



Philadelphia University
Faculty of Pharmacy
Department of Pharmaceutical Sciences
Second Semester, 2017/2018

Course Syllabus

Course Title: Physical pharmacy	Course code: 0510219
Course Level: 2 nd year	Course prerequisite : General physics (0211105)
Lecture Time: (1) Sun , Tus 9:10- 10 (2) Sun , Tus 11:10- 12 (3) Sun , Tus 12:10- 13 (4) Mon , Wen 8:15- 9:15 (5) Mon , Wen 11:15- 12:15	Credit hours: 2 hours

Academic Staff Specifics

Name	Rank	Office Number and Location	Office Hours	E-mail Address
Ruwaida Abdo	Lecturer	0915204	Every day 10- 11 and 13-14	rwabdo@yahoo.com

Course description:

At this level, the student will be familiar with the basics of physical pharmacy like solubility, dissolution, etc.... This knowledge is important to understand the pharmaceutical dosage forms regarding their physicochemical aspects, simple formulation, compounding, procedures. Detailed examples and applications are given at the end of each chapter.

Course objectives:

The aim of this course is to provide the student with basic knowledge and understanding of the phase rule and its applications to different systems containing multiple components, calculating the concentration of drug in different dosage forms using different concentration units, understanding the properties of electrolytes and nonelectrolyte solutions, understanding the procedure of preparing a buffer including the relevant calculations, and understanding the methods for making isotonic dosage forms. In addition, the students will be also exposed to the concepts of solubility, drug release, drug dissolution, and zero and first order decomposition reactions of drugs

Course /resources

- **Books (title , author (s), publisher, year of publication)**

1. Martin's Physical Pharmacy and Pharmaceutical Sciences By : Patrick J. Sinko, Lippincott Williams & Wilkins , 2006, 5th Edition

- **Supportive materials:**

In addition to the above, the students will be provided with handouts by the lecturer

Teaching methods:

Lectures (interactive; group discussion)

Learning outcomes:

Knowledge and understanding

At the end of this module, student will be able to:

1. Acquire knowledge in Physical principles of states of matter and phase rule.
2. To develop knowledge of the fundamental physicochemical properties of different states of matter and assess their role and applications in dosage forms.
3. To learn the methodology of preparing buffers with proper capacity
4. To learn how to make isotonic solutions
5. To be able to carry out calculations that is vital in pharmacy such as: pH, solubility, concentration, isotonicity .etc.
6. Adapt knowledge of Non-electrolytic and Electrolytic solutions regarding their types and properties mostly colligative properties.
7. Illustrate Solubility and Distribution Phenomenon and apply them in the pharmaceutical practices.
8. Understand the concepts of diffusion and dissolution and explain their role in drug release
9. Understand the different modes of drug decomposition and their effects on drug stability

Cognitive skills (thinking and analysis)

At the end of this module, student will be able to:

1. Analyze problems regarding the phase equilibria, solution and solubility, colligative properties.
2. Apply the learned data to enhance the solubility of drug.
3. Apply the knowledge gained of colligative properties in pharmacy particularly in the preparation of isotonic solutions.
4. Correlate permeability and diffusion properties of drug material to bioavailability.
5. Analyze pharmaceutical degradation data and relate it to drug stability.
6. Interpret data present in graphs, can make good analysis for the data, calculate related statistical values to come out with the best understanding of data obtained from experimental designs and graph sheets.

Communication skills (personal and academic).

At the end of this module, student will be able to:

1. Access the scientific resources related to the physical pharmacy topics taught in this course
2. Give good presentation and communicate their scientific conclusions clearly and correctly.

Practical and subject specific skills (Transferable Skills).

At the end of this module, student will be able to:

1. Meet deadlines for homework's and assignments
2. Handle experimental data and draw scientific conclusions
3. Assess problems relevant to physical principles.
4. Use the calculator and excell to calculate a lot of parameters needed in many equations
5. Use the graphical method to analyze their data
6. Interact efficiently with others.
7. Work effectively in a team.

