 • Vitamin C & calcium gluconate	Practical notes		x			x	
				Colorimetric assay of Iron containing capsules (Fefol)®	Practical notes		x			x	

				Hormones, Antihistaminics, Antiulcer Drugs & Vitamins	studentbook	x			x		X
5.3	Work effectively in a team	D3	d1	Measurment of light absorption in UV-Visible region(Beer-Lambert`s law)	Practical notes		x			x	
				Determination of lamda max of a coloured solution &study of factors affecting the optimization of the method.	Practical notes		x			x	
				Colorimetric assay of cortisone,sulfacetamide,procaine, Vitamin C,saliclylic acid,Vitamin E,Iron containing capsules (Fefol)®	Practical notes		x			x	
				Assay of prescription No.1(Diphenhydramine hydrochloride,zinc sulphate) Assay of prescription No.2(Vitamin C & calcium gluconate)	Practical notes		x			x	
				Activity	Practical notes/Internet		x	x		x	
5.6	Adopt ethical, legal and saftey guidelines	D7	d2	Measurment of light absorption in UV-Visible region(Beer-Lambert`s law)	Practical notes		x			x	
				Determination of lamda max of a coloured solution &study of factors affecting the optimization of the method.							

				Colorimetric assay of cortisone,sulfacetamide,procaine, Vitamin C,saliclylic acid,Vitamin E,Iron containing capsules (Fefol)® Assay of prescription No.1(Diphenhydramine hydrochloride,zinc sulphate) Assay of prescription No.2(Vitamin C & calcium gluconate)							
5.9	Implement writing and presentation skills	D10	d3	Activity	Practical notes/ internet/essential books		x	x		x	
5.10	Implement writing and thinking, problem solving and decision making skills	D11	d4	Activity	Practical notes/ internet/essential books		x	x		x	

COURSE SPECIFICATIONS

Biotechnology

Fourth year – secondTerm
2018-2019

Course specification of biotechnology

University: Zagazig **Faculty: Pharmacy**

A- Course specifications:

Program (s) on which the course is given: Bachelor of Pharmacy

Major or Minor element of programs: Major

Department offering the program: -------

Department offering the course: Microbiology and Immunology

Academic year Level: Fourth year students

Date of specification approval: September 2018

B- Basic information:

Title: **Biotechnology** Code: **MI424**

Lectures: 2 hrs/week

Practical: ------

Total: 2 hrs/week

C- Professional information:

1-Overall aim of the course

- **<u>On completion of the course, the student will be able to:</u>**

  Identify the basic principles of microbial biotechnology and fermentation and their applications. Understand the gene cloning and recombinant DNA technology technique and their applications. Apply the biotechnology techniques in production of certain valuable products such as vitamins, antibiotics and vaccines. Communicate effectively with public, patients and other health care professionals in addition to working effectively as a member of a team, writing and presenting reports.

2- Intended Learning Outcomes of biotechnology (ILOs)

A- Knowledge and Understanding	
a1	Outline the basic principles of microbial biotechnology and fermentation and their applications
a2	Identify the basic principles of microbial biotechnology and fermentation
a3	Recognize the applications of biotechnology and fermentation
a4	Describe the gene cloning and recombinant DNA technology technique and their applications
B- Professional and Practical skills	
b1	Use the proper terms of biotechnology
C- Intellectual skills	
c1	Apply biotechnology techniques in production of antibiotics, vitamins and vaccines
c2	Use the biotechnology techniques in the production and screening of primary and secondary metabolites
c3	Analyze and interpret experimental results to give clear advice and critical decisions about patient's state
D-General and Transferable skills	
d1	Communicate effectively both in oral and written manner
d2	Perform online computer search for writing reports
d3	Work effectively as a member of a team
d4	Adopt the ethical values, legal measures and safety guidelines.
d5	Write and present reports

D- Contents:

Week No.	Lecture contents (2 hrs/week)
1	• Microbial biotechnology and fermentation
2	• Fermentation system and fermentation processing • Production of microbial biomass
3	• Production of primary metabolites: alcohols, organic acids, amino acids and polysaccharides
4	• Production of secondary metabolites: antibiotics, vitamins, insecticides • Production of microbial enzymes • **Assignment**
5	• Biotransformation
6	• Production of immunological products and their quality control
7	• Production of bacterial and viral vaccines
8	• Gene cloning and recombinant DNA technology: a- Obtaining target gene
9	• Gene cloning and recombinant DNA technology: b- Selection of cloning vector
10	• Gene cloning and recombinant DNA technology: c- Making recombinant DNA inserts d- Introduction of recombinant DNA molecule into a host cell and selection of target clone • **Assignment**
11	• Production of human proteins: insulin, interferons, growth hormone, anticoagulants, interleukins.
12	• synthesis of DNA • PCR • DNA sequencing
13	• Applications of recombinant DNA technology: • Biomass utilization
14	• Applications of recombinant DNA technology: • Microbial insecticides and bio-control
15	**Final Written exam**

