Bachelor degree in Pharmacy

(Bylaw 2016)

Course Specification

2020-2021

Third Year / First Semester

Kafrelsheikh University, Faculty of Pharmacy
Course Specifications

Program on which the course is given	**Bachelor degree in Pharmacy**
Major or minor element of program	**Major**
Department offering the course	**Biochemistry**
Department supervising the course	**Biochemistry**
Academic Year / Level	**Third year / First term**
Date of specification approval	**9/2020**

A- Basic Information

Title : Biochemistry 2	**Code :PB 503**
Total contact hours :3 hr	**Lecture :2 hr**
	Practical :1 hr

B- Professional Information

1. Overall aims of the course: upon successful completion of this course, the students should be able to understand:

- The fundamental aspects of Biochemistry to the function of living system.
- The structure and function of living matter in molecular terms.
- The relationship between deffective protein mechanisms, DNA and their correlation to some diseases.
- The laboratory analytical data and analyze it to detect different clinical disorders.

2. Intended learning outcomes of the course (ILOs)

a- Knowledge and understanding: upon successful completion of this course, the students should be able to understand:

a1. Demonstrate the chemistry of amino acids.
a2. Discuss the relationship between amino acid metabolism and diseases
a3. Explain inborn errors and how to manage it
a4. Define protein structure and functions.
a5. Describe Heme metabolism
a6. Explain protein synthesis.
a7. Identify DNA and RNA structure and replication.
a8. Define mutations.
a9. List the different PCR techniques and applications.

b- Intellectual skills

b1. Assess biochemical basis for elucidation of some metabolic diseases.
b2. Recognize interrelationships between biochemistry and medicine.
b3. Calculate the energy production from metabolism.
b4. Assess some clinical disorders and protective guidelines**.**

c- Professional and practical skills

c1. Examine laboratory glass-wares and instruments used for determination of the different components in the biological fluids.
c2. Assess the safety guidelines for lab work
c3. Analyze the molecules found in biological fluids
c4. Assess the concentration of some metabolic and biological compounds present in urine and in blood samples.
c5. Demonstrate the obtained data and their diagnostic significance compared with their reference values.
c6. Analyze and interpret PCR reports.
c7. Analyze chemical reagents especially some dangerous materials.

d- General and transferable skills

d1. Communicate with others to avoid metabolic-related diseases.
d2. Assess biochemical investigations to diseases and suggest their causes.
d3. Develop health by means of life-style and adequate balanced nutrition.
d4. Work effectively in a team work.

3. Contents

Week	Topic	Total contact hours	Lecture	Practical
1	Amino acid chemistry	**3**	**2**	**1**
2	Amino acid metabolism	**3**	**2**	**1**
3	Inborn errors of amino acids	**3**	**2**	**1**
4	Protein chemistryand functions	**3**	**2**	**1**
5	Physical structures of proteins	**3**	**2**	**1**
6	Heme metabolism	**3**	**2**	**1**
7	**Mid-term exam**			
8	DNA,nucleotides and base pairing	**3**	**2**	**1**
9	DNA,replication and errors.	**3**	**2**	**1**
10	DNA and RNAs and polymerases	**3**	**2**	**1**
11	Protein synthesis and Central dogma of molecular biology	**3**	**2**	**1**
12	PCR and applications	**3**	**2**	**1**
13	Types and causes of mutations	**3**	**2**	**1**
14	Metabolic interrelationships	**2**	**2**	Practical exam
15	Catabolism of DNA	**2**	**2**	Practical exam

4. Teaching and learning methods

a. Lectures	**(√)**
b. Practical training / laboratory	**(√)**
c. Class Activity	**(√)**
d. E-learning	**(√)**

5. Student assessment methods

Written mid-term exam	**To assess**	**The ability of students to follow-up The course subjects.**
Practical exam	**To assess**	**The gained experience in laboratory methods and techniques.**
Oral exam	**To assess**	**The ability of students in expressing and presenting their knowledge clearly and in systematic approach.**
Written final exam	**To assess**	**The overall outcomes.**

Assessment schedule

Assessment 1	**Mid-term exam**	**Week**	**7**
Assessment 2	**Practical exam**	**Week**	**14,15**
Assessment 3	**Final exam**	**Week**	**16,17**
Assessment 4	**Oral**	**Week**	**16,17**

Weighting or assessments

Mid-term Examination	**30**	**%**
Final-Term Examination	**150**	**%**
Oral Examination	**30**	**%**
Practical Examination	**90**	**%**
Total	**300**	**%**

6. List of references

Course notes

- Notes in Biochemistry by staff-members of department of Biochemistry.
- Lab. Notes in Clinical Biocemistry by staff-members of epartment of Biochemistry.

Essential books (text books)

1- Biochemistry, Ferrier, Denise R (2017), 7th Edition, Lippincott Williams and Wilkins.
2- Harper's illustrated Biochemistry by Murray RK, Bender DA, Botham KM, Kennelly PJ, Rodwell VW, P. Anthony Weil PA (2018), 31th Edition, McGraw Hill.
3- Essentials of Biochemistry (For Medical Students), Shivananda Nayak B (2013) 2nd Edition, Jaypee Brothers Medical Publishers.
4- Essential Biochemistry: Pratt CW and Cornely K (2014), 3rd edition John Wiley &Sons Inc., USA.

Recommended books

1-Biochemistry, LubertStryer (2015), 8th Edition, WH Freeman.

2- Biochemistry with Clinical Correlations, Devlin TM (2015), 7th Edition ,Wiley-Liss INC, USA.
3- Biochemistry, Satyanarayana and Chakrapani (2013), 4th Edition
USA.

Websites

www.highwire.com, www.google.com,www.pubmed.com &www.biomed.net

7. Facilities required for teaching and learning

-Class rooms.
- Laboratory facilities including instruments and tools necessary for practical work e.g. glass wares, water baths, Flames, pH meters, electrophoretic apparatus, and centrifuge, spectrophotometers, and session rooms.
- Library.
- Data show.
-Computers. –Internet.
- Smart board
-E-learning unit

Course coordinator:

Prof.Nabil Mohie Abdel-Hamid

Head of Department:

Prof: Ramadan Eldomany

Date: 9/2020

Course Plan
Course ILOs Matrix – Teaching and Learning Strategy and Student Assessment

Course title: **Biochemistry 2** Course code: **PB 503**

Course Contents		ILOs	Teaching and Learning Methods	Student Assessment Methods
Week # 1	Amino acid chemistry	a1, c1, c2, c7, d4	Lectures and practical training	Written, practical and oral exams
Week # 2	Amino acid metabolism	a2, b3, c1, c2, c3, d4	Lectures and practical training	Written, practical and oral exams
Week # 3	Inborn errors of amino acids	a3. b1, b2, b4, c1, c5, d2, d4	Lectures, practical training, discussion and brain storming	Written, practical and oral exams
Week # 4	Protein chemistry	a1, a4, c1, c2, c7, d4	Lectures and practical training	Written, practical and oral exams
Week # 5	Physical structures of proteins	a1, a4, c1, c2, c7, d4	Lectures and practical training	Written, practical and oral exams
Week # 6	Heme metabolism	a5, b1, b2, b4, c1, c3, c4, c5	Lectures, practical training discussion and brain storming	Written, practical and oral exams
Week # 7	**Mid-term exam**			
Week # 8	DNA,nucleotides and base pairing	a7, c1, c2, c3, d4	Lectures and practical training	Written, practical and oral exams
Week # 9	DNA,Replication and errors.	a7, c1, c2, c3, d4	Lectures and practical training	Written, practical and oral exams
Week # 10	RNAs and polymerases	a7, c1, c2, c3, d4	Lectures and practical training	Written, practical and oral exams
Week # 11	Protein synthesis and Central dogma of molecular biology	a6, c1, c2, c3, d4	Lectures and practical training	Written, practical and oral exams
Week # 12	PCR and applications	a9, b2, c5, c6, d2, d4	Lectures, practical training discussion and brain storming	Written, practical and oral exams
Week # 13	Types and causes of mutations	a8, b1, b2, b4, c3, c6	Lectures and practical training	Written, practical and oral exams
Week # 14	Metabolic interrelationships	a2, b1, b3, c1, c4, d1, d4	Lectures	Written and oral exams
Week # 15	Catabolism of DNA	a7, c1, c2, c3, d4	Lectures	Written and oral exams

Course coordinator: Prof.Nabil Mohie Abdel-Hamid

Head of department: Prof. Ramadan Eldomany

Date: 9/2020

Kafrelsheikh University, Faculty of Pharmacy
Course Specifications

Programme on which the course is given	**Bachelor in Pharmacy**
Major or minor element of programme	**Major**
Department offering the course	**Pharmaceutical chemistry**
Department supervising the course	
Academic Year / Level	**Third year, first semester**
Date of specification approval	**9/2020**

A- Basic Information

Title: Pharmaceutical Chemistry 1	**Code: PC504**
Total contact hours:4hr.	**Lecture: 2hr.**
	Practical :2hr.

B- Professional Information

1. Overall aims of the course

Upon successful completion of this course, the students should be able to understand:

- the fundamentals of medicinal chemistry.
- the chemistry of different classes of chemotherapeutic agents, autonomic nervous system and antiviral drugs.
- SAR (Structure-activity relationship) of different classes of drugs.
- IUPAC rules for naming different drugs.
- Quantitatively drugs in different dosage forms using pharmacopeial methods of assay.