Assessment instruments

- Exams (First, Second and Final Exams)
- Quizzes.
- Short reports and/ or presentations, and/ or Short research projects
- Homework assignments

<u>Allocation of Marks</u>	
Assessment Instruments	Mark
First examination	20
Second examination	20
Final examination	40
Reports, research projects, Quizzes, Home works, Projects	20
Total	100

Documentation and academic honesty

- **Documentation style**
- Submit your homework covered with a sheet containing your name, number, course title and number, and type and number of the home work (e.g. tutorial, assignment, and project).
Any completed homework must be handed in to my office (room 518) by 12:00 on the due date. After the deadline “zero” will be awarded. You must keep a duplicate copy of your work because it may be needed while the original is being marked.

You should hand in with your assignments:

- 1- A brief report to explain your findings.
- 2- Your solution of questions.

For the research report, you are required to write a report similar to a research paper.

It should include:

- **Abstract:** It describes the main synopsis of your paper.
- **Introduction:** It provides background information necessary to understand the research and getting readers interested in your subject. The introduction is where you put your problem in context and is likely where the bulk of your sources will appear.
- **Methods** Describe your methods here. Summarize the algorithms generally, highlight features relevant to your project, and refer readers to your references for further details.

- **Results and Discussion:** This section is the most important part of your paper. It is here that you demonstrate the work you have accomplished on this project and explain its significance. The quality of your analysis will impact your final grade more than any other component on the paper. You should therefore plan to spend the bulk of your project time not just gathering data, but determining what it ultimately means and deciding how best to showcase these findings.
- **Conclusion:** The conclusion should give your reader the points to “take home” from your paper. It should state clearly what your results demonstrate about the problem you were tackling in the paper. It should also generalize your findings, putting them into a useful context that can be built upon. All generalizations should be supported by your data, however; the discussion should prove these points, so that when the reader gets to the conclusion, the statements are logical and seem self-evident.
- **Bibliography:** Refer to any reference that you used in your assignment. Citations in the body of the paper should refer to a bibliography at the end of the paper.

▪ **Protection by copyright**

1. Coursework, laboratory exercises, reports, and essays submitted for assessment must be your own work, unless in the case of group projects a joint effort is expected and is indicated as such.
2. Use of quotations or data from the work of others is entirely acceptable, and is often very valuable provided that the source of the quotation or data is given. Failure to provide a source or put quotation marks around material that is taken from elsewhere gives the appearance that the comments are ostensibly your own. When quoting word-for-word from the work of another person quotation marks or indenting (setting the quotation in from the margin) must be used and the source of the quoted material must be acknowledged.
3. Sources of quotations used should be listed in full in a bibliography at the end of your piece of work.

▪ **Avoiding plagiarism.**

1. Unacknowledged direct copying from the work of another person, or the close paraphrasing of somebody else's work, is called plagiarism and is a serious offence, equated with cheating in examinations. This applies to copying both from other students' work and from published sources such as books, reports or journal articles.
2. Paraphrasing, when the original statement is still identifiable and has no acknowledgement, is plagiarism. A close paraphrase of another person's work must have an acknowledgement to the source. It is not acceptable for you to put together unacknowledged passages from the same or from different sources linking these together with a few words or sentences of your own and changing a few words from the original text: this is regarded as over-dependence on other sources, which is a form of plagiarism.
3. Direct quotations from an earlier piece of your own work, if not attributed, suggest that your work is original, when in fact it is not. The direct copying of one's own writings qualifies as plagiarism if the fact that the work has been or is to be presented elsewhere is not acknowledged.
4. Plagiarism is a serious offence and will always result in imposition of a penalty. In deciding upon the penalty the Department will take into account factors such as the year of study, the extent and proportion of the work that has been plagiarized, and the apparent intent of the student. The penalties that can be imposed range from a minimum of a zero mark for the work (without allowing resubmission) through caution to disciplinary measures (such as suspension or expulsion).