E- Teaching and Learning Methods:

- Lectures
- Report writing

F- Student Assessment methods:

1- Written exams to assess: a1, a2, a3, a4,b1, c1, c2, c3

2- written report to assess: d1, d2,d3,d4, d5

4- Oral exam to assess: a1, a2, a3, a4,b1, c1, c2, c3, d1, d4

Assessment schedule

Assessment (2): Final written exam	Week 15
Assessment (3): Activity (Report)	Week 4- 10
Assessment (5): Oral exams	Week 15

Weighting of Assessment

Assessment method	Marks	Percentage
Final written exam	75	75%
Activity	5	5 %
Oral exam	20	20 %
TOTAL	100	100%

G- Facilities required for teaching and learning:

• **For lectures** Black (white) boards, air conditioned lab room and data show

H- List of References:

1- Course Notes: Student book of "Notes in pharmaceutical biotechnology" approved by Microbiology & Immunology department.

2- Essential Books:

✓ "Molecular Biotechnology", Pasternak G, ASM press, Washington DC (1994).

3- Recommended Books

- ✓ Martindale, "The extra pharmacopeia". 31st edn., by James, E.F Reynolds. And Kathleen Parfitt, Royal Pharmaceutical Society, London (2007).

Article I. 4- Periodicals and websites:

- ✓ www.Pubmed.com
- ✓ www.sciencedirect.com

Course Coordinator: Prof. Dr. Fathy serry.

Head of Department: Prof / Nehal Elsayed yousef

Date 2019/9/ 30 تم مناقشة و اعتماد توصيف المقرر من مجلس القسم بتاريخ

Matrix 1 of Biotechnology course

Course Contents		Knowledge and understanding				Professional and Practical skills	Intellectual skills			General and Transferable skills				
		a1	a2	a3	a4	b1	C1	C2	C3	d1	d2	d3	d4	d5
1	Microbial biotechnology and fermentation	√												
2	• Fermentation system and fermentation processing	√	√			√		√						
3	• Production of microbial biomass		√			√		√						
4	• Production of primary metabolites: alcohols, organic acids, amino acids and polysaccharides		√	√				√						
5	• Production of secondary metabolites: antibiotics, vitamins, insecticides • Production of microbial enzymes		√	√			√							
6	• Biotransformation • Production of immunological products and their quality control • Production of bacterial and viral vaccines	√	√	√	√	√	√							

7	• Gene cloning and recombinant DNA technology: Obtaining target gene	√	√		√	√	√		√					
8	• Gene cloning and recombinant DNA technology: Selection of cloning vector	√	√		√	√	√		√					
9	• Gene cloning and recombinant DNA technology: Making recombinant DNA inserts	√	√		√	√	√		√					
10	• Gene cloning and recombinant DNA technology: Introduction of recombinant DNA molecule into a host cell and selection of target clone		√		√	√	√		√					
11	• Production of human proteins: insulin, interferon, growth hormone, anticoagulants, interleukins		√	√	√		√							
12	• Chemical synthesis of DNA • PCR • DNA sequencing • DNA Microarray		√		√				√					
13	• Applications of recombinant DNA technology: Biomass utilization		√	√	√		√							

14	• Applications of recombinant DNA technology: Microbial insecticides and bio-control		√	√	√		√						√	

Matrix 2 of Biotechnology course

National Academic Reference Standards NARS	Program ILOs	Course ILOs	Course contents	Sources	Teaching and learning methods			Method of assessment	
					Lecture	Self learning	Practical session	Oral Exam	Written exam
2.1 Principles of basic, pharmaceutical, medical, social, behavioral, management, health and environmental sciences as well as pharmacy practice	**[A2] Mention the principles of pharmaceutical sciences (Pharmacy orientation; medical terminology;; pharmaceutical chemistry; pharmacognosy; pharmaceutical microbiology; molecular biology and pharmaceutical biotechnology; quality assurance and quality control; instrumental analysis and biological drug assays).**	**a1 a2**	• Microbial biotechnology and fermentation Fermentation system and fermentation processing • Production of microbial biomass • Production of primary metabolites • Production of secondary metabolites • Biotransformation • Production of immunological products and their quality control • Production of bacterial and viral vaccines • Gene cloning and recombinant DNA technology: (Obtaining target gene, Selection of cloning vector and Making recombinant DNA inserts) • Introduction of recombinant DNA molecule into a host	Notebook	√		√	√	√

			cell and selection of target clone • Production of human proteins: insulin, interferon, growth hormone, anticoagulants, interleukins • Chemical synthesis of DNA, PCR • DNA sequencing, DNA Microarray • Applications of recombinant DNA technology:						
2.2 Physical-chemical properties of various substances used in preparation of medicines including inactive and active ingredients as well as biotechnology and radio- labeled products.	**A10] state biotechnology concepts, techniques and applications**	**a3**	• Production of primary metabolites • Production of secondary metabolites • Production of microbial enzymes • Biotransformation • Production of immunological products and their quality control • Production of bacterial and viral vaccines • Production of human proteins: insulin, interferon, growth hormone, anticoagulants, interleukins • Applications of recombinant DNA technology (Biomass utilization, Microbial insecticides and bio-control)	Notebook	√		√	√	√
2.5 Principles of drug design, development and synthesis	**[A15] Determine the principles of pharmaceutical compounds synthesis**	**a3** **a4**	• Production of primary metabolites	Notebook	√		√		

