PHARMACEUTICS & PHARMACEUTICAL TECHNOLOGY DEPARTMENT

Courses of Pharmaceutics and Phamaceutical Technology Department

No.	Course Title	Course Code
1	Mathematics	PHT 110
2	Orientation and History of Pharmacy	PHT 111
3	Physical Pharmacy	PHT 212
4	Pharmaceutics I	PHT 223
5	Pharmaceutics II	PHT 314
6	Pharmaceutics III	PHT 325
7	Biopharmaceutics and Pharmacokinetics	PHT 416
8	Industrial Pharmacy	PHT 517
9	Novel Drug Delivery Systems	PHT 518
10	Quality Control and Quality Assurance	PHT 529

Elective Courses:

No.	Course Title	Course Code
1	Skin Care and Cosmetology	PHT 603
2	Radiopharmaceuticals	PHT 604

Mathematics (PHT 110)

Course Specifications

Program (s) on which the course is given: Bachelor of Pharmacy
Department offering the program: All Faculty Departments
Department offering the course: Pharmaceutics & Pharmaceutical Technology Department
Academic year: 2014/2015
Approval date : September 2014

A. Basic Information

Course Title: Mathematics
Course Code: PHT 151
Prerequisites: No Prerequisite.
Students' Level/Semester: First level/ First semester
Credit hours: **2**
Actual teaching hours per week:
Lectures: 2/week **Practical:** N/A **Tutorial:** N/A **Total:** 2/week

B. Professional Information

1. Overall Aim of Course

Mathematical thinking is important for all members of modern society as a habit of mind for its use in the workplace, business and finance; and for personal making decision for pharmacist and how to do survey.

2. Intended Learning Outcomes (ILOs)

By the end of the course, students should be able to:

a- Knowledge and Understanding:

a1. Recognize different methods of solving problems.
a2. Identify how to use the matrices for solving a system of equations.

b- Intellectual Skills:

b1. Apply mathematical calculations and integration in quantitative analysis
b2. Select appropriate method to solve a given problem.
b3. Use matrices for solving a system of equations.

c- Professional and Practical Skills:

c1. Apply mathematics in pharmaceutical calculations.

c2. Use numeracy, calculation and statistical methods as well as information technology tools.

c3. Use Cartesian and semilog papers to plot graphs.

d- General and Transferable Skills:

d1. Use different resources for obtaining data to act as a lifelong learner.

3. Contents:

Week	Topic	No. of hours	Lecture
One	Real Numbers	**2**	**2**
Two	Linear inequalities	**2**	**2**
Three	Factorization of Algebraic Expression	**2**	**2**
Four	First Midterm Exam Solving a system of linear equation. **+ First Mid-term**	**2**	**2**
Five	Equations of Straight Lines & circle.	**2**	**2**
Six	Limits	**2**	**2**
Seven	Revision	**2**	**2**
Eight	**Second Mid-Term Exam**	**-**	**-**
Nine	Differentiation	**2**	**2**
Ten	Integration	**2**	**2**
Eleven	Functions & graphs	**2**	**2**
Twelve	Matrices and application	**2**	**2**
Thirteen	Matrices and application	**2**	**2**
Total no. of hours		**24**	**24**
Fourteen	University Electives Exams		
Fifteen	Final exams of Faculty		
Sixteen			

4. Teaching and Learning Methods

4.1. Lectures
4.2. Problem solving
4.3. Oral discussions

5. Student Assessment Methods

5.1. Written exams to assess overall knowledge and intellectual skills.
5.2. Class Work (Participation & Assignments) to assess professional skills as well as general and transferrable skills

Assessment Schedule

Assessment 1 First Mid-term week 4
Assessment 2 Second Midterm exam week 8.
Assessment 3 Final exam week 15/16
Assessment 4 Class Work (Assignments & Participation) Every lecture

Weighting of Assessments

1st Mid-term Exam	10%
2nd Mid-Term Exam	20%
Final Exam	40%
Class Work (Participation& Ass.)	30%
Total	**100%**

6. List of References

6.1. Course notes

Handout of lectures' presentation uploaded to moodle.

6.2. Essential Book (Text Books)

- Ernest F. Haeussler, Jr. & others, **introductory life and Mathematical Analysis for Business Economics and the Social sciences** (United States of America: Pearson prentice hall, edition 11, 2006).

6.3. Recommended Books

None

6.4. Periodicals, Websites,….etc

www.Wikepedia.com

7. Facilities Required for Teaching and Learning

Lecture Halls
Computer fixed with projector
Rooms for office hours meeting.
Data show.
Board & Marker.

Course Coordinator Dr. Zeinab Tawfik

Head of Department Prof. Dr. Hussein Ammar

Date of approval September 2014

Orientation and History of Pharmacy (PHT 111)

Course Specifications

Program (s) on which the course is given	Bachelor of Pharmacy
Department offering the program:	All Faculty Departments
Department offering the course:	Pharmaceutics and Pharmaceutical Technology Department
Academic year:	2014 / 2015
Approval Date:	September 2014

A. Basic Information

Course Title: Orientation and History of Pharmacy **Course Code:** PHT 111
Prerequisites: None
Students' Level Semester: First Level/ First Semester
Credit Hours: 2hrs
Actual teaching hours per week:
Lecture: 2hr./week **Practical:** N/A **Tutorial:** N/A
Total: 2hr./week

B. Professional Information

1. Overall Aim of Course

This course deals with a study of the scope of pharmacy, pharmacy careers, ethics, practice of community pharmacy as well as the role of pharmacists in industry, hospital, government, military and research. The course comprises also pharmacy education and pharmaceutical national and international organizations. This course provides the student with the historical background of pharmaceutical sciences and the development of pharmacy profession in ancient Egypt and Arab countries. This course also involves introduction to dosage forms, definition and their classification. The course also includes an introduction to standard prescription notation and familiarization with pharmaceutical Latin terms for weights and volumes. It also predicts incompatibilities in prescriptions, their types and methods of corrections are also included.

2. Intended Learning Outcomes (ILOs)

By the end of the course, the student should be able to:

a- Knowledge and Understanding:

a1. Identify the scope of pharmacy and the available careers.

a2. Indicate roles of different organizations and ethics of pharmacy.
a3. Identify sources of drug information.
a4. Outline the suitable career for pharmacists.
a5. Discuss the influence of pharaohs and Arab on improvement of the career.
a6. Recognize the role of pharmacy profession in modern Egypt.
a7. Define different types of prescription incompatibilities and methods of correction.
a8. Recognize the difference between various dosage forms.
a9. Recognize pharmaceutical Latin terms for weights and volumes.

b- Intellectual Skills:

b1. Apply the code of ethics in different situations.
b2. Choose the career that suits him based on relating gained information to his abilities.
b3. Detect the differences between different dosage forms.
b4. Predict possible incompatibilities in a given prescription.

c- Professional and Practical Skills:

c1. Solve problems arising due to incompatibilities.
c2. Differentiate between different pharmaceutical dosage forms.
c3. Solve problems of ingredient's weight and volume.

d- General and Transferable Skills:

d1. Report the prescription incompatibilities.
d2. Interpret data using conversions between Roman numbers, metric and common systems.
d3. Counsel patients in different aspects related to pharmaceutical dosage forms.
d4. Employ suitable persons who can help to improve community.

3. Contents

Teaching Weeks	Topic	No. of Lecture hours	Lecture
One	Definition of: Pharmacy, Pharmacist, Drug, Medicine and Drug Characteristics	2	1
	Introduction on drugs.		1

Two	Active & inactive ingredients, pharmacy education, departments of facility of pharmacy	2	1
	Prescription		1
Three	Pharmacy profession in ancient Egypt	2	1
	Liquid pharmaceutical dosage form		1
Four	Pharmaceutical organizations and their roles, information resources in pharmacy	2	1
	Solid pharmaceutical dosage form		1.5
	1st Midterm Exam		**0.5**
Five	Pharmacy profession in Arab countries	2	1
			1
Six	Pharmacopoeia and formularies	2	1
	Solid dosage forms		1
Seven	Pharmacy profession in modern Egypt	2	1
	Molded pharmaceutical dosage form.		1
Eight	**Second Midterm exam**		
Nine	Scope of pharmacy, ethics and functions of pharmacists	2	1
	Semisolid pharmaceutical dosage forms		1
Ten	Essential drug list, self-care and role of pharmacist in self-medication	2	1
	Sterile Pharmaceutical dosage forms		1
Eleven	Roman numeral, metric system	2	1
	Prescription incompatibilities		1
Twelve	The common system, Avoirdupois system - conversion	2	1
	Revision		1
Thirteen	Revision	2	2
Total hrs.		**24**	24
Fourteen	**Final Exams of University Electives**		

Fifteen	**Final Exams**		
Sixteen			

4. Teaching and Learning Methods

4.1. Data show and computer in lectures.
4.2. Group discussion.
4.3. Demonstration videos.
4.4. Problem solving.
4.5. Office hours.
4.6. Self-learning by discussion of projects prepared by students.

5. Student Assessment Methods

5.1. Class work (Discussions, Participation and projects) to assess mainly knowledge and understanding, general and transferable skills.
5.2. Written exams to assess all the Intended Learning Outcomes.

Assessment Schedule

Assessment 1:	1st Midterm exam	Week 4th week
Assessment 2:	2nd Midterm exam	Week 8th week
Assessment 3:	Final term exam	Week 15/16 week
Assessment 4:	Class work ((Discussions, Participation and projects)	(During the semester)

Weighting of Assessments

1st Mid-Term Examination		10%
2nd Mid-Term Examination		20%
Final Examination		40%
Class work		30%
	Discussions and Participation 10%	
	Activities (projects) 20%	
Total		100%

6. List of References

6.1. Course Notes

Staff lectures handouts are **uploaded to the Moodle**.

6.2. Essential Books (Text Books)

Ansel's Pharmaceutical Dosage Forms and Drug Delivery Systems, Loyd V Allen, Nicholas G Popovich, Howard C Ansel, 9th ed., Lippincott Williams& Wilkins**,** Philadelphia, 2011. **(Given to each student)**

Aulton's Pharmaceutics: The Design and Manufacture of Medicines, Michael E Aulton, 4th ed., Elsevier Health Sciences, UK, 2013. **(Available at the library)**

6.3. Recommended Books

Remington: The Science and Practice of Pharmacy, Alfonso R. Gennaro, 20th ed., Lippincott Williams & Wilkins, Philadelphia, 2013. **(Available at the library)**

6.4. Periodicals, Websites, ……etc

Websites: http://www.wikipedia.org/
http://www.pubmed.com/

7. Facilities Required for Teaching and Learning

- Lecture halls.
- Personal Computer (available for each staff member).
- Computer equipped with projector and internet connection available for the usual lectures and Labs.
- Meeting rooms for office hours.
- White board.
- Library furnished with textbooks.

Course Coordinator: Ass. Prof. Dr. Mona Ibrahim Abdel Tawab EL-Assal

Head of Department: Prof. Dr. Hussein Ammar

Department Approval Date: September 2014

Physical Pharmacy (PHT 212)

Program (s) on which the course is given:	Bachelor of Pharmacy
Department offering the program:	All Faculty Departments
Department offering the course:	Department of Pharmaceutics & Pharmaceutical Technology
Academic year:	2014/2015
Approval Date:	September 2014

A. Basic Information

Course Title: Physical Pharmacy **Course Code:** PHT 212

Prerequisites: Orientation & History of Pharmacy (PHT 111)

Students' Level/Semester: Second Level / Third Semester

Credit hours: 3 (2+1)

Actual teaching hours per week:

Lectures: 2/week **Practical:** 2/week **Tutorial:** N/A **Total:** 4/week

B. Professional Information

1. Overall Aim of Course

This course aims to provide the student with good knowledge to study some physical pharmacy principles including state of matter and phase equilibria, solubility, rheology, surface phenomena and surfactants, the colligative properties emphasizing on those applicable to various topics of pharmaceutics and focusing on the theories behind phenomena needed for dosage form design.