2. Intended learning outcomes of the course (ILOs)

a- Knowledge and understanding:

On successful completion of the course, the student should be able to:

a1. Discuss the concept of medicinal chemistry.
a2. Describe the SAR of different drug classes.
a3. Name the nomenclature and classfication of healthcare products.
a4. Define uses of different drug classes (chemotherapeutic agents, autonomic nervous system and antiviral drugs).
a5. Demonstrate different synthetic pathways.
a6. Report the mode of action of mentioned drugs and drug metabolism.

b- Intellectual skills

b1. Utilize SAR to interpret the pharmacological activity of certain drugs.
b2. Recognize IUPAC names and structural formulae of drugs.
b3. Recognize the generic names of drugs and deduce the therapeutic utility for each class.
b4. Assess the structural feature of a compound to physicochemical properties which may affect its biological response or influence its formulation / administration.

c- Professional and practical skills

c1. Assess qualitative and quantitative methodology of analysis of drugs.
c2. Safely use basic laboratory equipments and chemicals.
c3. Test impurities of active substances in samples.

d- General and transferable skills

d1. Communicate therapeutic knowledge gained to other members of the healthcare team.
d2. Retrieve information from variety of sources.
d3. Work in a team with students.
d4. Create reports and present it about pharmaceutical chemistry.

3. Contents

Week	Topic	Total contact hours	Lecture	Practical
1	Introduction to Pharmaceutical Chemistry	4	2	2
2	Physicochemical properties of drugs in relation to biological action	4	2	2
3	Drug Metabolism	4	2	2
4	Drug Metabolism (cont.)	4	2	2
5	Autonomic nervous system	4	2	2
6	Autonomic nervous system (cont.)	4	2	2
7	**Semester works**			
8	Autonomic nervous system (cont.)	4	2	2

9	Chemotherapeutic Agents-Antimicorbial	**4**	**2**	**2**
10	Chemotherapeutic Agents-Antimicorbial (cont.)	**4**	**2**	**2**
11	Chemotherapeutic Agents-Antimicorbial (cont.)	**4**	**2**	**2**
12	Chemotherapeutic Agents-Antimicorbial (cont.)	**4**	**2**	**2**
13	Chemotherapeutic Agents-Antimicorbial (cont.)	**4**	**2**	**2**
14	Chemotherapeutic Agents-Antiviral	**2**	**2**	Practical exam
15	Chemotherapeutic Agents-Antiprotozoal	**2**	**2**	Practical exam

4. Teaching and learning methods

a. Lectures (√)
b. Practical training / laboratory (√)
c. Class activity (√)

5. Student assessment methods

Semester works	**To assess**	**The ability of students to follow-up The course subjects.**
Practical exam	**To assess**	**The gained experience in laboratory methods and techniques.**
Oral exam	**To assess**	**The ability of students in expressing and presenting their knowledge clearly and in systematic approach.**
Written final exam	**To assess**	**The overall outcomes.**

Assessment schedule

Assessment 1	**Semester works**	**Week**	**7**
Assessment 2	**Practical exam**	**Week**	**14, 15**
Assessment 3	**Final exam**	**Week**	**16, 17**
Assessment 4	**Oral**	**Week**	**16, 17**

Weighting or assessments

Semester works	**10**	**%**
Final-Term Examination	**50**	**%**
Oral Examination	**10**	**%**
Practical Examination	**30**	**%**
Total	**100**	**%**

6. List of references

Course notes

- Notes on pharmaceutical chemistry prepared and distributed by Dept. of Pharmaceutical Chemistry.
- Lab Manual of pharmaceutical chemistry prepared and distributed by Dept. of Pharmaceutical Chemistry.

Essential books (text books)

1)Graham Patrick "An Introduction to Medicinal Chemistry",5th edition,2013.
2) Wilson and Gisvold's " Textbook of Organic and Pharmaceutical Chemistry", 12th Ed., Jaime N. Delgado, J.B. Lippincot Co., 2010.
3)William O. Foye, " Principle of Medicinal Chemistry" 5th edition (2002), Williams & Wilkins, London.
4) M.E.Wolff Burger's " Medicinal Chemistry and Drug Discovery ", 7th edition (2010), Wiley-interscience Publication, New York, USA.
5) Gennaro (Editor), " Remington's Pharmaceutical Sciences ", 21th edition (2005), Lippincott Williams & Wilkins, Maryland, USA.

Recommended books

Wilson and Gisvold's " Textbook of Organic and Pharmaceutical Chemistry", 12th Ed., Jaime N. Delgado, J.B. Lippincot Co., 2010.

Websites

www.fda.gov , www.mohp.gov , www.emea.org , www.who.int , www.wikipedia.org .

7. Facilities required for teaching and learning

- E-learning and smart board.
- Class rooms.
-Laboratory facilities.
- Data show
- Computers.
–Library.
–Internet.
-Spectrophotometer

Course coordinator:

Dr. Tamer Mohamed Ibrahim

Head of Department:

Prof.Dr. Ramadan Eldomany

Date: 9/2020

Course Plan
Course ILOs Matrix – Teaching and Learning Strategy and Student Assessment

Course title: Pharmaceutical chemistry 1 **Course code:** PC 504

Course Contents		ILOs	Teaching and Learning Methods	Student Assessment Methods
Week # 1	Introduction to Pharmaceutical Chemistry	a1,a2	Lectures, practical training, discussion and brain storming	Written, practical and oral exams
Week # 2	Physicochemical properties of drugs in relation to biological action	b1,b4	Lectures, practical training, discussion and brain storming	Written, practical and oral exams
Week # 3	Drug Metabolism	a6,d1,,d2,d4	Lectures, practical training, discussion and brain storming	Written, practical and oral exams
Week # 4	Drug Metabolism (cont.)	a6,,b3,b4 ,d1,d2,d4	Lectures, practical training, discussion and brain storming	Written, practical and oral exams
Week # 5	Autonomic nervous system	a2,a3,a4,a5,a6,b1,b2,b3,b4,c1,c2,d1,d2,d3,d4	Lectures, practical training, discussion and brain storming	Written, practical and oral exams
Week # 6	Autonomic nervous system (cont.)	a2,a3,a4,a5,a6,b1,b2,b3,c2,c3,b4,d1 ,d2,d3,d4	Lectures, practical training, discussion and brain storming	Written, practical and oral exams
Week # 7	**Semester Works**			
Week # 8	Autonomic nervous system (cont.)	a2,a3,a4,a5,a6,b1,b2,b3,b4,c1,d1,d2,d3,d4	Lectures, practical training, discussion and brain storming	Written, practical and oral exams
Week # 9	Chemotherapeutic Agents-Antimicorbial	,a2,a3,a4,a5,a6,b1,b2,b3,c2,c3,b4 ,d1,d2,d3	Lectures, practical training, discussion and brain storming	Written, practical and oral exams
Week # 10	Chemotherapeutic Agents-Antimicorbial (cont.)	a2,a3,a4,a5,a6,b1,b2,b3,b4,c1,c2,d1,d2,d3,d4	Lectures, practical training, discussion and brain storming	Written, practical and oral exams
Week # 11	Chemotherapeutic Agents-Antimicorbial (cont.)	a2,a3,a4,a5,a6,b1,b2,b3,b4,c1,c2,d1,d2,d3,d4	Lectures, practical training, discussion and brain storming	Written, practical and oral exams
Week # 12	Chemotherapeutic Agents-Antimicorbial (cont.)	a2,a3,a4,a5,a6,b1,b2,b3,b4,c2,c3,d1,d2,d3,d4	Lectures, practical training, discussion and brain storming	Written, practical and oral exams
Week # 13	Chemotherapeutic Agents-Antimicorbial (cont.)	a2,a3,a4,a5,a6,b1,b2,b3,b4,c2,c3,d1,d2,d3,d4	Lectures, practical training, discussion and brain storming	Written, practical and oral exams
Week # 14	Chemotherapeutic Agents-Antiviral	a2,a3,a4,a5,a6,b1,b2,b3,b4,d1,d2.	Lectures, discussion and brain storming	Written and oral exams
Week # 15	Chemotherapeutic Agents-Antiprotozoal	a2,a3,a4,a5,a6,b1,b2,b3,b4,d1,d2.	Lectures, discussion and brain storming	Written and oral exams

Course coordinator: Dr. Tamer Mohamed Ibrahim
Head of department: prof. Dr. Ramadan Eldomany
Date: 9/2020

Kafrelsheikh University, Faculty of Pharmacy
Course Specifications

Programme on which the course is given	**Bachelor degree in Pharmacy**
Major or minor element of programme	**Major**
Department offering the course	**Microbiology & immunology**
Department supervising the course	**Microbiology & immunology**
Academic Year / Level	**Third year, first semester**
Date of specification approval	**9/2020**

A- Basic Information

Title : Pharmaceutical Microbiology	**Code : PM 503**
Total contact hours: 4hr	**Lecture :2hr**
	Practical :2hr

B- Professional Information

1. Overall aims of the course

Upon successful completion of this course, the students should be able to understand:

- The use of antibiotics, their mechanism of action and resistance .
- The medical and pharmaceutical uses of antiseptics, disinfectants and antibiotics.
- The different sources of microbial contamination and microbial spoilage of pharmaceutical dosage forms.
- The methodology of preserving pharmaceutical preparations and the factors affecting the process.
- The different techniques used in evaluation of different biocides and antibiotics.
- The suitable method of sterilization for any pharmaceutical preparations.