Course/module academic calendar

week	Basic and support material to be covered
(1,2 ,3 ,4)	Introduction States of matter - Binding Forces Between Molecules - Gases , The Ideal and general Gas Law , Aerosols, Liquefaction of Gases - The Supercritical Fluid State - Liquids , Vapor Pressure of Liquids , Boiling Point , Latent Heats of Vaporization - Solids and the Crystalline State , Characterization of Crystalline Materials , The latent heat of fusion, Melting Point and Intermolecular Forces , Polymorphism , Polymorphism and solubility , Amorphous Solids - The Liquid Crystalline State Properties and Significance of Liquid Crystals - Thermal Analysis ,Differential Scanning Calorimetry
(5 ,6)	Phase Equilibria and the Phase Rule Phase rule , Systems Containing One Component , Two-Component Systems Containing Liquid Phases , Two-Component Systems Containing Solid and Liquid Phases: (Eutectic Mixtures), Three-Component Systems
(7,8) First examination	- Solutions True solution ,Colloidal solutions , Coarse dispersion Nonelectrolytes solution , Ideal and Real Solutions Raoult's Law, Henry's Law Electrolyte solutions , Physical Properties of Substances colligative, additive, constitutive , extensive and intensive properties
(9)	Buffered and Isotonic Solutions Activity Coefficients and the Buffer Equation Buffer Capacity , Preparation of buffers Buffered Isotonic Solutions
(10,11) Second examination	Solubility and distribution phenomena General principles Solvent-solute interaction Solubility of gases in liquids Solubility of liquids in liquids Solubility of solids in liquids Distribution of solutes between miscible solvents
(12)	Diffusion Steady state diffusion , Fick's laws of diffusion
(13)	Drug release and dissolution Noyes – Whitney equation, Higuchi model
(14 ,15)	Chemical kinetics and stability Zero order reactions First order reactions Temperature effect
(16) Final Examination	Final Exam Week

Expected workload:

On average students need to spend 2 hours of study and preparation for each 50-minute lecture/tutorial.

Attendance policy:

Absence from lectures and/or tutorials shall not exceed 15%. Students who exceed the 15% limit without a medical or emergency excuse acceptable to and approved by the Dean of the relevant college/faculty shall not be allowed to take the final examination and shall receive a mark of zero for the course. If the excuse is approved by the Dean, the student shall be considered to have withdrawn from the course.

Other Education Resources**Books**

1. Applied Physical Pharmacy By: Mansoor M. Amiji & Beverly J. Sandmann, McGRAW-Hill, 2003.
2. Pharmaceutical Dosage Forms and Drug Delivery Systems by Loyd V. Allen, Jr., Nicolas G. Popovich & Howard C. Ansel, Lippincott Williams & Wilkins 8th Edition ,2005
3. Pharmaceutics The Science of Dosage Form Design, Edit.: Michael E. Aulton, Pub.: Churchill Livingstone, 2nd edition, 2002.
4. Merck Index: An Encyclopedia of Chemicals, Drugs, & Biologicals by Merck, Co, Maryadele J. Oneil (Editor), Ann Smith (Editor) 13th edition (October 2001), Merck & Co; ISBN: 0911910131
5. Physical Pharmacy: Physical Chemical Principles in the Pharmaceutical Sciences by Alfred Martin, Pilar Bustamante, A.H.C. Chun (Illustrator) 622 pages 4th edition (January 15, 1993), Lea & Febiger; ISBN: 0812114388
6. Remington: The Science and Practice of Pharmacy by Alfonso R. Gennaro (Editor) 20th edition (December 15, 2000), Lippincott, Williams & Wilkins; ISBN: 0683306472

Websites

<http://www.philadelphia.edu.jo/pharmacy/resources.html>