2. Intended Learning Outcomes (ILOs)

By the end of the course, the student should be able to:

a- Knowledge and Understanding:

a1. Define state of matter and phase equilibria.
a2. Recognize the problems and solutions accompanying phase equilibria
a3. Recognize the useful pharmaceutical applications of different Phase diagrams.
a4. Identify the different principles about solution and solubility.
a5. State the different factors affecting the drug solubility.
a6. Name the different factors affecting the drug dissolution rate.
a7. Recognize surface activity.
a8. Explain the types of surfactant and their use.
a9. Describe different types of rheological behaviors in pharmaceutical dosage forms.
a10. Identify the importance of rheology in preparing effective dosage forms.
a11. Outline the colligative properties of solutions.
a12. Identify the fundamentals of adsorption and its significance in pharmaceutical applications.

b- Intellectual Skills:

b1. Analyze problems regarding the phase equilibria, solution and solubility, surface phenomena, rheology, colligative properties.
b2. Select the suitable additive to adjust the solubility of a drug in a certain dosage form.
b3. Apply the learned data to enhance the solubility of drug.
b4. Predict solubility of drugs to formulate the proper dosage forms.
b5. Select proper surfactants in pharmaceutical industry.
b6. Detect viscosity in order to draw the different rheograms.
b7. Apply the knowledge gained of colligative properties in pharmacy particularly in the preparation of isotonic solutions.
b8. Apply the fundamentals of adsorption in pharmaceutical applications.

c- Professional and Practical Skills:

c1. Analyze experimental work adopting physical pharmacy background.
c2. Plot graphically the different data and results.
c3. Interpret the results obtained from experimental designs.
c4. Judge the rheological properties of different dosage forms.
c5. Choose the best additives to increase drug solubility.
c6. Design a successful physically stable liquid dosage form.

d- General and Transferable Skills:

d1. Assess problems relevant to physical principles.
d2. Interact efficiently with others.
d3. Work effectively in a team.

3. Contents

Teaching Week	Topic	No. of hours	Lecture	Practical
One	-Rheology - State of matter	**4**	**2**	
	- Density of liquids			**2**
Two	-Rheology - Solution & solubility.	**4**	**2**	
	- Critical micelle concentration			**2**
Three	-Rheology - Solution & solubility.	**4**	**2**	
	-Rheology			**2**
Four	- Solution & solubility. - Surface and interfacial tension.	**4**	**2**	
	Hydrophilic-lipophilic balance **1st Midterm Exam**			**1.5 Practical**

				0.5 Exam
Five	**Work Shop, Dr. Brendan Griffin, UCC**	**6**	**4**	
	- Effect of electrolytes on the solubility of benzoic acid			**2**
Six	- Surface and interfacial tension - Phase equilibrium and phase rule	**4**	**2**	
	The effect of pH on the solubility of weak electrolytes.			**2**
Seven	- Surface and interfacial tension - Phase equilibrium and phase rule	**4**	**2**	
	- Distribution of solutes between two immiscible liquids.			**2**
Eight	**2nd Midterm Exam**			
Nine	- Surface and interfacial tension - Phase equilibrium and phase rule	**4**	**2**	
	Revision			**2**
Ten	- Collegative properties - Solution & solubility	**4**	**2**	
	Practical exam & Quiz			**2**
Eleven	- Solution & solubility	**4**	**2**	
	Practical exam & Quiz			**2**
Twelve	- Solution & solubility	**2**	**2**	
Thirteen	**Revision**	**2**	**2**	
Total no. of hours		**46**	**26**	**20**
Fourteen	**University Elective Final Exams**			
Fifteen	**Final Exams**			
Sixteen				

4. Teaching and Learning Methods

- **4.1.** Data show and computer in lectures.
- **4.2.** Modified Lecture (Students' Response System through Clickers).
- **4.3.** Practical work.
- **4.4.** Group discussion.
- **4.5.** Data analysis.

4.6. Problem solving.
4.7. Demonstration videos.
4.8. Self-learning by discussion of projects prepared by students.
4.9. Office hours.

5. Student Assessment Methods

5.1. Class Work (lab performance and participation in lectures) to assess mainly knowledge and understanding as well as general and transferrable skills.
5.2. Written exams to assess mainly knowledge and understanding as well as intellectual skills.
5.3. Practical exam and quiz to assess mainly professional and practical skills.
5.4. Oral exam to assess all skills including transferable skills.

Assessment Schedule

Assessment 1… Written Exams		Week: (4, 8, 15/16)
Assessment 2 … Practical Exam		Week: (10-11)
Assessment 3… Quiz		Week: (10-11)
Assessment 4	Oral Exam	Week: (15/16)
Assessment 5	Class work (Lab performance and participation in lectures)	(During the semester)

Weighting of Assessments

1st Mid-Term Examination		5 %
2nd Mid-Term Examination		15 %
Final-Term Examination		30 %
Oral Examination		10 %
Class Work (lab performance + participation)		10 %
Practical		30 %
Practical Examination	25 %	
Quiz	5 %	
Total		100 **%**

6. List of References

6.1. Course Notes

Staff lectures handouts are **uploaded to the Moodle**.
lab manual **is given to each student**.

6.2. Essential Books (Text Books)

Martin's Physical Pharmacy and Pharmaceutical Sciences: Physical Chemical and Biopharmaceutical Principles in the Pharmaceutical Sciences, Patrick J

Sinko, 6th ed. Lippincott Williams& Wilkins, Philadelphia, 2010. **(Given to each student)**

Remington: The Science and Practice of Pharmacy, Alfonso R. Gennaro, 20th ed., Lippincott Williams & Wilkins, Philadelphia, 2000. **(Available at the library)**

6.3. Recommended Books

Aulton's Pharmaceutics: The Design and Manufacture of Medicines, Michael E Aulton, 3rd ed., Elsevier Health Sciences, UK, 2007. **(Available at the library)**

6.4. Periodicals, Websites, ……etc

Periodical scientific Journals: International Journal of Pharmaceutics
European Journal of Pharmaceutical Sciences
European Journal of Pharmaceutics & Biopharmaceutics

Websites: http://www.wikipedia.org/
http://www.pubmed.com/

7. Facilities Required for Teaching and Learning

- Lecture halls.
- Personal Computer (available for each staff member).
- Computer equipped with projector and internet connection available for the usual lectures and Labs.
- Classroom clickers (student response systems).
- Meeting rooms for office hours.
- White board.
- Different laboratory equipment (viscometer, stalagmometer, pycnometer, water bathes and glass ware …..etc).
- Books.

Course Coordinator: Prof. Dr. Seham A. Elkheshen

Head of Department: Prof. Dr. Hussein O. Ammar

Department Approval Date: September 2014

FUTURE UNIVERSITY IN EGYPT
FACULTY OF PHARMACEUTICAL SCIENCES AND PHARMACEUTICAL INDUSTRIES

Course Specifications

Pharmaceutics-I (PHT 223)

Program (s) on which the course is given:	Bachelor of Pharmacy
Department offering the program:	All Faculty Departments
Department offering the course:	Department of Pharmaceutics & Pharmaceutical Technology
Academic year:	----------
Approval Date:	September 2014

A. Basic Information

Course Title: Pharmaceutics-I **Course Code:** PHT 223

Prerequisites: Orientation and History of Pharmacy (PHT 111)

Students' Level/Semester: Second level/ Fourth Semester

Credit hours: **4 (3+1)**

Actual teaching hours per week:

Lectures: 3/week **Practical:** 2/week **Tutorial:** N/A **Total:** 5/week

B. Professional Information

1. Overall Aim of Course

By the end of the course, the student should gain a comprehensive understanding and knowledge concerning development, formulation and quality control of liquid dosage forms including solutions, colloids, suspensions and emulsions. In addition, the student will learn how to perform the required pharmaceutical calculations in prescriptions to formulate different liquid dosage forms. The course also introduces the fundamental concepts of pharmaceutical aerosol and inhalation dosage forms.

2. Intended Learning Outcomes (ILOs)

By the end of the course, the student should be able to:

a- Knowledge and Understanding:

a1. Differentiate between different liquid dosage forms.
a2. List types of solvents and methods of preparation of solutions.
a3. Enumerate different types of colloidal sol, methods of preparations and purification.
a4. Define electric double layer of interface.
a5. Name different theories used in formulation of suspensions
a6. State different types of emulsions as well as surfactants used in their preparation.
a7. Define different pharmaceutical extracts and methods of preparation
a8. Distinguish between different types of aerosols
a9. Define different types of inhalers
a10. Recognize methods of dose calculation.
a11. Recognize the principles of preparation of liquid dosage forms
a12. Distinguish the various methods employed for evaluation of pharmaceutical preparations.

a13. Differentiate between types of aerosols and their pharmaceutical uses
a14. Recognize difference between types of propellants
a15. Recognize difference between types of inhalers and advantage and disadvantages of each.
a16. Recognize different types of suspensions.

b- Intellectual Skills:

b1. Select the suitable method for preparation of pharmaceutical solutions.
b2. Choose the appropriate inhaler for each patient
b3. Differentiate different types of colloids and their application and their purification.
b4. Calculate the quantity needed of ingredients to fulfill a given prescription.
b5. Solve mathematical problems concerning dose calculations, dilution and concentration and allegation.
b6. Calculate dosage and dose regimen of medications

c- Professional and Practical Skills:

c1. Formulate aqueous, hydro-alcoholic and effervescent solutions.
c2. Prepare suspensions using different types of suspending agents.
c3. Choose the appropriate surfactant in preparation of emulsions.
c4. Write the appropriate label for a dispensed formulation.
c5. Compound different liquid dosage forms professionally.
c6. Dispense liquid dosage forms effectively and safely.
c7. Use the pharmaceutical abbreviations properly

d- General and Transferable Skills:

d1. Interpret pharmaceutical abbreviations correctly.

d2. Work effectively within a team.

d3. Interact positively during class.

d4. Make appropriate decisions in different situations.