2. Intended learning outcomes of the course (ILOs)

a- Knowledge and understanding:

On successful completion of the course, the student should be able to :

a1. Classify antibiotics, and non antibiotics antimicrobial agents.
a2. Discuss uses,mechanisms of action , resistance and evaluation of antimicrobial agents.
a3. Know The methods of microbial contamination of pharmaceutical preparations.
a4.know the different methods of sterilization
a5. Describe the validation procedures for sterile and non-sterile

products.

b- Intellectual skills

c- Professional and practical skills

c1. Test for the susceptibility of the microorganisms (sensitivity) to different antimicrobial agents.
c2. Use effectively the best preservative, disinfectant or antiseptic.
c3. Assess the potency of antimicrobial agents (pure and in pharmaceutical dosage form) by various assay methods.
c4. Test the sterility of various sterile products.
c5. Examine how to maintain a sterile area for manufacturing or testing sterile products.

d- General and transferable skills

d1. Construct the proper method for sterilization of different materials.
d2. Retrieve the general laboratory safety and aseptic techniques protocols.
d3. Assess different antimicrobial agents based on the results obtained in the laboratory.
d4.Write report about sterile products**.**

3. Contents

Week	Topic	Total contact hours	Lecture	Practical
1	Introduction & Classification types of Antibiotics .	**4**	**2**	**2**
2	Mode of action of Antibiotics.	**4**	**2**	**2**
3	Antibiotic drug combination	**4**	**2**	**2**
4	Bacterial resistance to antibiotics	**4**	**2**	**2**
5	Clinical use and missuse of antibiotics.	**4**	**2**	**2**
6	Microbiological assay of antibiotics, vitamins	**4**	**2**	**2**
7	**Semester exam**			
8	Classification of non antibiotic antimicrobial agents, mode of action & Resistance.	**4**	**2**	**2**
9	Applications of non antibiotic antimicrobial agents &Evaluation.	**4**	**2**	**2**
10	Microbial	**4**	**2**	**2**

	contamination of pharmaceutical products & problems			
11	Microbial spoilage of pharmaceutical products	**4**	**2**	**2**
12	Intoduction to Sterilization and Official methods of sterilization	**4**	**2**	**2**
13	Validation of Sterilization process.	**4**	**2**	**2**
14	Microbiological quality of pharmaceuticals	**2**	**2**	Practical exam
15	Aseptic area and testing of pyrogins	**2**	**2**	Practical exam

4. Teaching and learning methods

a. Lectures (√)
b. Practical training / laboratory (√)
c. Seminar / Workshop (√)
d. Class Activity (√)

5. Student assessment methods

Semester works	**To assess**	**The ability of students to follow-up The course subjects.**
Practical exam	**To assess**	**The gained experience in laboratory methods and techniques.**
Oral exam	**To assess**	**The ability of students in expressing and presenting their knowledge clearly and in systematic approach.**
Written final exam	**To assess**	**The overall outcomes.**

Assessment schedule

Assessment 1	**Semester exam**	**Week**	**7**
Assessment 2	**Practical exam**	**Week**	**14,15**
Assessment 3	**Final exam**	**Week**	**16,17**
Assessment 4	**Oral**	**Week**	**16,17**

Weighting or assessments

Semester works	**10**	**%**
Final-Term Examination	**50**	**%**
Oral Examination	**10**	**%**
Practical Examination	**30**	**%**

Total	100	%

6. List of references

Course notes

Notes and lab manual of pharmaceutical mcrobiology prepared by department staff members

Essential books (text books)

- W.B. Hugo & A.D. Russell, 2011, Pharmaceutical Microbiology Blackwell Scientific Publication.
- Black, J.C., 2017, Microbiology Principles & Applications (10th edition).

Websites

- Google scholar: https://scholar.google.com.eg/
- Pubmed: http://www.ncbi.nlm.nih.gov/pubmed
- Science Direct: http://www.sciencedirect.com/

7. Facilities required for teaching and learning

-Class rooms.
-Laboratory facilities(laminar flow, autoclave, incubator, hot oven). –Library.
- Data show (Overhead, video projector)

-Computers. –Internet.

Course coordinator:

Prof Dr: Ramadan Ahmed Aldomany

Head of Department:

Prof Dr: Ramadan Ahmed Aldomany

Date : 9 /2020

Course Plan
Course ILOs Matrix – Teaching and Learning Strategy and Student Assessment

Course title: **Pharmaceutical microbiology** Course code: **PM 503**

Course Contents		ILOs	Teaching and Learning Methods	Student Assessment Methods
Week # 1	Introduction & Classification types of Antibiotics .	a1,d2	Lectures and practical training	Written, practical and oral exams
Week # 2	Mode of action of Antibiotics.	a2,b1	Lectures and practical training	Written, practical and oral exams
Week # 3	Antibiotic drug combination	a2,c1,c3,d3	Lectures and practical training,	Written, practical and oral exams
Week # 4	Bacterial resistance to antibiotics	a2,b2,c1,c3,d3	Lectures and practical training,seminar & class activity	Written, practical and oral exams
Week # 5	Clinical use and missuse of antibiotics.	a2,b1	Lectures and practical training,seminar & class activity	Written, practical and oral exams
Week # 6	Microbiological assay of antibiotics, vitamins	a2,b2,c1,c3,d3	Lectures and practical training,seminar & class activity	Written, practical and oral exams
Week # 7	**Semester exam**		Lectures and practical training,seminar & class activity	
Week # 8	Classification of non antibiotic antimicrobial agents, mode of action & Resistance.	a1,a2,b2,c1,c3,d3	Lectures and practical training,seminar & class activity	Written, practical and oral exams
Week # 9	Applications of non antibiotic antimicrobial agents &Evaluation.	a2,b2,c1,c2,c3,d3	Lectures and practical training,seminar & class activity	Written, practical and oral exams
Week # 10	Microbial contamination of pharmaceutical products & problems	a3,b3,c4	Lectures and practical training,seminar & class activity	Written, practical and oral exams
Week # 11	Microbial spoilage of pharmaceutical products	a3,b3,c4	Lectures and practical training,seminar & class activity	Written, practical and oral exams
Week #	Intoduction to	a4,b4,c4,d1	Lectures and	Written, practical

12	Sterilization and Official methods of sterilization		practical training,seminar & class activity	and oral exams
Week # 13	Validation of Sterilization process.	a5,c4,d4	Lectures and practical training,seminar & class activity	Written, practical and oral exams
Week # 14	Microbiological quality of pharmaceuticals	c4,c5	Lectures	Written and oral exams
Week # 15	Aseptic area and testing of pyrogins	c4,c5,d2,d4	Lectures	Written and oral exams

Course coordinator: Prof Dr: Ramadan Ahmed Aldomany

Head of department: Prof Dr: Ramadan Ahmed Aldomany

Kafrelsheikh University, Faculty of Pharmacy
Course Specifications

Program on which the course is given	**Bachelor degree in Pharmacy**
Major or minor element of program	**Major**
Department offering the course	**Pharmacognosy**
Department supervising the course	**Pharmacognosy**
Academic Year / Level	**Third year, first semester**
Date of specification approval	**9/2020**

A- Basic Information

Title :Phytochemistry (2)	**Code :PG 505**
Total contact hours:4 hr.	**Lecture :2 hr.**
	Practical :2 hr.

B- Professional Information

1. Overall aims of course

Upon successful completion of this course, the students should be able to understand:

- The chemistry and biological activity of alkaloids and glycosides, in addition to hallucinating and anti-cancer drugs.
- The different techniques of chromatography and separation.

2. Intended learning outcomes of course (ILOs)

a- Knowledge and understanding:

a1-Describe the chemistry of glycosides and alkaloids, in addition to hallucinating and anti-cancer drugs.

a2-Enumerate botanical occurrence, extraction, isolation, identification and determination procedures of alkaloids.

a3- Describe different types of hallucinating and anti-cancer drugs

a4- Describe the different chromatographic techniques and types.

b- Intellectual skills

b1- Differentiate between the chemical structures and uses of different groups of phytochemical classes.

b2-Suggest the possible leads to new drugs depending on natural product templates.

b3- Select the different methods used for quantitative and qualitative determination of different groups of phytochemical classes.

c- Professional and practical skills

c1- Extract and Isolate Analyze different groups of natural products e.g glycosides and alkaloids.
c2- Analyze different groups of natural products e.g glycosides and alkaloids.
c3- Analyze different groups of natural products e.g hallucinating and anti-cancer drugs
c4-Formulate different groups of natural products e.g hallucinating and anti-cancer drugs

d- General and transferable skills

d1-Retrieve information from different data sources
d2- Work in groups.
d3- Communicate verbally.