			• Production of secondary metabolites • Production of microbial enzymes • Biotransformation • Production of immunological products and their quality control • Production of bacterial and viral vaccines • Production of human proteins: insulin, interferon, growth hormone, anticoagulants, interleukins • Applications of recombinant DNA technology (Biomass utilization, Microbial insecticides and bio-control) • Biotransformation • Production of immunological products and their quality control • Production of bacterial and viral vaccines• Gene cloning and recombinant DNA technology: • Obtaining target geneSelection of cloning vector • Making recombinant DNA inserts • Introduction of recombinant DNA molecule into a host cell and selection of target clone • Production of human proteins: insulin, interferon, growth					√	√

			hormone, anticoagulants, interleukins • Chemical synthesis of DNA • DNA sequencingApplications of recombinant DNA technology: • Biomass utilization • Microbial insecticides and bio-control						
2.11 Principles of body function in health and disease states as well as basis of genomic and different biochemical pathways regarding their correlation with different diseases.	**A26] Outline basis of molecular biology**	**a4**	• Gene cloning and recombinant DNA technology: • Obtaining target geneS election of cloning vector • Making recombinant DNA inserts • Introduction of recombinant DNA molecule into a host cell and selection of target clone • Production of human proteins: insulin, interferon, growth hormone, anticoagulants, interleukins • Chemical synthesis of DNA, PCR • DNA sequencing, DNA Microarray • Applications of recombinant DNA technology: • Biomass utilization • Microbial insecticides and bio-control	Notebook	√		√	√	√

3.1 Use the proper pharmaceutical and medical terms, abbreviations and symbols in pharmacy practice	**B1. Use the proper pharmaceutical and medical terms and abbreviations and symbols in pharmacy practice**	**b1**	• Fermentation system and fermentation processing • Production of microbial biomass • Biotransformation • Production of immunological products and their quality control • Production of bacterial and viral vaccines • Gene cloning and recombinant DNA technology: • Obtaining target gene • Selection of cloning vector • Making recombinant DNA inserts • Introduction of recombinant DNA molecule into a host cell and selection of target clone	Notebook	√		√	√	√
4.5 Select the appropriate methods of isolation, synthesis, purification, identification, and standardization of active substances from different origins.	**C10. Choose the appropriate methods of synthesis, identification and standardization of active substances from different origins.**	**c1** **c2**	• Production of secondary metabolites: antibiotics, vitamins, insecticides • Production of microbial enzymes • Biotransformation • Production of immunological products and their quality	Notebook	√		√	√	√

			control • Production of bacterial and viral vaccines • Gene cloning and recombinant DNA technology: • Obtaining target gene • Selection of cloning vector • Making recombinant DNA inserts • Introduction of recombinant DNA molecule into a host cell and selection of target clone • Production of human proteins: insulin, interferon, growth hormone, anticoagulants, interleukins • Applications of recombinant DNA technology: • Biomass utilization • Microbial insecticides and bio-control						
4.13 Analyze and interpret experimental results as well as published literature.	**C18. Evaluate and interpret experimental results and published literature.**	**c3**	• Gene cloning and recombinant DNA technology: • Obtaining target gene • Selection of cloning vector • Making recombinant DNA inserts • Introduction of recombinant DNA molecule into a host	Notebook	√		√	√	√

			cell and selection of target clone • Chemical synthesis of DNA • DNA sequencing						
5.1 Communicate clearly by verbal and means.	**[D1] Communicate effectively with patients and other health care professionals, including both written and oral communication.**	**d1**							
5.3 Work effectively in a team.	**[D3] Implement tasks as a member of a team.**	**d3**	Activity	Internet search		√		√	√
5.4 Use numeracy, calculation and statistical methods as well as information technology tools.	**[D5] Practice computer skills including word, spreadsheet, database use and internet communications.**	**d5**	• Activity	Internet search		√		√	√
5.6 Adopt ethical, sales and safety guidelines.	**[D7] Adopt ethical, legal and safety guidelines.**	**d4**	• Activity	Internet search		Se		√	√
5.9 Implement writing and presentation skills.	**[D10] Implement writing and presentation skills.**	**d2 d5**	• Activity	Internet search		√		√	√