3. Contents

Teaching Weeks	Topic	No. of hours	Lecture	Practical
One	• Pharmaceutical solutions and their types Classification of solutions, Advantages and disadvantages		**2**	

	• Types of solvents used in formulations - Methods of preparations of solutions , types of water, Methods of water purification • Suspensions: Definition, routes of administration, advantages and disadvantages.	**5**	**1**	
	• Ammonium Chloride mixture • Iron Ammonium Citrate mixture			**2**
Two	• Pharmaceutical Solutions (cont.) aqueous solution, water purification ، • Pharm calculations -Dose calculations • Suspension: Theory of sedimentation (Stock's law and factors affecting the rate of sedimentation (viscosity-particle size-density difference between medium and particle),	**5**	**2**	
	• Potion Reviere • Magnesium citrate mixture			**2**
Three	• Pharmaceutical Solutions (cont.) -Aqueous solution gargles, mouthwash, douches, enema, otic and nasal drops. • Suspension: Factors affecting the rate of sedimentation (viscosity-particle size-density difference between medium and particle), Advantage and disadvantage of high medium	**5**	**2**	

	viscosity			
	• Elixir • Salting out/Tincture Myrrh			**2**
Four	• Pharmaceutical Solutions (cont.) -aromatic waters, preparation of aromatic waters •Suspensions (cont.) -Sedimentation parameters (sediment volume – degree of flocculation-their comparison) Types of suspensions (flocculated and deflocculated and comparison)	**5**	**2**	
	• Aromatic Water • Mist Alba			**1.5**
	• **First Midterm Exam**			**0.5**
Five	• Pharmaceutical Solutions (cont.) -Viscid solutions (syrups, jelly, mucilage, honey • Pharmaceutical calculations: Allegation • Suspensions (Cont.) Interfacial property of suspended particles (flocculated –deflocculated) Rheology of flocculated and deflocculated suspension.	**5**	**2**	
	• Heavy MgO suspension • Calamine lotion			**2**
Six	• Pharmaceutical Solutions			

	(cont.) -Non aqueous solutions (elixir, liniment, collodion, glycerites, oleovitamis) • Pharm calculations (allegation) • Suspensions (Cont.) agents-flocculating agents-suspending agents)	**5**	**2** 1	
	• Mouthwash • Decoction • infusion			**2**
Seven	• Pharmaceutical Solutions (cont.) -Extractives • Pharm calculations -Dose calculations -Child dose calculations - • Emulsions - Types of emulsions (o/w, w/o, multiple, micro emulsions) - Tests of differentiation between o/w and w/o emulsions	**5**	**2** **1**	
	• Emulsions: wet method • Castor Oil emulsion			**2**
Eight	**Second Midterm exam**			
Nine	• Pharmaceutical Solutions (cont.) --Additives • Pharm calculations -dilution and concentration (ratio		**2**	

	and percentage strength calculations) • Emulsions (cont.) - How emulsifying agent stabilize emulsion (theory of emulsification) - Emulsifying agent types	**5**	**1**	
	• Emulsions: dry method • Liquid Paraffin emulsion			**2**
Ten	• Pharmaceutical Aerosols: - Types of Aerosol – Mode of operation –Types of propellants • Colloids -Definition -Types of colloids: (lyophilic, lyophobic, association), Method of preparation of lyophobic colloid (dispersion methods, electric arc, condensation methods). Association colloid structure, CMC. Purification of colloids (dialysis, electro-dialysis- ultra filtration) • Emulsions (cont.) - Emulsifying agent types. -Types of synthetic emulsifiers - What are spans and tweens and their water loving characters	**5**	**1** **2**	
	• Practical Revision			**2**
Eleven	• Pharmaceutical Aerosols: - Aerosol formulation -Aerosol filling methods -Valve assembly -Aerosol Containers		**1**	

	-Quality Control of Aerosols • Colloids (cont.) Properties of colloids: 2- Kinetic properties (Brownian motion- sedimentation – diffusion-osmotic pressure- viscosity)	**5**	**2**	
	Final Practical Exam			**2**
Twelve	• Inhalers -MDI -DPI -Nebulizers • Colloids (cont.) Properties of colloids: 3-Electrical properties of interface (source of surface charge – electric double layer double layer- zeta potential –Nernst potential)	**3**	**1** **2**	
Thirteen				
Total No. of hours		**53**	**33**	**20**
Fourteen	**University Elective Final Exams**			
Fifteen	**Final Exams**			
Sixteen				

4. Teaching and Learning Methods

4.1. Lectures and presentations

4.2. . Quizzes and problem solving

4.3. Laboratory sessions

4.4. Demonstration video

4.5. Group discussions

5. Student Assessment Methods

5.1. Written exams to assess knowledge and understanding as well as intellectual skills.

5.2. Practical exams to assess professional and practical skills.

5.3. Oral exams to assess all types of skills and mainly general and transferrable skills

5.4. Class Work and Quizzes to assess and encourage reflection on and review of the material taught.

Assessment Schedule

Assessment 1 … 1st Mid-term Exam …Week …..… 4
Assessment 2.....2nd Mid-term Exam...Week …….. 8
Assessment 3……Practical Exam…….Week……11
Assessment 4 …..Final Exam…… Week … 15/16
Assessment 5…. Oral Exam……Week……15/16
Assessment 6 …Class work (Lab performance and participation in lectures) + Quizzes (During the semester)

Weighting of Assessments

1st Mid-Term Exam	5	%
2nd Mid-Term Examination	15	%
Final-Term Examination	30	%
Oral Examination	10	%
Practical Examination	30	%
Class Work (Quizzes)	10	%
Total	**100**	**%**

6. List of References

6.1. Course Notes:

Staff lectures handouts are **uploaded to the Moodle**.
lab manual **is given to each student**.

6.2. Essential Books (Text Books)

- Ansel's Pharmaceutical Dosage Forms and Drug Delivery Systems, Loyd V Allen, Nicholas G Popovich, Howard C Ansel, 9th ed., Lippincott Williams & Wilkins**,** Philadelphia, 2005. **(Given to each student)**

- Aulton's Pharmaceutics: The Design and Manufacture of Medicines, Michael E Aulton, 4th ed., Elsevier Health Sciences, UK, 2013.
- Remington: The Science and Practice of Pharmacy, Alfonso R. Gennaro, 20th ed., Lippincott Williams & Wilkins, Philadelphia, 2013.

6.3. Recommended Books

- Martin's Physical Pharmacy and Pharmaceutical Sciences: Physical Chemical and Biopharmaceutical Principles in the Pharmaceutical Sciences, Patrick J Sinko, 6th ed. Lippincott Williams & Wilkins, Philadelphia, 2011.

6.5. Periodicals, Websites, ……etc

- www.pubmed.com
- www.rxlist.com

7. Facilities Required for Teaching and Learning

- Lecture Halls
- Laboratories
- Data-Show and smart board, white board; easy available for the usual lectures and Labs .
- Personal Computer (available for each staff member)
- Computer hall with enough devices and internet connection
- Meeting rooms for office hours
- Facilities for practical work for example, glassware, balances, chemicals…

Course Coordinator ----------

Head of Department Professor Dr. Hussein Ammar

Department Approval Date: September 2014

FUTURE UNIVERSITY IN EGYPT
FACULTY OF PHARMACEUTICAL SCIENCES AND PHARMACEUTICAL INDUSTRIES

Course Specifications

PharmaceuticsII (PHT 314)

Program (s) on which the course is given:	Bachelor of Pharmacy
Department offering the program:	All Faculty Departments
Department offering the course:	Department of Pharmaceutics & Pharmaceutical Technology
Academic year:	----------
Approval Date:	September 2014

A. Basic Information

Course Title: Pharmaceutics-II **Course Code:** PHT 314

Prerequisites: Orientation and History of Pharmacy (PHT 111)

Students' Level/Semester: Third Level/ Fifth Semester

Credit hours: 4 (3+1)

Actual teaching hours per week:

Lectures: 3/week **Practical:** 2/week **Tutorial:** N/A **Total:** 5/week

B. Professional Information

1. Overall Aim of Course

This course comprises study of solid, semisolid as well as molded semisolid dosage forms. This course aims to familiarize the students with solid pharmaceutical dosage forms, and to employ the different unit operations in the preparation and manufacturing of these dosage forms including powder, granules, coated and uncoated tablets, hard gelatin capsules and soft gelatin capsules. In addition, this course describes some aspects of dermal delivery for topical disorders and also for systemic problems as ointments, creams, gels, pastes and transdermal patches. Molded semisolid preparations comprising different types of suppositories are also included.

2. Intended Learning Outcomes (ILOs)

By the end of the course, the student should be able:

a- Knowledge and Understanding:

a.1. Identify the properties of different pharmaceutical dosage forms.
a.2. Identify types of pharmaceutical powders and granules.
a.3. Recall the skin structure.
a4. Classify the semi solid dosage forms.
a.4. Differentiate between the various types of tablet dosage forms.
a.5. List categories of inert ingredients, with examples, which are employed in the manufacture of compressed tablets and capsules.
a.6. Identify problems encountered during manufacturing of solid dosage forms.
a.7. Distinguish the methods of manufacturing of solid dosage forms.
a.8. List different types of ointment bases creams and suppositories.
a.9. Describe the methods of preparation of ointments, creams and suppositories.

a.10. State quality standards and USP compendia requirements for tablets
a.11. Recognize the various methods employed for evaluation of pharmaceutical preparations.
a.12. List types, advantages and disadvantages of solid dosage forms
a.13. Describe the principles of various instruments.

b- Intellectual Skills:

b1. Choose rationally the formulations suitable for preparation of solid, semisolid as well as molded semisolid dosage forms after comparing advantages and disadvantages of the various types of dosage forms. .
b2. Solve problems related to solid, semisolid as well as molded semisolid dosage forms manufacturing.
b3. Select the appropriate method of achieving a successful solid dosage form formulation.
b4. Predict the pathway of permeates through the skin.

c- Professional and Practical Skills:

c1. Formulate different types of dosage forms
c2. Dispense pharmaceutical dosage forms effectively and safely.
c3. Select medicines based on understanding etiology of diseases
c4. Apply techniques used in operating pharmaceutical equipment and instruments.
c5. Solve problems in different practical situations
c6. Estimate the role of excipients in the formulation of tablets, capsules, suppositories, ointments, gels.

d- General and Transferable Skills:

d1. Work effectively within a team.
d2. Interact positively during class
d3. Make appropriate decisions regarding different cases related to pharmaceutical dosage forms.

3. Contents

Teaching Weeks	Topic	No. of hours	Lecture	Practical
One	• Introduction to solid dosage forms, -pharmaceutical powder and granules • Skin Structure and types of dermatologicals	**5**	**3**	
	Preparation of ointments (zinc oxide and sulfur ointments)			**2**

Two	• Solid dosage forms (cont.) -- pharmaceutical powder and granules • Semisolid preparations: ointments	**5**	**3**	
	Preparation of cold creams			**2**
Three	- Tablet (Wet granulation (reciprocating granulator, fluid bed, and spray drier- properties of tablet additives) - Semisolid preparations: pastes , poultices and gels	**5**	**3**	
	Preparation of vanishing and shaving creams.			**2**
Four	- Tablet (Wet granulation (reciprocating granulator, fluid bed, and spray drier- properties of tablet additives) - Semisolid preparations: pastes , poultices and gels	**5**	**3**	
	First Midterm Exam			**0.5**
	Preparation of pastes			**1.5**
Five	- Problems of tablet manufacture - Suppositories	**5**	**3**	
	Preparation of cacao butter based suppository			**2**
Six	- Tablets coating - Factors affecting rectal absorption	**5**	**3**	
	Preparation of glycerol-gelatin based suppository			**2**
Seven	- Evaluation of tablets - Suppositories quality control	**5**	**3**	
	Preparation of soap glycerin based suppository			**2**
Eight	**Second Midterm exam**			

Nine	• Capsules -Introduction -Gelatin -Hard Gelatin Capsules • Bio-adhesives	**5**	**3**	
	Preparation of macrogol based suppository			**2**
Ten	• -Capsules (cont) -Hard Gelatin Capsules(cont) -problems in capsule filling -Soft gelatin capsules -problems in formulation • Bio-adhesives	**5**	**3**	
	Preparation of effervescence granules Students presentation			**2**
Eleven	• Capsules (cont) -Formulation strategy -Quality control of capsules • Micro-particles in drug delivery	**5**	**3**	**2**
	Revision Students presentation			
Twelve	• Capsules (cont) -innovation in capsule manufacturing -Formulation of successful solid dosage forms (case study) • Micro-particles in drug delivery	**5**	**3**	
	Final Practical Exam			**2**

Thirteen				
Total No. of hours		**55**	**33**	**22**
Fourteen	**University Elective Final Exams**			
Fifteen	**Final Exams**			
Sixteen				

4. Teaching and Learning Methods

4.1. Lectures and presentations
4.2. Demonstration videos
4.3. Group discussion
4.4. Problem solving
4.5. Practical Work
4.6. Office hours

5. Student Assessment Methods

5.1. **Quiz and lab performance evaluation**: to assess and encourage study and review of the theoretical and practical material.
5.2. **Practical exam**: to assess professional and practical skills.
5.3. **Written exams**: to assess Knowledge and understanding as well as intellectual skills.
5.4. **Oral exam**: to assess understanding, intellectual as well as general and transferrable skills.
5.5. **Class work (Project/ Oral Presentation):** to assess the general and transferrable skills (ability to present and interpret the information studied) as each student studying the course is expected to give an oral presentation on topics related to liquid dosage forms.