3. Contents

Week	Lectures	No. of hours	Lecture	Practical
1	Glycosides: Introduction and classification	2	2	—
2	Glycosides:Anthraquinone	4	2	2 Positive mayer's alkaloids
3	Glycosides:Cardiac	4	2	2 Negative mayer's alkaloids Acid radicals
4	Glycosides:Flavonoid, saponin, cyanogenetic and thioglycosides.	4	2	2 Qualitative and quantitative determination of anthraquinones
5	Alkaloids; Introduction, isolation &purification	4	2	2 Qualitative determination of flavonoids
6	Alkaloids; non heterocyclic, pridine & piperidine.	4	2	2 Qualitative and quantitative determination of cardiac glycosides
7	**Mid-term exam**			
8	Alkaloids; tropane	4	2	2 Paper chromatography Thin layer chromatography
9	Alkaloids; qinoline & isoquinoline.	2	2	2 Paper chromatography Thin layer chromatography
10	Alkaloids; Indole &	4	2	2

	purine.			2 Column chromatography
11	Alkaloids; Imidazole, steroid & tropolone.	4	2	2 Column chromatography
12	Chromatography: -Introduction, column chromatography and electrophoresis.	4	2	2 Column chromatography
13	-Thin layer & paper chromatography	4	2	Revision
14	HPLC , GC , Gel filteration , Ion exchange.	2	2	Practical exam
15	Anti-cancer & hallucinating drugs	2	2	Practical exam

4. Teaching and learning methods

a. Lectures (√)
b. Practical training / laboratory (√)
c. Seminar / Workshop (√)
d. Class Activity (√)
e. E-learning (√)
f. smart board (√)

5. Student assessment methods

Semester Work	**To assess**	**The ability of students to follow-up The course subjects.**
Practical exam	**To assess**	**The gained experience in laboratory methods and techniques.**
Oral exam	**To assess**	**The ability of students in expressing presenting their knowledge clearly and in systemic approach**
Written final exam	**To assess**	**The overall outcomes**

Assessment schedule

Assessment 1	**Semester Work**	**Week**	**7**
Assessment 2	**Practical exam**	**Week**	**10,11**
Assessment 3	**Final exam**	**Week**	**16**
Assessment 4	**Oral**	**Week**	**16**

Weighting or assessments

Semester Work	**10**	**%**
Final-Term Examination	**50**	**%**
Oral Examination	**10**	**%**
Practical Examination	**30**	**%**
Total	**100**	**%**

6. List of references

Course notes

Notes on phytochemistry prepared in the form of a book authorized by the department staff.

Essential books (text books)

-Beale, M.H. and Ward, J.L., 2013. 50 Years of Phytochemistry Research: Volume 43.
-Arnason, J.T., Mata, R. and Romeo, J.T. eds., 2013. *Phytochemistry of medicinal plants* (Vol. 29). Springer Science & Business Media.
- Dewick, P. M. Medicinal Natural Products, A biosynthetic approach. 2002,John Wiley & Sons, New York .

-Evans, William C., Trease & Evans' Pharmacognosy, 14th Ed., London: Saunders, 1998.
- Balbaa, S.; Hilal, S. and Zaki, A. Medicinal Plant Constituents. 1976 ,Elsevier *Publishing* Co., New York.

Recommended books

Bruneton. J. Pharmacognosy Phytochemistry Medicinal plants 2nd ed. 1999, - Lavoisier *Publishing*, Paris.
-Robbers, J.E.; Spedie, M.R. and Tyler, V.E. Pharmacognosy and Pharmacobiotechnology. 1996, Lippincott Williams & Wilkins

Websites

www.biomedcentral.com
www.medscape.com
http://www.sciencedirect.com/
http://www.ncbi.nlm.nih.gov/

7. Facilities required for teaching and learning

-Class rooms.
-E-learning.
-Smart Board
-Laboratory facilities.
–Library.
- Data Show
-Computers. –Internet.

Course coordinator:

Dr. Mai Elnagar

Head of Department:

Dr. Ramadan Eldomany

Date: 9 /2020

Course Plan
Course ILOs Matrix – Teaching and Learning Strategy and Student Assessment

Course title: Phytochemistry (2) Course code: PG 505

Course Contents	Lectures	ILOs	Teaching and Learning Methods	Student Assessment Methods
Week # 1	Glycosides: Introduction and classification	a1,b1,b2,c1,c2,d1,d2,d3	Lectures	Written, practical and oral exams
Week # 2	Glycosides: Anthraquinone	a1,b1,b2,c1,c2,d1,d2,d3	Lectures and practical training	Written, practical and oral exams
Week # 3	Glycosides:Cardiac	a1,c2,d1,d2,d3	Lectures and practical training	Written and oral exams
Week # 4	Glycosides:Flavonoid, saponin, cyanogenetic and thioglycosides.	a1,b1,b2,c1,c2,d1,d2,d3	Lectures and practical training	Written, practical and oral exams
Week # 5	Alkaloids; Introduction, isolation & purification	a1,a2,b1,b2,b3,c1,c2,d1,d2,d3	Lectures and practical training	Written, practical and oral exams
Week # 6	Alkaloids; non heterocyclic, pridine & piperidine.	a1,a2,b1,b2,b3,c1,c2,d1,d2,d3	Lectures and practical training	Written, practical and oral exams
Week # 7	Alkaloids; tropane.	a1,a2,b1,b2,b3,c1,c2,d1,d2,d3	Lectures and practical training	Written and oral exams
Week # 8	**Mid-term exam**			
Week # 9	Alkaloids; qinoline & isoquinoline.	a1,a2,a4,b2,b3,c2,d1,d2,d3	Lectures and practical training	Written, practical and oral exams
Week # 10	Alkaloids; Indole & purine.	a1,a2,a4,b2,b3,c2,d1,d2,d3	Lectures and practical training	Written, practical and oral exams
Week # 11	Alkaloids; Imidazole, steroid & tropolone.	a1,a2,a4,b2,b3,c2,d1,d2,d3	Lectures and practical training Activity	Written, practical and oral exams
Week # 12	Chromatography: -Introduction, column chromatography and electrophoresis.	a4,d1,d2,d3	Lectures	Written, practical and oral exams
Week # 13	-Thin layer & paper chromatography	a4,d1,d2,d3	Lectures	Written, practical and oral exams
Week # 14	HPLC , GC , Gel filtration , Ion exchange.	a4,c1,c2,d1,d2,d3	Lectures Activity	Written, practical and oral exams
Week # 15	Anti-cancer & hallucinating drugs	a1,a3,c1,c2,c3,c4,d1,d2,d3	Lectures Activity	Written, practical and oral exams
Week # 16	Final exam			

Course coordinator: Dr. Mai Elnagar

Head of department: Dr. Ramadan Eldomany

Bachelor degree in Pharmacy

(Bylaw 2016)

Course Specification

2020-2021

Fourth Year / First Semester

Kafrelsheikh University, Faculty of Pharmacy
Course Specifications

Programme on which the course is given	**Bachelor degree in Pharmacy**
Major or minor element of programme	**Major**
Department offering the course	**Pharmaceutical chemistry**
Department supervising the course	
Academic Year / Level	**Fourth year, first semester**
Date of specification approval	**9/2020**

A- Basic Information

Title : Pharmaceutical Chemistry 3	**Code : PC706**
Total contact hours:4hr.	**Lecture :2hr.**
	Practical :2hr.

B- Professional Information

1. Overall aims of the course

Upon successful completion of this course, the students should be able to understand :

- the relationship of chemical structure to biological activity and the general structural features required for the drug action.
- the effect of molecular modifications on the absorption, distribution, metabolism, and target binding of drugs.
- Quantitatively drugs in different dosage forms using pharmacopeial methods of assay

2. Intended learning outcomes of the course (ILOs)

a- Knowledge and understanding:

On successful completion of the course, the student should be able to:

a1. Report the mode of action of mentioned drugs.
a2. Describe the SAR of different drug classes
a3. List the nomenclature and classfication of healthcare products
a4. Define uses of different drug classes (anticancer drugs,analgesic drugs,vitamins,endocrine system acting drugs, and antihyperlipidemics).
a5. Demonstrate different synthetic pathways.

b- Intellectual skills

b1. Utilize SAR to interpret the pharmacological activity of certain drugs.
b2. Illustrate IUPAC names with structural formulae of drugs.
b3. Recognize the generic names of drugs and deduce the

therapeutic utility for each class.
b4. Assess the structural feature of a compound to physicochemical properties which may affect its biological response or influence its formulation / administration.

c- Professional and practical skills

c1. Use GLP-compliant analytical tools for efficacy and QA testing of APIs and their healthcare products.
c2. Analyze the therapeutic knowledge gained in real life professional practice.
c3. Use effectively basic laboratory equipments and chemicals safely.
c4. Assess impurities of active substances in samples.

d- General and transferable skills

d1. Communicate therapeutic knowledge gained to other members of the healthcare team.
d2. Retrieve information from variety of sources.
d3. Work in a team with students.
d4. Estimate reports and present it in lights of pharmaceutical chemistry .

3. Contents

Week	Topic	Total contact hours	Lecture	Practical
1	Anticancer drugs	4	2	2
2	Anticancer drugs (cont.)	4	2	2
3	Anticancer drugs (cont.)	4	2	2
4	Analgesic drugs	4	2	2
5	Analgesic drugs (cont.)	4	2	2
6	Analgesic drugs (cont.)	4	2	2
7	**Semester work**			
8	Drugs acting on endocrine system	4	2	2
9	Drugs acting on endocrine system (cont.)	4	2	2
10	Drugs acting on endocrine system (cont.)	4	2	2

11	Drugs acting on endocrine system (cont.)	**4**	**2**	**2**
12	Antihyperlipidemics	**4**	**2**	**2**
13	Antihyperlipidemics (cont.)	**4**	**2**	**2**
14	Vitamins	**2**	**2**	Practical exam
15	Vitamins (cont.)	**2**	**2**	Practical exam

4. Teaching and learning methods

a. Lectures (√)
b. Practical training / laboratory (√)
c. Class activity (√)

5. Student assessment methods

Semester work	**To assess**	**The ability of students to follow-up the course subjects.**
Practical exam	**To assess**	**The gained experience in laboratory methods and techniques.**
Oral exam	**To assess**	**The ability of students in expressing and presenting their knowledge clearly and in systematic approach.**
Written final exam	**To assess**	**The overall outcomes.**

Assessment schedule

Assessment 1	**Semester work**	**Week**	**7**
Assessment 2	**Practical exam**	**Week**	**14, 15**
Assessment 3	**Final exam**	**Week**	**16, 17**
Assessment 4	**Oral**	**Week**	**16, 17**

Weighting or assessments

Semester work	**10**	**%**
Final-Term Examination	**50**	**%**
Oral Examination	**10**	**%**
Practical Examination	**30**	**%**
Total	**100**	**%**

6. List of references

Course notes

- Notes on pharmaceutical chemistry prepared and distributed by Dept. of Pharmaceutical Chemistry.
- Lab Manual of pharmaceutical chemistry prepared and distributed

by Dept. of Pharmaceutical Chemistry.