Assessment Schedule

Assessment 1 … 1st Mid-term Exam … Week ……4
Assessment 2.....2nd Mid-term Exam. . . .Week …… 8
Assessment 3… Practical Exam + Quiz….Week……12
Assessment 4…..Classwork (Project, oral presentation)
(during the semester)
Assessment 5 …..Final Exam…….Week …. 15/16
Assessment 6……Oral Exam……..Week…..15/16
Assessment 7…..Lab performance…….each lab

Weighting of Assessments	
1st Mid-Term Exam	5 %
2nd Mid-Term Examination	15 %
Final-Term Examination	30 %
Oral Examination	10%
Practical Examination (practical exam +lab performance +Quizzes)	30%
Class Work (Project; Oral presentation)	10 %
Total	**100 %**

6. List of References

6.1 Course Notes

Staff lectures handouts are **uploaded to the Moodle**.
lab manual **is given to each student**.

6.2 Essential Books (Text Books)

- Ansel's Pharmaceutical Dosage Forms and Drug Delivery Systems, Loyd V Allen, Nicholas G Popovich, Howard C Ansel, 9th ed., Lippincott Williams & Wilkins**,** Philadelphia, 2011**. (Given to each student)**
- Aulton's Pharmaceutics: The Design and Manufacture of Medicines, Michael E Aulton, 4th ed., Elsevier Health Sciences, UK, 2013.

6.3 Recommended Books

- Martin's Physical Pharmacy and Pharmaceutical Sciences: Physical Chemical and Biopharmaceutical Principles in the Pharmaceutical Sciences, Patrick J Sinko, 6th ed. Lippincott Williams & Wilkins**,** Philadelphia, 2011.
- Remington: The Science and Practice of Pharmacy, Alfonso R. Gennaro, 21st ed., Lippincott Williams & Wilkins, Philadelphia, 2013.

6.4 Periodicals, Websites, ……etc

- http://www.wikipedia.org/
- http:// www.pubmed.com

7 Facilities Required for Teaching and Learning

- Lecture Hall
- Laboratories
- Data-Show and smart board, white board; easy available for the usual lectures and Labs .
- Personal Computer (available for each staff member)

- Computer equipped with projector and internet connection available for the usual lectures and Labs.
- Meeting rooms for office hours
- Facilities for practical work for example: glassware and dispensing tools, suppositories molds, balances, chemicals**.**

Course Coordinator ----------

Head of Department Prof. Dr. Hussein O. Ammar

Department Approval Date: September 2014

FUTURE UNIVERSITY IN EGYPT
FACULTY OF PHARMACEUTICAL SCIENCES AND PHARMACEUTICAL INDUSTRIES

Course Specifications

Pharmaceutics-III (PHT 325)

Program (s) on which the course is given:	Bachelor of Pharmacy
Department offering the program:	All Faculty Departments
Department offering the course:	Pharmaceutics and Pharmaceutical Technology
Academic year:	----------
Approval Date:	September 2014

A. Basic Information

Course Title: Pharmaceutics-III **Course Code: PHT 325**

Prerequisites: Mathematics (PHT 110) and Physical Pharmacy (PHT 212)

Students' Level/Semester: Third Level/ Sixth Semester

Credit hours: 3 (2+1)

Actual teaching hours per week:

Lectures: 2 hr. /week **Practical:** 2hr. /week **Tutorial:** N/A

Total: 4hr. /week

B. Professional Information

1. Overall Aim of Course

The course deals with sterile dosage forms, reaction kinetics and drug stability. The course is designed to provide the student with adequate knowledge on sterile dosage forms including parenteral and ophthalmic as well as sterilization processes. The course also provides the student with an in-depth knowledge of reaction kinetics underlying the degradation of drugs and methods of determination of the order of the reaction. The course is also designed to provide the student with adequate knowledge about the degradation pathways of the drugs in different pharmaceutical dosage forms and how to predict a product shelf- life.

2. Intended Learning Outcomes (ILOs)

By the end of the course, the student should be able to:

a- Knowledge and Understanding:

a1. Recognize the theoretical background regarding the order of reaction.
a2. Describe the difference between the different reaction orders regarding the dependence of the reaction rate on the initial concentration.
a3. Describe the difference between the different orders regarding the dependence of the fractional life on the initial concentration.
a4. List the different factors affecting the rate of drug degradation.
a5. Recognize the route of drug degradation in dosage forms and how to guard against degradation.
a6. Define parenteral dosage forms
a7. Distinguish the different types of parenteral dosage forms and their route of administration and their preparation techniques.

a7. List methods of parenteral sterilization and validation.
a8. Define packaging, labeling, and storage of injections.
a9. Differentiate between small and large volume parenteral.
a10. Identify different types of irrigation solutions.
a11. Outline the different types of ophthalmic dosage forms.
a12. Discuss the advantages and limitations of ophthalmic dosage forms.

b. Intellectual Skills:

b1. Predict the order of drug degradation through mathematical methods
b2. Predict the effect of temperature on the drug stability and its relation to drug shelf life determination.
b3. Estimate the orbitery reduction in the shelf life upon storage under non-standard conditions.
b4. Perform necessary calculations for establishing the expiration dates of different pharmaceutical products.
b5. Select the suitable parenteral dosage form and the route of administration to be given to a certain patient.
b.6. Solve mathematically problems related to isotonic solutions, milliequivalents, millimole and milliosmole.
b7. Compare between different sterilization techniques.
b8. Detect the necessary additives to be added to different types of ophthalmic preparations.
b9. Suggest suitable strategies to increase the bioavailability of ophthalmic dosage forms.

c- Professional and Practical Skills:

c1. Apply different methods for determination of the order of the reaction.
c2. Relate the drug degradation rate and the product shelf life with its storage conditions.
c3. Predict methods to increase the product shelf-life.
c4. Prepare isotonic electrolyte solutions and infusion fluids.
c5. Solve the problems encountered during the formulation of parenteral and ophthalmic dosage forms.
c6. Calculate the quantities of chemicals needed to formulate a given prescription of parenteral dosage forms.

d- General and Transferable Skills:

d1. Argue about problems relevant to drug degradation and/or parenteral preparations.
d2. Work in a team to perform a stability study assessment.
d3. Communicate effectively with others during experiments.

3. Contents

Week	Topic	No. of hours	Lecture	Practical
One	- Introduction of course spec. important definition in reaction kinetics, kinetic expression, order of reaction, apparent or pseudo-order reactions, zero order reaction. - Parenteral preparations & route of administration. - Official types of injections & component of parenteral.	**4**	**2**	
	- Methods of calculation involved in preparation of isotonic solution: Freezing point depression method- NaCl Equivalent method.			**2**
Two	- Half-life and shelf life of zero order reactions, suspension as apparent zero order. - Formulation and preparation of parenteral.	**4**	**2**	
	- Electrolyte solutions (milli-equivalent - Introduction and zero order problems			**2**
Three	- First-order reactions. - Formulation and preparation of parenteral.	**4**	**2**	
	- First order problems (theoretical + graphical representation). - Millimoles and milliosmole.			**2**
Four	- Second-order reactions. - Solvents for injection.	**4**	**2**	

	Experiment 1: The hydrolysis of ethyl acetate using 1N HCl as a catalyst. **1st Midterm Exam**			**1.5** **0.5**
Five	- Complex, parallel, consecutive and reversible reactions. - Methods of sterilization.	**4**	**2**	
	Second order problems & miscellaneous problems.			**2**
Six	- Determination of reaction order. - Validation of sterilization.	**4**	**2**	
	Experiment 3: The effect of hydrogen ion concentration on the hydrolysis of ethyl acetate			**2**
Seven	- Factors affecting the rate of reaction. - The industrial preparation of parenteral products (packaging, labeling & storage of injections).	**4**	**2**	
	Arrhenius problems			**2**
Eight	**2nd Midterm Exam**			
Nine	- Factors affecting the rate of reaction, effect of temperature. - Small & large volume parenteral (replacement therapy).	**4**	**2**	
	Experiment 4: The effect of temperature on the rate of acid hydrolysis of ethyl acetate			**2**
Ten	- Factors affecting the rate of reaction, effect of formulation factors. - Irrigation solution.	**4**	**2**	
	Experiment 2: Determination of the reaction rate constant of the hydrolysis of ethyl acetate in presence of an equal quantity of sodium hydroxide.			**2**
Eleven	- Factors affecting the rate of reaction, effect of pH. - Structure of the eye and	**4**	**2**	

	ophthalmic eye drops bioavailability.			
	- **Practical exam & Quiz**			**2**
Twelve	- Factors affecting rate of reaction. - Ophthalmic preparations.	**2**	**2**	
	- **Practical exam & Quiz**			**2**
Thirteen	**Revision**	**2**	**2**	
Total no. of hours		**46**	**24**	**22**
Fourteen	**University Elective Final Exams**			
Fifteen	**Final Exams**			
Sixteen				

4. Teaching and Learning Methods

4.1. Data show and computer in lectures.
4.2. Practical work.
4.3. Group discussion.
4.4. Data analysis.
4.5. Problem solving.
4.6. Office hours.
4.7. Demonstrations.
4.8. Research and presentation.

5. Student Assessment Methods

5.1. Class Work (Lab performance and participation in lectures) to assess knowledge and understanding as well as general and transferrable skills.
5.2. Written Exams to assess knowledge and understanding as well as Intellectual skills
5.3. Practical Exams and quiz to assess professional and practical skills.
5.4. Oral exam to assess all skills including transferable skills.
5.5. Discussion of reports prepared by students to assess their ability of self-learning and their transferable skills.
5.6. Assignments to assess all types of skills.

Assessment Schedule

Assessment 1… Written exams	Week:	(4, 8, 15/16)
Assessment 2 … Practical exam	Week:	(11-12)
Assessment 3… Quiz	Week:	(11-12)
Assessment 4 … Oral Exam	Week:	(15/16)

Assessment 5 … Class work (Lab performance and participation in lectures) (During the semester)

Assessment 6….Assignments and reports (During the semester)

Weighting of Assessments

1st Mid-Term Examination		5 %
2nd Mid-Term Examination		15 %
Final – Term Examination		30 %
Oral Exam		10 %
Practical		30 %
Practical Quiz Exam	10%	
Assignments and reports	5%	
Practical Experiment	15 %	
Class Work (lab performance and participation)		10 %
Total	**100 %**	

6. List of References

6.1. Course Notes

Staff lectures handouts are **uploaded to the Moodle**.

Lab manual **is given to each student**.

6.2. Essential Books (Text Books)

- Martin's Physical Pharmacy and Pharmaceutical Sciences: Physical Chemical and Biopharmaceutical Principles in the Pharmaceutical Sciences, Patrick J Sinko, 6th ed. Lippincott Williams& Wilkins, Philadelphia, 2010. **(Given to each student)**
- Ansel's Pharmaceutical Dosage Forms and Drug Delivery Systems, Loyd V Allen, Nicholas G Popovich, Howard C Ansel, 9th ed., Lippincott Williams& Wilkins**,** Philadelphia, 2011. **(Given to each student)**
- Aulton's Pharmaceutics: The Design and Manufacture of Medicines, Michael E Aulton, 4th ed., Elsevier Health Sciences, UK, 2013. **(Available at the library)**.