Essential books (text books)

1) William O. Foye, " Principle of Medicinal Chemistry" 7th edition (2012), Williams & Wilkins, London.
2)Wilson and Gisvold's " Textbook of Organic and Pharmaceutical Chemistry", 12th Ed., Jaime N. Delgado, J.B. Lippincot Co., 2010.
3) William O Foye, " Principle of Medicinal Chemistry" 5th edition (2002), Williams & Wilkins, London.
4) M.E.Wolff Burger's " Medicinal Chemistry and Drug Discovery ", 7th edition (2010), Wiley-interscience Publication, New York, USA.
5) Gennaro (Editor), " Remington's Pharmaceutical Sciences ", 21th edition (2005), Lippincott Williams & Wilkins, Maryland, USA.

Recommended books

Wilson and Gisvold's " Textbook of Organic and Pharmaceutical Chemistry", 12th Ed., Jaime N. Delgado, J.B. Lippincot Co., 2010.

Websites

www.fda.gov , www.mohp.gov , www.emea.org , www.who.int

7. Facilities required for teaching and learning

- E-learning and smart board.
-Class rooms.
-Laboratory facilities.
- Data show
- Computers.
–Library.
–Internet. -Spectrophotometer

Course coordinator:

Dr. Tamer Mohamed Ibrahim

Head of Department:

Prof.Dr. Ramadan Eldomany

Date: 9/2020

Course Plan

Course ILOs Matrix – Teaching and Learning Strategy and Student Assessment

Course title: Pharmaceutical chemistry 3 **Course code:** PC 706

Course Contents		ILOs	Teaching and Learning Methods	Student Assessment Methods
Week # 1	Anticancer drugs	a1, a2, a4, a5,b1,b2,b3	Lectures, practical training, discussion and brain storming	Written, practical and oral exams
Week # 2	Anticancer drugs (cont.)	a1, a2, a4, a5, b1, b2, b3,c2,c3,d2,d3,d4	Lectures, practical training, discussion and brain storming	Written, practical and oral exams
Week # 3	Anticancer drugs (cont.)	a1, a2, a4, a5, b1, b2, b3,c2,c3, d2,d3	Lectures, practical training, discussion and brain storming	Written, practical and oral exams
Week # 4	Analgesic drugs	a1, a2,a3,a4, a5,b1,b2,b3,c2,c3, d1,d2,d3	Lectures, practical training, discussion and brain storming	Written, practical and oral exams
Week # 5	Analgesic drugs (cont.)	a1, a2,a3,a4, a5,b1,b2,b3,c2,c3, d1,d2,d3	Lectures, practical training, discussion and brain storming	Written, practical and oral exams
Week # 6	Analgesic drugs (cont.)	a1, a2,a3,a4, a5,b1,b2,b3,c2,c3, d1,d2,d3	Lectures, practical training, discussion and brain storming	Written, practical and oral exams
Week # 7	**Mid-term exam**			
Week # 8	Drugs acting on endocrine system	a1, a2,a4, b1,b3,c1,c2,c3, d2,d3	Lectures, practical training, discussion and brain storming	Written, practical and oral exams
Week # 9	Drugs acting on endocrine system (cont.)	a1, a2,a4, b1,b3,c1,c2,c3, d2,d3	Lectures, practical training, discussion and brain storming	Written, practical and oral exams
Week # 10	Drugs acting on endocrine system (cont.)	a1, a2,a4, b1,b3,c1,c2,c3, d2,d3	Lectures, practical training, discussion and brain storming	Written, practical and oral exams
Week # 11	Drugs acting on endocrine system (cont.)	a1, a2,a4, b1,b3,c1,c2,c3, d2,d3	Lectures, practical training, discussion and brain storming	Written, practical and oral exams
Week # 12	Antihyperlipidemic	a1, a2,a3,a4, b1,b2,,b3,c2,c3, d2,d3	Lectures, practical training, discussion and brain storming	Written, practical and oral exams
Week # 13	Antihyperlipidemic (cont.)	a1, a2,a3,a4, b1,b2,,b3,c2,c3, d2,d3	Lectures, practical training, discussion and brain storming	Written, practical and oral exams
Week # 14	Vitamins	a2, a4,b5, b1 ,b2,,b3,c1,c2,c3, d1, d2,d3	Lectures, discussion and brain storming	Written and oral exams
Week # 15	Vitamins (cont.)	a2, a4,b5, b1 ,b2,,b3,c1,c2,c3, d1, d2,d3	Lectures, discussion and brain storming	Written and oral exams

Course coordinator: Dr. Tamer Mohamed Ibrahim
Head of department: prof. Dr. Ramadan Eldomany
Date: 9/2020

Kafrelsheikh University, Faculty of Pharmacy
Course Specifications

Program on which the course is given	**Bachelor degree in Pharmacy**
Major or minor element of program	**Major**
Department offering the course	**Biochemistry**
Academic Year / Level	**Forth year, first semester**
Date of specification approval	**9/2020**

A- Basic Information

Title : Clinical Biochemistry	**Code : PB 704**
Total contact Hours:4	**Lecture :2 hr**
	Practical :2 hr

B- Professional Information

1. Overall aims of the course: upon successful completion of this course, the students should be able to know:

- The fundamental aspects of clinical chemistry of various diseases such as cancer, liver, heart and kidney.
- The necessary clinical knowledge and skills, correlate the biochemical analyses of a certain disease and its appropriate management.
- The recent specific diagnostic markers of each disease and how they can be analyzed.

2. Intended learning outcomes of the course (ILOs)

a- knowledge and understanding: upon successful completion of this course, the students should be able to know:

a1. Demonstrate the methods for proper specimen collection, handling and disposal.

a2. Identify the enzymes used for clinical diagnosis of certain diseases.

a3. Explain the diagnostic features with laboratory tests for disorders of plasma,carbohydrates, proteins and lipoproteins.

a4. State the important biochemical markers and diagnostic laboratory tests of liver, heart, kidney, and gastrointestinal tract diseases.

a5. Discuss the relation between some disorders of the endocrine systems and metabolic diseases.

a6. List the different tumor markers and their specificity and measurement.

a7.List the different techniques for recombinant DNA technology , PCR and their applications in medicine .

b- Intellectual skills

b1. Assess the biochemical markers to guide clinical decision.
b2. Recognize interrelationships of clinical chemistry, molecular biology and medicine.
b3.Utilize biochemical tests in diagnosis, prognosis, monitoring and screening.

c- Professional and practical skills

c1.Assess samples withdrawn from different biological fluids correctly and safely.
c2. Use effectively laboratory glass-wares, instruments, reagents &kits used for determination of different components in biological fluids.
c3.Assess standard laboratory procedures and documentation.
c4.Examine different biological samples in scientific and correct manner.
c5.Analyze the scientific way of thinking to suggest the diagnosis of the case based on the determined biochemical data**.**
c6.Use effectively chemical reagents especially some dangerous materials.

d- General and transferable skills

d1. Retrieve information in internet and library.
d2. Work effectively as a member in a team.
d3. Evalute the biochemical investigations in relation to diseases to find out their causes and suggest rational treatment.
d4. Develop good health by means of life style.

3. Contents

Week	Topic	Total credit hours	Lecture	Practical
1	Diabetes mellitus and laboratory tests	**3**	**2**	**1**
2	Liver Functions and laboratory Tests	**3**	**2**	**1**
3	Renal Functions and laboratory tests	**3**	**2**	**1**
4	Urine as a diagnostic tool for diseases	**3**	**2**	**1**
5	Electrolyte balance and imbalance	**3**	**2**	**1**
6	Nutrition and health	**3**	**2**	**1**
7	**Mid-term exam**	**3**		**1**
8	Tumor markers	**3**	**2**	**1**
9	Hormonal disturbances	**3**	**2**	**1**
10	Hormonal disturbances 2	**3**	**2**	**1**
11	Hormonal disturbances 3	**3**	**2**	**1**
12	Plasma proteins	**3**	**2**	**1**
13	Coagulations.	**3**	**2**	**1**
14	Immunoglobulins.	**2**	**2**	**Practical exam**

15	Plasma and non-pasma enzymes.	**2**	**2**	**Practical exam**

4. Teaching and learning methods

a. Lectures (√)
b E-learning . (√)
c. Class Activity (brain storming &discussion) (√)
d. Practical training / laboratory (√)

5. Student assessment methods

Periodical exam	**To assess**	**The ability of students to follow-up the course subjects.**
Practical exam	**To assess**	**The gained experience in laboratory methods and techniques.**
Written final exam	**To assess**	**The ability of students in expressing and presenting their knowledge clearly and in systematic approach.**
Oral exam	**To assess**	**The overall outcomes.**

Assessment schedule

Assessment 1	**Periodical exam**	**Week**	**7**
Assessment 2	**Practical exam**	**Week**	**14,15**
Assessment 3	**Written final exam**	**Week**	**16,17**
Assessment 4	**Oral exam**	**Week**	**16,17**

Weighting or assessments

Periodical exam	**10**	**%**
Practical exam	**30**	**%**
Written final exam	**50**	**%**
Oral exam	**10**	**%**
Total	**100**	**%**

6. List of references

Course notes

- Notes in Clinical Biochemistry by staff-members of department of Biochemistry.
- Lab.manual in Clinical Biocemistry by staff-members of Department of Biochemistry.