6.3. Recommended Books

Drug Stability for Pharmaceutical Scientists, Loftsson, T., Academic Press, Oxford, UK, 2014.

6.4. Periodicals, Websites, ……etc

Periodical scientific Journals: International Journal of Pharmaceutics
European Journal of Pharmaceutical Sciences
European Journal of Pharmaceutics & Biopharmaceutics

Websites: http://www.wikipedia.org/
http://www.pubmed.com/

7. Facilities Required for Teaching and Learning

1 - Lecture halls.
2 - Personal Computer (available for each staff member).
3 - Computer equipped with projector and internet connection available for the usual lectures and Labs.
4 - Meeting rooms for office hours.

1 - White board.
2 - Smart boards.
3 - Different laboratory equipment (e.g. beakers, conical flasks, glass stoppered conical flasks, burettes, bulb pipettes of different volumes, measuring cylinders, glass rods,…….etc).
4 - Books.
5 - Library furnished with textbooks.

Course Coordinator: ----------

Head of Department: Prof. Dr. Hussein O. Ammar

Department Approval Date: September 2014

Biopharmaceutics & Pharmacokinetics (PHT 416)

Course Specifications

Program (s) on which the course is given: Bachelor of Pharmacy
Department offering the program: All Faculty Departments
Department offering the course: Pharmaceutics and Pharmaceutical Technology Department
Academic year: ----------
Approval date : September 2014

A. Basic Information

Course Title: Biopharmaceutics & Pharmacokinetics
Course Code: PHT 416
Prerequisites: Pharmaceutics-III (PHT 325)
Students' Level/Semester: Fourth Level/ Seventh Semester
Credit hours: **3 (2+1)**
Actual teaching hours per week:
Lectures: 2/week **Practical:** 2/week **Tutorial:** N/A **Total:** 4/week

B. Professional Information

1. Overall Aim of Course

This course introduces the students to the concept of biopharmaceutics and pharmacokinetics. It deals with the kinetics of drug absorption, distribution and elimination as well as the effect of physicochemical properties and formulation on the rate and extent of drug absorption. The course also deals with compartmental models and assessment of dosage regimen.

2. Intended Learning Outcomes (ILOs)

By the end of this course, the student should be able to:

a- Knowledge and Understanding:

a1. List the factors that affect drug bioavailability.
a2. Define pharmacokinetics, pharmacodynamics, compartment models, volume of distribution and total body clearance.
a3. State the factors affecting gastrointestinal absorption.
a4. Name different routes of drug administration.
a5. Outline factors affecting the dissolution rate of drugs.

a6. Identify parameters for assessment and comparison of bioavailability.
a7. Define bioequivalence of drug products.
a8. Describe factors affecting drug metabolism.
a10. Recognize pharmacokinetic principles.

b- Intellectual Skills:

b1. Detect type of drug absorption.
b2. Compare specialized transport mechanisms of drug absorption.
b3. Recognize different compartmental model systems.
b4. Apply concepts of pharmacokinetics.
b5. Assess bioequivalence of drug products.

c- Professional and Practical Skills:

c1. Draw curves representing relationships between time and concentration of drug in plasma following intravenous and extravascular administration.
c2. Calculate half-life and elimination rate constant following intravenous administration of different drugs.
c3. Calculate half-life, absorption rate constant and elimination rate constant following extravascular administration of different drugs.
c4. Solve problems related to renal clearance of drugs.
c5. Distinguish between pharmaceutical equivalents, pharmaceutical alternatives and therapeutic equivalents of different drug products.
c6. Perform bioequivalence study.

d- General and Transferable Skills:

d1. Plan dosage regimens for patients to accomplish a desired steady state in multiple drug administration.
d2. Recommend new dosage regimens in case of patients suffering renal impairment.
d3. Suggest optimum drug dosage for patients suffering from kidney dysfunction, liver cirrhosis or heart failure.

3. Contents

Teaching Weeks	Topic	No. of hours	Lecture	Practical
One	• Scope of biopharmaceutics, pharmacokinetics & principles of drug absorption. • Passive diffusion	4 hrs.	2 hrs.	
	• Introduction to Pharmacokinetics			2 hrs
Two	• Specialized transport mechanisms (Active transport, Facilitated diffusion) • Dissolution and drug absorption	4 hrs.	2 hrs.	
	• Pharmacokinetics of drugs administrated by i.v. route 1- One Compartment model in i.v. injection single dose. A- Calculation of k from plasma data			2 hrs.
Three	• Factors affecting gastrointestinal absorption (Gastric emptying time). • Drug surface area, crystal or amorphous drug form	4 hrs.	2 hrs.	
	• Pharmacokinetics of drugs administrated by i.v. route (Cont.) B- Calculation of k from urinary excretion data.			2 hrs.
Four	• Salts form, the state of hydration of a drug molecule. • Bioavailability and bioequivalence (Blood, serum or plasma concentration time curve)	4 hrs.	2 hrs.	
	• Pharmacokinetics of drugs administrated by i.v. route (Cont.) 2- Two Compartment model in i.v.			1.5 hrs.

	injection single dose.			
	First midterm exam			0.5 hr
Five	• Parameters for assessment and comparison of bioavailability (Peak height). • Parameters for assessment and comparison of bioavailability (Time of peak, Area under the serum conc. time curve).	4 hrs.	2 hrs.	
	• Pharmacokinetics of drugs administrated by i.v. route (Cont.) 3- I.V. administration, Multiple Dosing: A- I.V. infusion			2 hrs.
Six	• Bioequivalence of drug products (Pharmaceutical equivalents) • Bioequivalence of drug products (Pharmaceutical alternatives and therapeutic equivalents).	4 hrs.	2 hrs.	
	• Pharmacokinetics of drugs administrated by i.v. route (Cont.) B. I.V. multiple dose adminstration			2 hrs.
Seven	• Factors that influence bioavailability of oral drugs (Drug substance physicochemical properties, pharmaceutical ingredients). • Factors that influence bioavailability of oral drugs (Dosage form characteristics, physiological factors and patient characteristics)	4 hrs.	2 hrs.	
	• Pharmacokinetics of drug absorption .			2 hrs.
Eight	• **Second Midterm Exam**			

Nine	• Routes of drug administration (Oral route) • Routes of drug administration (rectal route)	4 hrs.	2 hrs.	
	• Extravascular Multiple Dosing			2 hrs.
Ten	• Routes of drug administration (Parenteral route: subcutaneous injections, intramuscular injections and intravenous injections). • Epicutaneos route	4 hrs.	2 hrs.	
	• Bioavailability			2 hrs.
Eleven	• Ocular, aural and nasal routes, fate of drug after absorption • Drug metabolism or biotransformation	4 hrs.	2 hrs.	
	• Clearance and renal clearance.			2 hrs.
Twelve	• Excretion of drugs. Pharmacokinetics principles (One-compartment model) • Dissolution		2 hrs.	
	Final Practical Exam			2 hrs
Thirteen	• Two-compartment model, half-life. • Concept of clearance • Dosage regimen considerations (Empirical therapy) • Dosage regimen considerations (Kinetic approach).	4 hrs.	2 hrs.	
				.
Total no. of hrs.		46	24	22
Fourteen	**.University requirements Exams**			

Fifteen	**Final Written Exam**
Sixteen	

4. Teaching and Learning Methods

- **4.1.** Lectures.
- **4.2.** Practical sessions (to solve given problems theoretically and graphically).
- **4.3.** Data show.
- **4.4.** Board and marker.
- **4.5.** Group discussion
- **4.6.** Problem solving
- **4.7.** Office hours
- **4.8.** Assignments

5. Student Assessment Methods

- **5.1.** Written exams to assess the student's knowledge and understanding.
- **5.2.** Practical exam to assess the student's professional and practical skills through testing his ability to calculate specific rate constants and half-lives of drugs following certain route of administration.
- **5.3.** Oral exams to assess all types of skills and mainly general and transferrable skills.
- **5.4.** Classwork to assess performance and participation during lectures and tutorials.

Assessment Schedule

Assessment 1	1st Midterm exam	**Week**	4
Assessment 2	2nd Midterm exam	**Week**	8
Assessment 3	Practical exam	**Week**	12
Assessment 4	Final Exam	**Week**	15/16
Assessment 5	Oral Exam	**Week**	15/16
Assessment 5	Classwork (Lab performance and participation in lectures) During the semester		

Weighing of Assessments

Class work	10%
First Midterm Exam	5%
Second Mid-Term Exam	15%
Practical Exam	30%

Final Exam	30%
Oral Exam	10%
Total	**100%**

6. List of References

6.1. Course Notes

Staff lectures handouts are **uploaded to the Moodle**.
lab manual **is given to each student**.

6.2. Essential Books (Text Books)

- Ansel's Pharmaceutical dosage forms and drug delivery systems, ninth edition, and publisher-Lippincott Williams Wilkins, 2011.

6.3. Recommended Books

- Leon Shargel, Susanna Wu-Pong, Andrew B.C.Yu, "Applied Biopharmaceutics & Pharmacokinetics", sixth edition, 2010.

6.4. Periodicals, Websites, ……etc

www.Pubmed.com
www.rxlist.com
www.cspsa.com

7. Facilities Required for Teaching and Learning

7.1. Data Show.
7**.2.** White Board & Markers.
7.3. Cartesian and semilog graph copybooks.
7.4. Lecture halls

Course Coordinator -
Head of Department Prof. Dr. Hussein Ammar

Department Approval Date: September 2014

Industrial Pharmacy (PHT 517)

Course Specifications

Program (s) on which the course is given:	Bachelor of Pharmacy
Department offering the program:	All Faculty Departments
Department offering the course:	Pharmaceutics and Pharmaceutical Technology Department
Academic year:	----------
Date of specifications approval:	September 2014

A. Basic Information

Course Title: Industrial Pharmacy **Course Code:** PHT 517

Prerequisites: Pharmaceutics II (PHT 314)

Students' Level/Semester: Fifth year / Ninth semester

Credit hours: **4 (3+1)**

Actual teaching hours per week:

Lectures: 3/week **Practical:** 2/week **Tutorial:** N/A

Total: 5/week

B. Professional Information

1. Overall Aim of Course

In this course, the student will be able to know the planning construction, validation and maintenance of modern pharmaceutical facilities. This course makes the student be able to develop, design, build, validate and implement a pharmaceutical plant. Also, the student should be able to know the environmental considerations layout of industrial firms, material for plant construction, packaging materials, ISO and manufacturing of active pharmaceutical ingredients and finally, the student will be aware about safety measurements in factories. In addition, After completing the course, the student will have learnt all the basic knowledge in the area of industrial unit operations (particle size reduction and particle size enlargement, powder and liquid mixing, heat transfer, evaporation, extraction, drying, etc. ….) and the specific manufacturing factors associated with the preparation and evaluation of tablets.