Essential books (text books)

1- Sushma KANUKALE (2019): Clinical Biochemistry: FUNDAMENTALS and QUICK REVIEW.
2- Vijay Kumar, Kiran Dip Gill, (2018): Basic Concepts in Clinical Biochemistry: A Practical Guidebooks.
3- -Devlin TM (2010): Textbook of Biochemistry With Clinical Correlations, 7th edition, Wiley-Liss, USA

Recommended books

1-Shashank Kumar (2020): Clinical Biochemistry and Drug Development: From

Fundamentals to Output.
2- Walker S, Ashby P, Rae P,Beckett G (2010): Lecture Notes Clinical Biochemistry, 8th edition, Blackwell Pub.USA.

Websites

www.highwire.com,www.google.com,www.pubmed.com &www.biomed.net

7. Facilities required for teaching and learning

Class rooms.
-Laboratory facilities including instruments and tools necessary for practical work e.g. glass wares, pH meters , electrophoretic apparatus, centrifuge, spectrophotometers, session rooms.
–Library.
- Data show
-Computers.
–Internet.
- E-learning

Course coordinator:

Prof .Dr: Nabil Mohie

Head of Department:

Prof. Dr. Ramadan Ahmed Aldomany

Date: 9 /2020

Course ILOs Matrix – Teaching and Learning Strategy and Student Assessment

Course title: **Clinical biochemistry** Course code: **PB 803**

Course Contents		ILOs	Teaching and Learning Methods	Student Assessment Methods
Week # 1	**Diabetes mellitus and laboratory tests**	a1,a2,b1,c1, c6,c2,d1.	Lectures, E-learning and practical training	Written, practical and oral exams
Week # 2	**Liver Functions and laboratory Tests**	a1, a2. a3, a7, b1,c1,c2,c3, c6, d1,d2.	Lectures, E-learning practical training, discussion and brain storming	Written, practical and oral exams
Week # 3	**Renal Functions and laboratory tests**	a1, a2, a4,a5, b1,b3,c2,c3,c4,c5,d1,d2.	Lectures E-learning and practical training, discussion and brain storming	Written, practical and oral exams
Week # 4	**Urine as a diagnostic tool for diseases**	a1, a3, b1,b3,c3,c4,c5,d1,d2,d3	Lectures, E-learning and practical training, discussion and brain storming	Written, practical and oral exams
Week # 5	**Electrolyte balance and imbalance**	a4,a5,b1,b2,b3,c1,c2, c5, d1,d2,d3	Lectures, E-learning and practical training, discussion and brain storming	Written, practical and oral exams
Week # 6	**Nutrition and health**	a1, b1, c1, d1, d2, d3, d4	Lectures , E-learning and practical training, discussion and brain storming	Written, practical and oral exams
Week # 7	**Mid-term exam**			
Week # 8	Tumor markers	a1, a6,b1,b2,c1,c2,c3,c4,c5,d1,d2,d3	Lectures, E-learning and practical training, discussion and brain storming	Written, practical and oral exams
Week # 9	Hormonal disturbances	a5, a7, c5, d1, d3	Lectures, E-learning and practical training, discussion and brain storming	Written, practical and oral exams
Week # 10	Hormonal disturbances 2	a5, a7, c5, d1, d3	Lectures, E-learning and practical training, discussion and brain storming	Written, practical and oral exams
Week # 11	Hormonal disturbances 3	a5, a7, c5, d1, d3	Lectures, E-learning and practical training, discussion and brain storming	Written, practical and oral exams
Week # 12	Plasma proteins	a2. a3, b1,b2,b3,c1,c2,c3,c4, c5,d3	Lectures, E-learning and practical training, discussion and brain storming	Written, practical and oral exams
Week # 13	Coagulations.	a1, a3, a4, c1,c2,c3,c6,d1,d2,d3,d4	Lectures, E-learning and practical training, discussion and brain storming	Written, practical and oral exams
Week # 14	Immunoglobulins.	a4, b1, b3, c1, c2, d2	Lectures, E-learning and practical training, discussion and brain storming	Written and oral exams
Week # 15	Plasma and non-pasma enzymes.	a2, b1, b3, c1, c2, c5, d2	Lectures, E-learning and practical training, discussion and brain storming	Written and oral exams

Course coordinator: Prof. Dr. Nabil Mohie

Head of department: Prof. Dr. Ramadan Ahmed Aldomany

Kafrelsheikh University, Faculty of Pharmacy
Course Specifications

Programme on which the course is given	**Bachelor degree in Pharmacy**
Major or minor element of programme	**Major**
Department offering the course	**Microbiology & immunology**
Department supervising the course	**Microbiology & immunology**
Academic Year / Level	**Forth year, first semester**
Date of specification approval	**9/2020**

A- Basic Information

Title : Microbiology of diseases	**Code : PM 705**
Total contact hours:4 hr	**Lecture :2hr**
	Practical :2hr

B- Professional Information

1. Overall aims of the course

Upon successful completion of this course, the students should be able to understand:

- the complex interaction between microorganism and the human host ;including outcome of infection.
- microbial infection process including virulence factors,pathogenisis , clinical pictures for different microbial dieases.
- different diagnostic procedures, treatment of different microbial infections including bacterial and fungal infection .

2. Intended learning outcomes of the course (ILOs)

a- Knowledge and understanding:

On successful completion of the course, the student should be able to:

a1. Define the terms of infection , pathogen , commensal, opportunistic infection and nosocomial infection.

a2 Know the clinical symptoms and treatment of different microbial diseases

a3. Know the virulence factors and pathogenisis of different microbial diseases

b- Intellectual skills

- b1. Recognize the clinical symptoms of microbial infections.
- b2. Predict the mechanism of different microbial diseases.
- b3. predict treatment of these microbial infections.
- b4. Utilize specific preventive and control measures to prevent infections spread in the community.

c- Professional and practical skills

- c1. Use effectively clinical samples in aseptic way.
- c2. Use microbiological laboratory tests in order to isolate and identify different pathogens in some clinical sample.
- c3. Select the drug of choice and preventive methodes for different microbial infections.

d- General and transferable skills

- d1.Communicate effectively with the medical stuff in different hospital setting
- d2. Demonstrate in writing and orally for analysis of specialized or general issue of microbial infection.

3. Contents

Week	Topic	Total contact hours	Lecture	Practical
1	Introduction to microbial infection	4	2	2
2	Bacteriology- Gram positive cocci	4	2	2
3	Gram positive cocci	4	2	2
4	Gram positive bacilli	4	2	2
5	Gram negative cocci	4	2	2
6	Mycobacterium group	4	2	2
7	**Semester works**			
8	Gram negative bacilli	4	2	2
9	Gram negative bacilli (cont.)	4	2	2
10	Gram negative bacilli (cont.)	4	2	2
11	Gram negative bacilli (cont.)	4	2	2
12	Chylamydiae &Rickettsiae	4	2	2
13	Mycology	4	2	2
14	Mycology	2	2	Practical exam
15	Spirochetes	2	2	Practical exam

4. Teaching and learning methods

a. Lectures	**(√)**
b. Practical training / laboratory	**(√)**
c. Seminar / Workshop	**(√)**
d. class activity	**(√)**

5. Student assessment methods

Semester works	**To assess**	**The ability of students to follow-up The course subjects.**
Practical exam	**To assess**	**The gained experience in laboratory methods and techniques.**
Oral exam	**To assess**	**The ability of students in expressing and presenting their knowledge clearly and in systematic approach.**
Written final exam	**To assess**	**The overall outcomes.**

Assessment schedule

Assessment 1	**Semester works**	**Week**	**7**
Assessment 2	**Practical exam**	**Week**	**14,15**
Assessment 3	**Final exam**	**Week**	**16,17**
Assessment 4	**Oral**	**Week**	**16,17**

Weighting or assessments

Semester works	**10**	**%**
Final-Term Examination	**50**	**%**
Oral Examination	**10**	**%**
Practical Examination	**30**	**%**
Total	**100**	**%**

6. List of references

Course notes

Notes on Immunology and bacteriology .. approved by department

Essential books (text books)

Jwartez ,E.et al. Medical Microbiology 28th ed . Appton & Lange.

Recommended books

Murray et al ,Medical microbiology 9th ed

Websites

www.med.sc.edu
www.themicrobe.com
www.themicrobiologyplace.com
www.ekb.eg

7. Facilities required for teaching and learning

-Class rooms.
-Laboratory facilities, microscope, laminar flow & autoclave
–Library.
- Data show (Overhead, video projector)

-Computers. –Internet.

Course coordinator:

Professor Dr. Ramadan Ahmed Aldomany

Head of Department:

Professor Dr. Ramadan Ahmed Aldomany

Date : 9 /2020

Course Plan
Course ILOs Matrix – Teaching and Learning Strategy and Student Assessment

Course title: **Microbiology of diseases** Course code: **PM705**

Course Contents		ILOs	Teaching and Learning Methods	Student Assessment Methods
Week # 1	Introduction to microbial infection	a1	Lectures and practical	Written, practical and oral exams
Week # 2	Bacteriology- Gram positive cocci	a2,a3, b1, b2, b3, b4 ,b5, c1, c2, c3, c4, c5,c6,c7, d1, d2	Lectures and practical training	Written, practical and oral exams
Week # 3	Gram positive cocci	a2,a3, b1, b2, b3, b4 ,b5, c1, c2, c3, c4, c5,c6,c7, d1, d2	Lectures , practical training, seminar& class activity	Written, practical and oral exams
Week # 4	Gram positive bacilli	a2,a3, b1, b2, b3, b4 ,b5, c1, c2, c3, c4, c5,c6,c7, d1, d2	Lectures , practical training, seminar& class activity	Written, practical and oral exams
Week # 5	Gram negative cocci	a2,a3, b1, b2, b3, b4 ,b5, c1, c2, c3, c4, c5,c6,c7, d1, d2	Lectures , practical training, seminar& class activity	Written, practical and oral exams
Week # 6	Mycobacterium group	a2,a3, b1, b2, b3, b4 ,b5, c1, c2, c3, c4, c5,c6,c7, d1, d2	Lectures , practical training, seminar& class activity	Written, practical and oral exams
Week # 7	**Mid-term exam**			
Week # 8	Gram negative bacilli	a2,a3, b1, b2, b3, b4 ,b5, c1, c2, c3, c4, c5,c6,c7, d1, d2	Lectures , practical training, seminar& class activity	Written, practical and oral exams
Week # 9	Gram negative bacilli (cont.)	a2,a3, b1, b2, b3, b4 ,b5, c1, c2, c3, c4, c5,c6,c7, d1, d2	Lectures , practical training, seminar& class activity	Written, practical and oral exams
Week # 10	Gram negative bacilli (cont.)	a2,a3, b1, b2, b3, b4 ,b5, c1, c2, c3, c4, c5,c6,c7, d1, d2	Lectures , practical training, seminar& class activity	Written, practical and oral exams
Week # 11	Gram negative bacilli (cont.)	a2,a3, b1, b2, b3, b4 ,b5, c1, c2, c3, c4, c5,c6,c7, d1, d2	Lectures , practical training, seminar& class activity	Written, practical and oral exams
Week # 12	Chylamydiae &Rickettsiae	a2,a3, b1, b2, b3, b4 ,b5, c1, c2, c3, c4, c5,c6,c7, d1, d2	Lectures , practical training, seminar& class activity	Written, practical and oral exams
Week # 13	Mycology	a2,a3, b1, b2, b3, b4 ,b5, c1, c2, c3, c4, c5,c6,c7, d1, d2	Lectures , practical training, seminar& class activity	Written, practical and oral exams

Week # 14	Mycology	a2,a3, b1, b2, b3, b4 ,b5, c1, c2, c3, c4, c5,c6,c7, d1, d2	Lectures	Written and oral exams
Week # 15	Spirochetes	a2,a3, b1, b2, b3, b4 ,b5, c1, c2, c3, c4, c5,c6,c7, d1, d2	Lectures	Written and oral exams

Course coordinator: Professor Dr. Ramadan Ahmed Aldomany

Head of department: Professor Dr. Ramadan Ahmed Aldomany

Kafrelsheikh University, Faculty of Pharmacy
Course Specifications

Program on which the course is given	**Bachelor degree in Pharmacy**
Major or minor element of program	**Major**
Department offering the course	**Pharmaceutical technology**
Department supervising the course	
Academic Year / Level	**Fourth year, First Semester**
Date of specification approval	**9/2020**

A- Basic Information

Title : Industrial Pharmacy	**Code : 4054**
Total contact hours :4	**Lecture :2**
	Practical :2

B- Professional Information

1. Overall aims of the course

Upon successful completion of this course, the students should be able to:

- Outline the design and mechanism of action of the instruments included in selected unit operation in pharmaceutical practice.
- Point out the principles of size reduction, size enlargment, supercritical fluid technology, filtration and centrifugation.
- Review the use and application of supercritical fluid technology, size reduction, size enlagement, size classification, filtration and centrifugation in pharmaceutical industry.
- Select the best equipment for a given operation based on specification of the materials and the required product as well as the principle of equipment operation.

2. Intended learning outcomes of the course (ILOs)

a- Knowledge and understanding:

Upon successful completion of the course, the graduate should be able to:

- a1- Describe the mechanisms of size reduction and granulation.
- a2- Identify the factors affecting size reduction process.
- a3- Identify the factors affecting filtration rate.
- a4- Describe the equipments of filtration, centrifugation, size reduction, size enlargment and size classification.
- a5- Identify the principles of size separation and supercritical fluid technology and its advantages.
- a6- Demonstrate the importance of industrial gases and water conditioning in pharmacy .

b- Intellectual skills

- b1-Select the best equipment for preperation of granules or pellets.
- b2- Select the best equipment and/or operational line to perform size reduction process.
- b3-Recognize problems associated with unit operations.
- b4-Assess the relationship between equipment design and product characteristics.
- b5- select the best supercritical fluid technique to extract active ingredient or to prepare particle.

c- Professional and practical skills

- c1- Analyze solid-liquid and liquid- liquid separation process.
- c2- Analyze size reduction operation.
- c3- Test granules and pellets.
- c4- Examine drug particles based on their particle size
- c5- Analyze filtration operation.

d- General and transferable skills

- d1- Retrieve analyze and utilize information from different sources.
- d2- Work effectively in a team.
- d3- Develop critical thinking and problem solving ability in the industrial pharmacy field.
- d4- Demonstrate continuous self learning ability.

3. Contents

Week	Topic	Total contact hours	Lecture	Practical (contact hours)
1	Introduction – Theory of filtration	**4**	**2**	**2**
2	Design of filtration equipments	4	**2**	**2**
3	Centrifugal filtration	4	**2**	**2**
4	Particle size reduction, objectives-theory and mechanisms	4	**2**	**2**
5	Equipment for particle size reduction	4	**2**	**2**
6	Granulation; methods and mechanisms of granule formation	**4**	**2**	**2**
7	Mid-term exam			
8	Pharmaceutical granulation equipment and pelletizers	**4**	**2**	**2**
9	Introduction to supercritical fluid technology and its application in drug extraction and particle design	**4**	**2**	**2**
10	Objectives of size separation	**4**	**2**	**2**
11	Methods of size separation	**4**	**2**	**2**
12	Derived properties of powder	**4**	**2**	**2**
13	Introduction to Industrial gases	**4**	**2**	**2**
14	Water conditioning	**2**	**2**	Practical exam
15	Industrial waste waters	**2**	**2**	Practical exam

4. Teaching and learning methods

a. Lectures (√)
b. Practical training / laboratory/ field visit (√)
c. Seminar / Workshop ( )
d. Class Activity (Brain storming/discussion) (√)
e. E- Learning (√)
f. smart board (√)

5. Student assessment methods

Written mid-term exam	**To assess**	**The ability of students to follow-up the course subjects.**
Practical exam	**To assess**	**The gained experience in laboratory methods and techniques.**
Oral exam	**To assess**	**The ability of students in expressing and presenting their knowledge clearly and in systematic approach.**
Written final exam	**To assess**	**The overall outcomes.**

Assessment schedule

Assessment 1	**Mid-term exam**	**Week**	**7**
Assessment 2	**Practical exam**	**Week**	**14,15**
Assessment 3	**Final exam**	**Week**	**16,17**
Assessment 4	**Oral**	**Week**	**16,17**

Weighting or assessments

Mid-Term Examination	**10**	**%**
Final-Term Examination	**50**	**%**
Oral Examination	**20**	**%**
Practical Examination	**20**	**%**
Semester Work		**%**
Other types of assessment		**%**
Total	**100**	**%**

6. List of references

Course notes

Notes on Industrial Pharmacy prepared by the department staff.

Essential books (text books)

Sudhakara Reddy Pondugula, M. Gopal Rao, Govinda Rajan Gudala, R. Vamsi Krishna, Pharmaceutical Engineering: Practical Manual (Unit Operations), Bsp, 2007.

Recommended books

M.M Gupta, Dr. N .E S. Wesley, Text Book of Pharmaceutical Engineering including unit operations, Vardhaman Publisher and Distributors, Jaipur, Volume 1, Number 1, Jaipur, India, 2008

Websites

www.pubmed.com

www.sciencedirect.com

7. Facilities required for teaching and learning

- **Class rooms.**
- **Laboratory facilities(Equipment of Educational factory)**
- **Data show**
- **E- Learning**
- **Smart board**
- **Computers.**
- **Internet.**

Course coordinator:

Dr / Mohamed Fathy

Head of Department:

Prof.Dr/Abd Elaziz Elsaid

Date: 9 /2020

Course Plan
Course ILOs Matrix – Teaching and Learning Strategy and Student Assessment
Course title: Industrial Pharmacy **Course code: 5054**