2. Intended Learning Outcomes (ILOs)

By the end of the course, the student will be able to:

a- Knowledge and Understanding:

a1. Identify the basics of pharmaceutical industry profile in Egypt and all over the world.

a2. Recognize the basics of layout, planning facilities, mechanical utilities for pharmaceutical factory.

a3. Order the leading companies and blockbuster products in the pharmaceutical industries all over the world.

a4. Match between the employed safety measures in the pharmaceutical plants.

a5. Memorize the conditions required for efficient production of the various pharmaceutical products.

a6. Describe the GMP and GLP guidelines for pharmaceutical plants.

a7. State the ISO specifications and requirements.

a8. Describe how pharmaceutical plants could prepare themselves for audits.

a9. Define the sterile area, related infrastructure and equipment.

a10. Describe the sequential production steps involved in the production of pharmaceutical products (raw materials, intermediates and finished marketed products).

a11. Describe the basic concepts of industrial unit operations like particle size reduction, particle size enlargement, powder and liquid mixing, heat transfer, evaporation, extraction, drying.

a12. Enumerate the environmental factors influencing the design of each unit operation.

a13. Identify the experimental variables to optimize the production operations.

a14. Select the most appropriate equipment for each unit operation.

a15. Order the unit operations involved in each process train.

a16. Define the commonly used industrial terminology.

b- Intellectual Skills:

b1. Predict the appropriate construction material for various equipment.

b2. Select appropriate safety measurements in pharmaceutical plants.

b3. Convert the laboratory units to the appropriate industrial units.

b4. Analyze the marketing data for various pharmaceutical companies.

b5. Estimate the market share and the annual growth rate percentages for the investigated companies.

b6. Categorize the available pharmaceutical plants in the Egyptian market according to type and purpose.

b7. Compare between the available packaging materials for the same pharmaceutical product.

b8. Recognize the problems emerging during the production of various products.

b9. Distinguish tablet-related problems like capping and lamination.

b10. Solve problems related to heat transfer, drying using the suitable dimensions and units.
b11. Suggest the possible solutions to the problems encountered with flowability of powders.
b12. Analyze the variables influencing the heat transfer and drying.
b13. Select the proper extraction method for (solid-liquid and liquid-liquid) processes.

c- Professional and Practical Skills:

c1. Use the proper industrial terms and abbreviations utilized in industrial plants.
c2. Sketch appropriate diagrams showing layout of industrial plants.
c3. Estimate the flowability and mixing efficiency of powder mixture.
c4. Compare between the global marketing trends (eg. merges versus divestments) in major industrial companies.
c5. Apply the requirements for ISO certification of pharmaceutical plants.
c6. Justify the reasons and possibilities for extension of an existing industrial plant (building new or acquisition of another plant).
c7. Analyze the published reports of the financial and market structures of major industrial companies.
c8. Use the appropriate equipment efficiently, safely and economically.
c9. Plot suitable sketches for commonly used equipment in the pharmaceutical industry.
c10. Determine the optimum glidant concentration to improve powder flowability.
c11. Choose the best heat transfer agent for heat conduction.
c12. Prepare tablets on a large scale in a well established industrial plant.
c13. Design an appropriate experiment to measure the flowability of powders.
c14. Justify the reasons and possibilities for obtaining extra equipment to achieve a reliable comprehensive system.

d- General and Transferable Skills:

d1. Communicate clearly by appropriate industrial terms.
d2. Use numeracy and calculation to convert laboratory units to the appropriate industrial units.
d3. Apply proper documentation and drug filing systems as required by GMP and GLP.
d4. Write brief reports about the recent activities in the pharmaceutical industry field.
d5. Plot a simple layout for an industrial plant.
d6. Use different resources to keep updated with the most recent advances in industrial equipment and unit operations.

3. Contents

Teaching Weeks	Topic	No. of hours	Lecture	Practical
One	- Pharmaceutical industrial profile.	5	3	
	- Units and dimensions. - Pharmaceutical industry-related definitions			2
Two	- API facilities.	5	3	
	- Layout sketches of pharmaceutical industry factories. - Pharmaceutical industry-related definitions			2
Three	- Mechanical utilities.	5	3	
	- Sketches of mechanical utilities. - Pharmaceutical industry-related definitions			2
Four	- Safety measurements in industrial firms.	5	3	
	- Sketches of sterile area. – Packaging.			1.5
	First midterm exam			0.5
Five	- ISO.	5	3	
	- Estimation of the flow properties of powders and granules: I- Determination of the bulk density (gm/cm^3). II- Measurement of the flow rate.			2
Six	- GMP guidelines.	5	3	
	- Estimation of the flow properties of powders and granules: III- Measurement of the angle of repose. IV. Determination of the optimum glidant concentration.			2
Seven	- Particle size reduction and enlargement	5	3	

	In Factory: Wet granulation with planetary mixer using gum / alcohol. In labs: 1. *Size reduction* (Hammer mill + Ball mill + Cutter mill). 2. *Size enlargement* (Reciprocating horizontal granulator + Perforated basket granulator).			2
Eight	**Second midterm exam**			
Nine	- Mixing.	5	3	
	In Factory: Mixing with V-shaped & double cone blenders (study the effect of the type of mixer, mixing time and mixing RPM). In labs: 1. *Size enlargement* (Chilsonator). 2. *Mixing* (Tumbler mixers+ Nauta mixer + High shear mixer/granulator).			2
Ten	- Tableting technology.	5	3	
	In Factory: 1. Tabletting of granules using a rotary Tablet press. 2. Measurement of tablet weight variation, hardness and friability for the prepared tablets and 2 market products (Rivo® and Adol®).			2
Eleven	- Heat transfer.	5	3	
	In labs: *Heat transfer* (Problems, Steam			2

	dryers + Steam traps + Floating head heat exchanger). In Factory: 1. Measurement of tablet disintegration and dissolution. 2. Preparation of a calibration curve of a model drug (paracetamol).			
Twelve	- Evaporation. *Evaporation* (Problems, Horizontal tube evaporator + Vertical tube evaporator + Forced circulation evaporator). 2. *Extraction* (Batch percolator + Packed column tower). **- Practical exam + Quiz**	5	3 2	 2
Thirteen	- Drying.	3	3	
		58	**36**	**22**
Fourteen	**University Elective Final Exams**			
Fifteen	**Final Exams**			
Sixteen				

4. Teaching and Learning Methods

4.1. Power point lectures.

4.2. Practical Labs.

4.3. Internet search

4.4. Group discussion.

5. Student Assessment Methods

5.1. Written exams to assess overall knowledge and intellectual skills.

5.2. Practical exam to assess professional and practical skills.

5.3. Quiz to assess theoretical background of the practical part.

5.4. Oral exam to assess all types of skills and mainly general and transferable skills.

5.5. Class Work (Lab Performance) to assess all types of skills.

5.6. Project to assess all types of skills.

Assessment Schedule

Assessment 1… First midterm exam	Week: (4)
Assessment 2 …Second midterm exam	Week: (8)
Assessment 3…Practical exam + Quiz	Week: (12)
Assessment 4…Final Written exam	Week: (15/16)
Assessment 5… Oral exam	Week: (15/16)
Assessment 6 Class work (Lab performance and participation in lectures)	During the semester
Assessment 7 Project	During the semester

Weighting of Assessments

First mid-Term Examination		5%
Second mid-Term Examination		15%
Final-Term Examination		30%
Oral Examination		10%
Practical Examination		30%
Practical exam	20%	
Quiz	5%	
Project	5%	
Class Work (Lab performance & participation)		10%
Total		**100%**

List of References

6.1. Course Notes

Notes on Industrial **Pharmacy are uploaded to the Moodle.**

Lab manual**: Practical Industrial Pharmacy is given to each student.**

6.2. Essential Books (Text Books) (Given to each student)

- **The theory and Practice of Industrial Pharmacy**, Leon Lachman, 3rd ed.,
  Lea & Febiger ,1986.

- Aulton's Pharmaceutics: The Design and Manufacture of Medicines, Michael E Aulton, 3rd ed., Elsevier Health Sciences, UK, 2007.

6.3. Recommended Books

Ansel's Pharmaceutical Dosage Forms and Drug Delivery Systems, Loyd V Allen, Nicholas G Popovich, Howard C Ansel, 9th ed., Lippincott Williams& Wilkins**,** Philadelphia, 2011. (available at the library)

6.4. Periodicals, Websites, ……etc

Periodicals: Journal of Drug Development and Industrial Pharmacy.

Websites: www.pubmed.com , www.Rxlist.com , www.Pharmweb.com

6. Facilities Required for Teaching and Learning

7.1. Personal computer equipped with a data show.

7.2. White board.

7.3. Internet searching.

7.4. Laboratory equipped by funnels and measuring cylinders.
7.5. Lecture halls.
7.6. Laboratories.
7.7. Meeting rooms for office hours

Course Coordinator:--

Head of Department: Prof. Dr. Hussein Ammar

Department Approval Date: September 2014

Novel Drug Delivery Systems (PHT 518)

Program (s) on which the course is given: Bachelor of Pharmacy
Department offering the program: All Faculty Departments
Department offering the course: Department of Pharmaceutics & Pharmaceutical Technology
Academic year: ----- ----------
Approval Date: September 2014

A. Basic Information

Course Title: Novel Drug Delivery Systems **Course Code:** PHT 518
Prerequisites: Biopharmaceutics and Pharmacokinetics (PHT 416)
Students' Level/Semester: Fifth Level / Ninth Semester
Credit hours: 2 (2+0)
Actual teaching hours per week:
Lectures: 2/week **Practical:** N/A **Tutorial:** N/A **Total:** 2/week

B. Professional Information

1. Overall Aim of Course

This course is concerned about providing students with fundamentals required for designing novel drug delivery systems. The application of vesicles in drug delivery and gene delivery are included in the course. The student will gain essential information of targeted drug delivery starting from small molecules and ending to proteins and genes. The basic principles of preformulation and drug delivery system selection are part of the course. The types and applications of polymers in pharmaceuticals; controlled release, bio adhesive and floating systems, are also included. In addition, the course describes some aspects of transdermal drug delivery and transdermal patches.

2. Intended Learning Outcomes (ILOs)

By the end of the course, the student should be able to:

a- Knowledge and Understanding:

a1. Recall the strategies required for preformulation and design of novel drug delivery systems.
a2. List the different types of vesicles applied in pharmaceutical technology.
a3. Discuss the pharmaceutical principles that govern the selection of drug delivery systems.
a4. Recognize the various applications of polymers in drug delivery systems design.
a5. Identify the types of novel oral controlled release devices.
a6. Define the principles of delivering drugs through skin for systemic effect.
a7. Recognize the physicochemical fundamentals involved in the synthesis of different nanoparticles.
a8. Outline the fundamentals of different techniques used for nanoparticles characterization.

a9. Recognize the principles of gene delivery.
a10. Classify the limitations facing drug delivery systems.

b- Intellectual Skills:

b1. Differentiate between drug delivery systems.
b2. Suggest dosage form modification to improve drug bioavailability.
b3. Select the appropriate drug delivery system.
b4. Apply logical thinking to solve problems drug delivery systems design and manufacturing.
b5. Detect methods of achieving a successful novel drug delivery system.
b6. Predict the pathway of permeates including drugs and genes through the skin.

c- Professional and Practical Skills:

c1. Solve problems arising during drug delivery system design.
c2. Apply preformulation techniques in designing drug and gene delivery systems.
c3. Estimate the role of excipients and polymers in formulation of pharmaceuticals
c4. Select rationally the suitable vesicular system after considering advantages and disadvantages of the various types of vesicles.

d- General and Transferable Skills:

d1. Argue about the selection of a drug delivery system.
d2. Communicate effectively with others.
d3. Work effectively within a team.
d4. Interact positively in class.
d5. Make appropriate decisions after applying critical thinking on problem-solving.

3. Contents

Teaching Week	Topic	No. of Lecture hours
One	Preformulation and pharmaceutical principles that govern the selection of drug delivery systems.	**2**
Two	Vesicular systems in drug delivery; Liposomes, transferosomes, ethosomes, niosomes and cubosomes.	**2**
Three	Vesicular systems in drug delivery (cont.); Solid lipid nanoparticles and nanostructure lipid Carriers.	**2**

Four	**1st Midterm Exam** The types and application of polymers in pharmaceuticals; Natural and synthetic polymeric nanoparticles, dendrimers and scaffolds.	**0.5** **1.5**
Five	Novel drug delivery systems; Oral route	**2**
Six	Novel drug delivery systems; Oral route (cont.)	**2**
Seven	Novel drug delivery systems; Transdermal route	**2**
Eight	**2nd Midterm Exam**	
Nine	Novel *in-situ* drug delivery systems	**2**
Ten	Metal nanoparticles	**2**
Eleven	Gene delivery	**2**
Twelve	Seminar Discussion	**2**
Thirteen	Revision	**2**
Total no. of hours		**24**
Fourteen	**University Elective Final Exams**	
Fifteen	**Final Exams**	
Sixteen		

4. Teaching and Learning Methods

4.1. Data show and computer in lectures.
4.2. Group discussion.
4.3. Power point presentations.
4.4. Demonstration videos.
4.5. Self-learning by discussion of projects prepared by students.
4.6. Office hours.

5. Student Assessment Methods

5.1. Written exams: to assess knowledge, theoretical background, intellectual skills as well as professional skills.

5.2. Class Work as oral presentation, discussions and participation: to assess knowledge and Intellectual skills as well as general and transferrable skills through testing the student's ability to present and interpret the information studied.

Assessment Schedule

Assessment 1… 1st Midterm exam	Week 4
Assessment 2…. 2nd Midterm exam	Week 8
Assessment 3…..Class Work (Seminar discussions & participation)	Week 12
Assessment 4…… Final term exam	Week 15/16

Weighting of Assessments

1st Mid-Term Examination	10%
2nd Mid-Term Examination	20%
Final-Term Examination	40%
Class work	30%
Discussions and Participation	10%
Activities (presentations)	20%
Total	**100%**

6. List of References

6.1. Course Notes

Handouts uploaded on Moodle system.

6.2. Essential Books (Text Books)

Ansel's Pharmaceutical Dosage Forms and Drug Delivery Systems, Loyd V Allen, Nicholas G Popovich, Howard C Ansel, 9th ed., Lippincott Williams& Wilkins**,** Philadelphia, 2011. **(Given to each student)**

Aulton's Pharmaceutics: The Design and Manufacture of Medicines, Michael E Aulton, 3rd ed., Elsevier Health Sciences, UK, 2007. **(Available at the library)**

Martin's Physical Pharmacy and Pharmaceutical Sciences: Physical Chemical and Biopharmaceutical Principles in the Pharmaceutical Sciences, Patrick J Sinko, 6th ed. Lippincott Williams& Wilkins, Philadelphia, 2010. **(Given to each student)**

Remington: The Science and Practice of Pharmacy, Alfonso R. Gennaro, 20th ed., Lippincott Williams & Wilkins, Philadelphia, 2000. **(Available at the library)**

6.3. Recommended Books

Pharmaceutics - Drug Delivery and Targeting, Pharmaceutical Press, Y. Perrie, T. Rhades, Pharmaceutical Press, London, 2010.

Pharmaceutical Preformulation and Formulation, M. Gibson., 2nd ed., Taylor & Francis, London (2009).

Florence, A.T., Attwood, D., Physicochemical Principles of Pharmacy, 5th ed., Pharmaceutical Press Ltd, London, 2011.

6.4. Periodicals, Websites, ……etc

Periodical scientific Journals: Journal of Controlled Release
International Journal of Pharmaceutics
European Journal of Pharmaceutical Sciences
European Journal of Pharmaceutics & Biopharmaceutics
Biomaterials

Websites: http://www.wikipedia.org/
http://www.pubmed.com/

7. Facilities Required for Teaching and Learning

8. Lecture halls.
9. Personal Computer (available for each staff member).
10. Computer equipped with projector and internet connection available for the usual lectures and Labs.
11. Meeting rooms for office hours.
12. White board.
13. Books.
14. Library furnished with textbooks.

Course Coordinator: -
Head of Department: Prof. Dr. Hussein O. Ammar

Department Approval Date: September 2014

FUTURE UNIVERSITY IN EGYPT
FACULTY OF PHARMACEUTICAL SCIENCES AND PHARMACEUTICAL INDUSTRIES

Course Specifications

Quality Control and Quality Assurance (PHT 529)

Program (s) on which the course is given:	Bachelor of Pharmacy
Department offering the program:	All Faculty Departments
Department offering the course:	Pharmaceutics and Pharmaceutical Technology Department
Academic year:	----------
Approval Date:	September 2014

A. Basic Information

Course Title: Quality Control and Quality Assurance **Course Code:** PHT 529

Prerequisites: Instrumental Analysis (PHC 213)
Pharmaceutics I (PHT 223)
Pharmaceutics II (PHT 314)
Pharmaceutics III (PHT 325)

Students' Level/Semester: Fifth Level/ Tenth Semester

Credit hours: **4 (3+1)**

Actual teaching hours per week:

Lectures: 3/week **Practical:** 2/week **Tutorial:** N/A **Total:** 5/week

B. Professional Information

1. Overall Aim of Course

This course introduces the students to the necessary knowledge about the quality control tests of different dosage forms. In addition, inter-relationship between quality control, quality assurance and good manufacturing practice as well as the concepts of process validation are highly highlighted. The course provides the students with information on Q.A. and Q.C. submitting analytical procedures, validation data, and samples to support the documentation of identity, quality and purity of drug substance and drug products.

2. Intended Learning Outcomes (ILOs)

By the end of the course, the student should be able to:

a- Knowledge and Understanding:

a1. Describe the quality control tests for each dosage forms.
a2. Identify the basic concepts and methods of validation.
a3. Differentiate between quality control, quality assurance and good manufacturing practice.
a4. Recognize the basis of Good analytical practice.
a5. Outline the principles of drug analysis & quality control.
a6. Express up-to-date information in the field of drug analysis.

b- Intellectual Skills:

b1. Assess the quality of the manufacturing operations involved in pharmaceutical industry.

b2. Select the proper quality control tests using different pharmacopeias.
b3. Predict the quality of various products based on the specific tests.
b4. Apply proper documentation and the filing of given products.
b5. Relate the quality control tests of different pharmacopeias (USP, BP and EP).

b6. Relate the quality of the reference substance to standard.

b7. Select the suitable stability indicating method.

b8. Create a suitable sampling plan.

b9. Interpret validation schemes.

b10. Analyze obtained results qualitatively & quantitatively.

c- Professional and Practical Skills:

c1. Use the appropriate equipment efficiently, safely and economically.
c2. Carry out the suitable quality control tests for various dosage forms.
c3. Test the standard quality of the finished product accurately.
c4. Apply validation (prospective, retrospective, concurrent & revalidation) effectively.
c5. Select different types of samples following a scheme.
c6. Apply method validation schemes.
c7. Apply stability indicating methods.
c8. Analyze raw and finished products

d- General and Transferable Skills:

d1. Communicate clearly by the appropriate quality and validation terms.
d2. Use numeracy and calculation to solve problems
d3. Write proper documents satisfying the regulatory requirements.
d4. Work autonomously or with minimum guidance in quality control laboratories.
d5. Manage the time in analytical work effectively

3. Contents

Week	Topic	No. of hours	Lecture	Practical
One	Q.C. tests of tablets	5	3	
	-Good Analytical Practice &Sampling: -Introduction -Sampling of pharmaceuticals and related materials.			
	Assay of FeSO4 (Ferrofol Capsules)			2

Two	Q.C. tests of tablets -Good Analytical Practice &Sampling: -Introduction -Sampling of pharmaceuticals and related materials. Monograph illustration, limit & identity tests	5	3	2
Three	Q.C. tests of capsules and effervescent granules -Type of sampling tools -Sampling plans Assay of indomethacin (indocid™capsules)	5	3	2
Four	Q.C. tests of suppositories -Type of sampling tools -Sampling plans EDTA- Titration of zinc (prisoline Zinc eye drops) **First midterm exam**	5	3	1.5 0.5
Five	Q.C. tests of semisolids II-Documentation Assay of iron-content (Pediatric Ferrous Sulfate Oral Solution)	5	3	2
Six	Q.C. tests of solutions II-Documentation	5	3	

	Assay of phenol contents of antiseptic			2
Seven	Q.C. tests of suspensions II- Validation of analytical methods -Compendial testing -Validation of analytical methods Assay of anhydrous theophyline (Quibron tablets)	5	3	2
Eight	**Second Midterm Exam**			
Nine	Q.C. tests of emulsions II- Validation of analytical methods -Compendial testing -Validation of analytical methods Assay of antibiotics(Epicocillin injectable preparation)	5	3	2
Ten	Q.C. tests of parenterals -Data elements required for assay validation Spectrophotametric justification of purity index	5	3	2
Eleven	Q.C. tests of ophthalmics -Data elements required for assay validation Spectrophotametric assay of furosemide (Lasix injectable preparation)	5	3	2

	Assay of two component mixture(Tincture of iodii) Assay of calcium content(Calcium gluconate ampoules)			
Twelve	Q.C. tests of aerosols iii-drug stability, stability studies and stability indicating methods -Drug stability -Stability testing **Practical exam + Quiz**	5	3	2
Thirteen	Reasons for validation iii-drug stability, stability studies and stability indicating methods -Drug stability -Stability testing Quality assurance Forced degradation studies Stability indicating methods Components of validation	3	3	
		58	**36**	**22**

Fourteen	**University Elective Final Exams**
Fifteen	**Final Exams**
Sixteen	

4. Teaching and Learning Methods

4.1. Power point lectures.

4.2. Practical Labs.

4.3. Internet search

4.4. Group discussion.

5.5. Research and presentations.

5. Student Assessment Methods

5.1. Written exam to assess overall knowledge and intellectual skills.

5.2. Practical exam to assess professional and practical skills.

5.3. Quiz to assess theoretical background of the practical part.

5.4. Oral exam to assess all types of skills and mainly general and transferable skills.

5.5. Class work (Lab performance and participation in lectures).

Assessment Schedule

Assessment 1 Written first midterm exam	Week 4
Assessment 2 Written second midterm exam	Week 8
Assessment 3 Practical exam + Quiz	Week 12
Assessment 4 Written final exam	Week 15/16
Assessment 5 Oral exam	Week 15/16

Assessment 6 Class work (Lab performance and participation in lectures) (During the semester)

Weighting of Assessments

First mid-Term Examination	5%
Second mid-Term Examination	15%
Final-Term Examination	30%
Oral Examination	10%
Practical Examination + Quiz	30%
Class Work	10%
Total	**100%**

6. List of References

6.1. Course Notes

Notes on Quality control of drugs **are uploaded to the Moodle.**

Notes on Quality control & quality assurance **are uploaded to the Moodle.**

Lab manual: Practical Quality control **is given to each student**

6.2. Essential Books (Text Books) (Given to each student)

- **Pharmaceutical process validation**, Nash R.A. and Wachter A.H., 3rd ed., Marcel Dekker, 2003.

Ansel's Pharmaceutical Dosage Forms and Drug Delivery Systems, Loyd V Allen, Nicholas G Popovich, Howard C Ansel, 9th ed., Lippincott Williams& Wilkins**,** Philadelphia, 2011.

6.3. Recommended Books

Aulton's Pharmaceutics: The Design and Manufacture of Medicines, Michael E Aulton, 3rd ed., Elsevier Health Sciences, UK, 2007. **(Available at the library)**

6.3. Periodicals, Websites, ……etc

Periodicals: Journal of Drug Development and Industrial Pharmacy.

Websites: www.pubmed.com , www.Rxlist.com , www.Pharmweb.com

7. Facilities Required for Teaching and Learning

7.1. Personal computer equipped with a data show.

7.2. White board.

7.3. Internet searching.

7.4. Laboratory equipped by Spectrophotometers, measuring flasks, burettes, pipettes, measuring cylinders and filter papers.