Course Contents		ILOs	Teaching and Learning Methods	Student Assessment Methods
Week # 1	Introduction – Theory of filtration	a3, d1, d4	Lectures and practical training	Written, practical and oral exams
Week # 2	Design of filtration equipments	a3, a4, b3, b4, c5, d1, d3, d4	Lectures and practical training	Written, practical and oral exams
Week # 3	Centrifugal filtration	a3, a4, c5, d1, d4	Lectures and practical training	Written, practical and oral exams
Week # 4	Particle size reduction, objectives- theory and mechanisms	a1, a2, b2, c4, c2 d1, d4	Lectures and field visit.	Written, practical and oral exams
Week # 5	Equipment for particle size reduction	a1, a2, a4, b2, b3, b4, c2, d3	Lectures and practical training	Written, practical and oral exams
Week # 6	Granulation; methods and mechanisms of granule formation	a1, b1, c3, d1, d2, d4	Lectures and practical training	Written, practical and oral exams
Week # 7	Mid-term exam			
Week # 8	Pharmaceutical granulation equipment and pelletizers	a1, a4, b1, b3, b4, c3, d2, d3	Lectures and practical training	Written, practical and oral exams
Week # 9	Introduction to supercritical fluid technology and its application in drug extraction and particle design	a5, b5, d1, d4	Lectures and class activity.	Written, practical and oral exams
Week # 10	Objectives of size separation	a5,c1, d1, d4	Lectures	Written, practical and oral exams
Week # 11	Methods of size separation	a4, a5, b3, b4, c1, c4, d2, d3	Lectures and practical training	Written, practical and oral exams
Week # 12	Derived properties of powder	a1, b4, c4, d1, d2, d3	Lectures and practical training	Written, practical and oral exams
Week # 13	Introduction to Industrial gases	a6, d1, d4	Lectures and field visit.	Written and oral exams
Week # 14	Water conditioning	a6, d1, d4	Lectures	Written and oral exams
Week # 15	Industrial waste waters	a6, d1, d4	Lectures	Written and oral exams

Course coordinator: Dr / Mohamed Fathy
Head of department: Prof.Dr/Abd Elaziz Elsaid

Kafrelsheikh University, Faculty of Pharmacy
Course Specifications

Program on which the course is given	**Bachelor degree in pharmacy**
Major or minor element of program	**Major**
Department offering the course	**Pharmacology & Toxicology**
Department supervising the course	
Academic Year / Level	**Fourth year, first semester**
Date of specification approval	**9/2020**

A- Basic Information

Title : Pharmacology-3	**Code : PO703**
Total contact hours: 4 hr.	**Lecture: 2 hr.**
	Practical: 2 hr.

B- Professional Information

1. Overall aims of the course

Upon successful completion of this course, the students should be able to undrstand:

- The mechanism of action of chemotherapeutic agents, different drugs affecting the endocrine system, respiratory system, and vitamins.
- The use and the side effects of such drugs.
- Drugs affecting central nervous system and blood in laboratory animals.

2. Intended learning outcomes of the course (ILOs)

a- Knowledge and understanding:

a1. Describe different types of cancer and learn about the classes of antineoplastics.
a2. List different drugs used in cancer and endocrine system.
a3. Discuss the mechanism of action of different chemotherapeutic agents and the possible side effects and drug interactions
a4. Describe the adverse reactions and the different chemotherapeutic agents.
a5. Learn various endocrine abnormalities and management.
a6. List different types of vitamins.

b- Intellectual skills

b1. Clarify the pathophysiology of cancer
b2. Correlate between risk factors and cancer prognosis
b3. Categorize antineoplastic drugs in terms of efficacy, uses, route of administration and adverse effects.
b4. Assess adverse reactions and contra-indications of hormone replacement and antagonist therapy.
b5. Distinguish between different therapeutic indications of vitamins.

c- Professional and practical skills

c1. Demonstrate different treatment strategies for tumors
c2. Distinguish and differentiate between different drugs acting on the endocrine system and vitamins.
c3. Relate the drug of choice in different tumors.
c4. Learn the patient about possible side effects of chemotherapeutic agents.
c5. Use effectively library search, information, private study as well as analyze experimental results.

d- General and transferable skills

d1 Communicate clearly by verbal means through group discussions.
d2. Retrieve and evaluate information from different sources.
d3. Demonstrate critical-thinking abilities.

3. Contents

Week	Topic	Total contact hours	Lecture	Practical
1	Chemotherapeutic agents	**4**	**2**	**2**
2	Chemotherapeutic agents (cont.)	**4**	**2**	**2**
3	Chemotherapeutic agents (cont.)	**4**	**2**	**2**
4	Chemotherapeutic agents (cont.)	**4**	**2**	**2**
5	Chemotherapeutic agents (cont.)	**4**	**2**	**2**
6	Chemotherapeutic agents (cont.)	**4**	**2**	**2**
7	**Mid-term exam**			
8	Chemotherapeutic agents (cont.)	**4**	**2**	**2**
9	Drugs affecting endocrine system	**4**	**2**	**2**
10	Drugs affecting endocrine system (cont.)	**4**	**2**	**2**
11	Drugs affecting endocrine system (cont.)	**4**	**2**	**2**
12	Drugs affecting endocrine system (cont.)	**4**	**2**	**2**
13	Drugs affecting endocrine system(cont.)	**4**	**2**	**2**
14	Vitamins	**2**	**2**	Practical exam
15	Vitamins	**2**	**2**	Practical exam

4. Teaching and learning methods

a. Lectures	**(√)**
b. Practical training / laboratory	**(√)**
c. Seminar / Workshop	**( )**
d. Class Activity	**(√)**
e. E- learning	**(√)**
f. Smart board	**(√)**

5. Student assessment methods

Semester Work	**To assess**	**The ability of students to follow-up the course subjects.**
Practical exam	**To assess**	**The gained experience in laboratory methods and techniques.**
Oral exam	**To assess**	**The ability of students in expressing and presenting their knowledge clearly and in systematic approach.**
Written final exam	**To assess**	**The overall outcomes.**

Assessment schedule

Assessment 1	**Semester Work**	**Week**	**7**
Assessment 2	**Practical exam**	**Week**	**14,15**
Assessment 3	**Final exam**	**Week**	**16,17**
Assessment 4	**Oral**	**Week**	**16,17**

Weighting or assessments

Semester Work	**10**	**%**
Final-Term Examination	**50**	**%**
Oral Examination	**10**	**%**
Practical Examination	**30**	**%**
Total	**100**	**%**

6. List of references

Course notes

Notes on pharmacology (Department of Pharm./Tox;., College of Pharmacy)

Essential books (text books)

Goodman & Gilman's : The Pharmacological Basis of Therapeutics

Recommended books

-Basic & Clinical Pharmacology (2003). G. Katzung.9th ed.Lavoisier S.A.S.

- Pharmacology (2007). Rang H.P.& Dale M. 7th Edition. Churchill Livingston London

-Lippincott Modern Pharmacology (2009). C. Champe, A. Harvey and Denise R. (illustrated pharmacology Review).6 th ed. Lippincott Williams & Wilkins

Websites

www. biomed central. Com

www. medscape. com
www. Pubmed. Com

7. Facilities required for teaching and learning

-Class rooms.
-Laboratory facilities (laboratory animals, chemicals). The practical part of the course includes identification of pharmacological effects of some drugs in laboratory animals.
-Library
-Data show
-Computers
-Internet

Course coordinator:

Dr. Shady Allam

Head of Department:

Dr. Sherin zakaria

Date : / 9 /2020

Course Plan

Course ILOs Matrix – Teaching and Learning Strategy and Student Assessment

Course title: **pharmacology** -3 Course code: **PO703**

Course Contents		ILOs	Teaching and Learning Methods	Student Assessment Methods
Week # 1	Chemotherapeutic agents	a1, a2, b1, b2, c1, c3, c4, d1, d2	Lectures and practical, brain storming, discussion	Written, practical and oral exams
Week # 2	Chemotherapeutic agents (cont.)	a1, a2, b1, b2, c3, c4, d1, d2	Lectures and practical, brain storming, discussion	Written, practical and oral exams
Week # 3	Chemotherapeutic agents (cont.)	a1, a2, a3, a4, b1, b2, c3, c4, d1, d2	Lectures and practical, brain storming, discussion	Written, practical and oral exams
Week # 4	Chemotherapeutic agents (cont.)	a1, a2, a3, a4, b1, b2, c3, c4,c5, d2	Lectures and practical, brain storming, discussion	Written, practical and oral exams
Week # 5	Chemotherapeutic agents (cont.)	a2, a3, a4, b1, b2, , c4,c5, d2, d3	Lectures and practical, brain storming, discussion	Written, practical and oral exams
Week # 6	Chemotherapeutic agents (cont.)	a2, a3, a4, b3, c4,c5, d2, d3	Lectures and practical, brain storming, discussion	Written, practical and oral exams
Week # 7	Mid-term exam			
Week # 8	Chemotherapeutic agents (cont.)	a1, a2, a3, a4, b3, c4,c5, d2, d3	Lectures and practical, brain storming, discussion	Written, practical and oral exams
Week # 9	Drugs affecting endocrine system	a2, a5, b4, c2, d2, d3	Lectures and practical, brain storming, discussion	Written, practical and oral exams
Week # 10	Drugs affecting endocrine system (cont.)	a2, a5, b4, c2, d2, d3	Lectures and practical, brain storming, discussion	Written, practical and oral exams
Week # 11	Drugs affecting endocrine system (cont.)	a2, a5, b4, c2, d2, d3	Lectures and practical, brain storming, discussion	Written, practical and oral exams
Week # 12	Drugs affecting endocrine system (cont.)	a2, a5, b4, c2, d2, d3	Lectures and practical, brain storming, discussion	Written, practical and oral exams
Week # 13	Drugs affecting endocrine system (cont.)	a2, a5, b4, c2, d2, d3	Lectures and practical, brain storming, discussion	Written, practical and oral exams
Week # 14	Vitamins	a6, b5, c2, d2, d3	Lectures	Written and oral exams
Week # 15	Vitamins	a6, b5, c2, d2, d3	Lectures	Written and oral exams

Course coordinator: Dr. Shady Allam
Head of department: Dr. Sherin Zakaria