7.5. Lecture halls.

7.6. Laboratories.

7.7. Meeting rooms for office hours

Course Coordinator:--

Head of Department: Prof. Dr. Hussein Ammar

Department Approval Date: September 2014

Skin Care and Cosmetology (PHT 603)

Program (s) on which the course is given:	Bachelor of Pharmacy
Department offering the program:	All Faculty Departments
Department offering the course:	Department of Pharmaceutics & Pharmaceutical Technology
Academic year:	----------
Approval Date:	September 2014

A. Basic Information

Course Title: Skin Care and Cosmetology **Course Code:** PHT 603

Prerequisites: Pharmaceutics II (PHT 314)

Students' Level/Semester: Elective

Credit hours: **2 (1+1)**

Actual teaching hours per week:

Lectures: 1 hr/week **Practical:** 2 hr/week **Tutorial:** N/A **Total:** 3 hr/week

B. Professional Information

1. Overall Aim of Course

This course aims to get the student aware of the scope of different types of cosmetics and skin products as preparations for care of the skin and preparation of cosmetics, their evaluation and use as well as preparations for skin protection are also included in this course. The course includes formulation of skin bleaches, sunscreens, antiperspirants, deodorants, anti-acne, masks, cleansing products, shaving preparations, color cosmetics, nail polishes, shampoos and hair setting products (hair colorants and hair straightening). The course also deals with possible side effects of the active and inactive cosmetic ingredients and formulations.

2. Intended Learning Outcomes (ILOs)

By the end of the course, the student should be able to:

a- Knowledge and Understanding:

a.1. List types of creams, skin powders.

a.2. Define tooth pastes, nail lacquer, lipstick, baby preparations

a.3. Recognize shampoos and hair products, antiperspirant, sun screen and, foot care preparations.

a.4. Define anti-skin aging preparations

a.5. Recognize advanced cosmetic preparation.

a.6. Differentiate between types of cosmetic preparations.
a.7. Define acne and methods of treatments.
a8. Recognize side effects of the cosmetic ingredients and formulations.

b- Intellectual Skills:

b.1 Compare between different dermatological dosage forms.
b.2. Select the appropriate types of dermatological preparation that suits a specific case.
b.3. Design different types of dermatological preparations**.**

c- Professional and Practical Skills:

c.1. Formulate different types of creams, pastes and lipsticks
c.2. Calculate quantity of ingredients needed for dermatological preparations.
c.3. Solve problems of prescriptions.
c.4. Outline the steps needed for dispensing a certain cosmetic preparations.
c.5. Predict the most suitable technique for different cosmetic preparations.

d- General and Transferable Skills:

d.1. Argue about problems and calculations relevant to prescriptions.
d.2. Interact efficiently with others
d.3. Work effectively in a team

3. Contents

Teaching Weeks	Topic	No. of hours	Lecture	Practical
One	Cosmetic creams	**3**	**1**	
	Cold cream (Borax-Beeswax)			**2**
Two	Cosmetic powders	**3**	**1**	
	Vanishing cream-Un pigmented foundation cream			**2**
Three	Lipsticks	**3**	**1**	
	Cleansing cream- All-purpose cream			**2**
Four	Dentifrices	**3**	**1**	
	Shaving preparations + **First Midterm Exam**			**1.5 + 0.5**
Five	Shampoos	**3**	**1**	
	Antiperspirant cream- Sun screen			**2**
Six	Hair products	**3**	**1**	

	Acne vulgaris cream			**2**
Seven	Nail lacquer -Baby preparation	**3**	**1**	
	Anti-dandruff cream- Anti-diaper rash cream			**2**
Eight	**Second Midterm exam**			
Nine	Antiperspirants and deodorants	**3**	**1**	
	Tooth paste- Clear liquid shampoo			**2**
Ten	Foot care and hygiene – Sunscreen	**3**	**1**	
	Face powder- Anti-chap sticks- Lipsticks			**2**
Eleven	Sunscreen- Skin aging and its management	**3**	**1**	
	Revision			**2**
Twelve	Advanced cosmetics	**3**	**1**	
	Practical Exam			**2**
Thirteen	Acne and methods of treatment, Side effects of cosmetic ingredients and formulations	**1**	**1**	
Total No. of hours		**34**	**12**	**22**
Fourteen	**University Elective Final Exams**			
Fifteen	**Final Exams**			
Sixteen				

4. Teaching and Learning Methods

4.1. Lectures.

4.2. Power point presentations.

4.3. Assignment.

4.4. Practical laboratory sessions.

4.5. Group Discussion.

5. Student Assessment Methods

5.1. Class Work (Lab performance + discussions) to assess knowledge and understanding as well as general and transferrable skills.

5.2. Written exams to assess knowledge and understanding as well as intellectual skills.

5.3. Practical exam and Quiz to assess professional and practical skills.

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Assessment Schedule

Assessment 1 …Written Exam Week: (4, 8, 15/16)
Assessment 2 …Practical Exam Week: (12)
Assessment 3 …Quiz Week: (12)
Assessment 4 … Class Work (Lab performance + Discussions) Each Lab.

Weighting of Assessments

1st Mid-Term Examination	5%
2nd Mid-Term Examination	15%
Final-Term Examination	40%
Class Work (discussions + lab performance)	10%
Practical	30%
Practical Examination 25%	
Quiz 5%	
Total	100**%**

6. List of References

6.1. Course Notes

Staff lectures hand outs are **uploaded to the Moodle.**
Lab manual **is given to each student.**

6.2. Essential Books available in the Library (Text Books)

- Ansel's Pharmaceutical dosage forms and drug delivery systems, nine edition, and publisher-Lippincott Williams Wilkins, 2011.

6.3. Recommended Books

- Remington: The Science and Practice of Pharmacy, Alfonso R. Gennaro, 20th ed., Lippincott Williams & Wilkins, Philadelphia, 2013.

7. **Periodicals, Websites,** ……etc

www.pubmed.com

www.wikipedia.com

7. **Facilities Required for Teaching and Learning**

- Lecture halls.
- Laboratories.
- Personal Computer (available for each staff member).
- Computer equipped with projector and internet connection available for the usual lectures and Labs.
- Meeting rooms for office hours.
- White board.
- Different laboratory equipment (balances, water bathes and glass ware as mortars and pestles, measuring cylinders, measuring cups…..etc)

Course Coordinator: --

Head of Department: Prof. Dr. Hussein O. Ammar

Department Approval Date: September 2014

FUTURE UNIVERSITY IN EGYPT
FACULTY OF PHARMACEUTICAL SCIENCES AND PHARMACEUTICAL INDUSTRIES

Course Specifications

Radiopharmaceuticals (PHT 604)

Program (s) on which the course is given:	Bachelor of Pharmacy
Department offering the program:	All Faculty Departments
Department offering the course:	Department of Pharmaceutics & Pharmaceutical Technology
Academic year:	----------
Approval Date:	September 2014

A. Basic Information

Course Title: Radiopharmaceuticals **Course Code:** PHT 604

Prerequisites: Pharmaceutics III (PHT 325)

Students' Level/Semester: Elective

Credit hours: 2(2+0)

Actual teaching hours per week: 2

Lectures: 2 hr/week **Practical:** N/A **Tutorial:** N/A **Total:** 2 hr/week

B. Professional Information

1. Overall Aim of Course

The topics presented in this course aim at expanding the postgraduate student knowledge and understanding of radio pharmacy. The course will get the student familiar with fundamentals of radiopharmaceuticals with emphasis on production and application of radioisotopes in pharmacy, therapy and diagnosis. Moreover, the application of radioactivity as an important technique in research works, In addition to getting the students acquainted with the methods for protection from radiation.

2. Intended Learning Outcomes (ILOs)

By the end of the course, the student should be able to:

a- Knowledge and Understanding:

a1. Recognize the principles of radioactivity and radioactive decay.
a2. Recognize the production and application of radioisotopes
a3. Enumerate different radiopharmaceuticals used for treatment, diagnosis, research and biochemical analysis.
a4. Define the different units to measure radiation.
a5. Name different ways for protection from radiation.
a6. State how to calculate absorbed dose.
a7. Define different methods of isotopes preparation.
a8. Distinguish between different types of radiations used in diagnosis as well as treatment.

b- Intellectual Skills:

b1. Apply the knowledge learned to evaluate different methods used in the protection from radiation.

b2. Differentiate between types of radiations and their pharmaceutical uses.

b3. Select suitable isotope according to needed application.

b4. Rationalize choice of isotopes in research.

b5. Calculate dosage of radioactive medications.

c- Professional and Practical Skills:

c1. Calculate the absorbed doses of radioactivity

c2. Choose the appropriate isotope depending on application in research, diagnosis, biochemical analysis as well as treatment.

d- General and Transferable Skills:

d1. Use data and information published in the literature.

d2. Work effectively in a team.

d3. Interact positively in class.

3. Contents

Teaching Weeks	Topic	No. of hours	Lecture
One	Radioactivity and its units	**2**	**2**
Two	Radioactive decay	**2**	**2**
Three	Radioactive decay (cont.)	**2**	**2**
Four	Production of radioisotopes.	**2**	**1.5**
	First Midterm Exam		**0.5**
Five	Production of radioisotopes.	**2**	**2**
Six	Dose calculation + Assignment	**2**	**2**

Seven	Applications of radioisotopes in therapeutic field.	**2**	**2**
Eight	**Second Midterm exam**		
Nine	Applications of radioisotopes in diagnostic field.	**2**	**2**
Ten	Applications of radioisotopes in pharmaceutical field.	**2**	**2**
Eleven	Radiation in research work.	**2**	**2**
Twelve	Harmful effects of radiation.	**2**	**2**
Thirteen	Protection from radiation.	**2**	**2**
Total No. of hours		**24**	**24**
Fourteen	**University Elective Final Exams**		
Fifteen	**Final Exams**		
Sixteen			

4. Teaching and Learning Methods

- **4.1.** Lectures.
- **4.2.** Assignments.
- **4.3.** Power point presentations.
- **4.4.** Group Discussion.
- **4.5.** Office hours.
- **4.6.** Demonstrations.

5. Student Assessment Methods

- **5.1.** Written exams to assess knowledge and understanding as well as intellectual and professional skills.

5.2. Evaluation of assignment to assess general and transferrable skills.

5.3. Classwork as Periodical exams (Quiz) and participation to assess knowledge and understanding, intellectual and professional skills.

Assessment Schedule

Assessment 1 Written Exams Week 4, 8, 15/16

Assessment 2 Class work (Participation, Quizzes & Assignments) (During the semester)

Weighting of Assessments

1st Mid-Term Examination		10%
2nd Mid-Term Examination		20%
Final-Term Examination		40%
Class Work		30%
-Participation	10%	
- Quizzes	10%	
- Assignments	10%	
Total		**100%**

6. List of References

6.1. Course Notes

Staff lectures hand outs are **uploaded to the Moodle.**

6.2. Essential Books (Text Books)

- G.S. Banker, G.S. & C.T., "Modern Pharmaceutics",4th Edition. 2007 . Marcel Dekker, Inc.

6.3. Recommended Books

- Ansel, H., Loyd, A., Jnr, Popvich," N .Pharmaceutical Dosage Forms & Drug Delivery Systems" (10 th edition). 2014. Interpharm Press

6.4. Periodicals, Websites, ……etc

- www.sciencedirect.com

- www.Pubmed.com

7. Facilities Required for Teaching and Learning

- Lecture halls
- Computer equipped with projector and internet connection available for the usual lectures
- Meeting rooms for office hours

Course Coordinator: ----------

Head of Department: Prof. Dr. Hussein Ammar

Department Approval Date: September 2014