# Republic of Yemen

## Ministry of Higher Education & Scientific Research

Emirates International University

Faculty of Medicine & Health Sciences

Department of pharmacy

**Bachelor of Pharm D**

# Course Specification of

# Physical Pharmacy

## Course No. (PHYP 105)



Prepared by: Dr. Sami Ahmed Alsamiet

Reviewed by: Dr Mokhtar Alghorafi

Head of the Department:

Quality Assurance Head

Dean:

## I. Course Identification and General Information:

| | | | | | |
|---|---|---|---|---|---|
| 1 | **Course Title:** | Physical Pharmacy | | | |
| 2 | **Course Code & Number:** | PHYP 105 | | | |
| 3 | **Credit Hours:** | **Credit Hours** | **TheoryHours** | | **Lab. Hours** |
| | | | **Lecture** | **Exercise** | |
| | | 2 | 2 | -- | -- |
| 4 | **Study Level/ Semester at which this Course is offered:** | 1st Level / 2nd Semester | | | |
| 5 | **Pre –Requisite (if any):** | - | | | |
| 6 | **Co –Requisite (if any):** | None | | | |
| 7 | **Program (s) in which the Course is Offered:** | Bachelor of Pharm D | | | |
| 8 | **Language of Teaching the Course:** | English | | | |
| 9 | **Study System:** | Semester based System | | | |
| 10 | **Mode of Delivery:** | Full Time | | | |
| 11 | **Location of Teaching the Course:** | Faculty of Medicine & Health Sciences | | | |
| 12 | **Prepared by:** | Dr/ Sami Ahmed Al Sammit | | | |
| 13 | **Date of Approval:** | | | | |

## II. Course Description:

The course aims to provide students with basic principles of the physicochemical properties of pharmaceutical and various substances that are used in designing and preparation of different pharmaceutical dosage forms.

| III. Course Intended Learning Outcomes (CILOs) : (maximum 8) Upon successful completion of the course, students will be able to: | | | | Referenced PILOs Learning out of program |
|---|---|---|---|---|
| | **A. Knowledge and Understanding:** | **I,A or E** | | |
| a1 | Illustrate the physicochemical properties of pharmaceutical and various substances which are used in preparation of different pharmaceutical dosage forms. | I | | **A1** |
| a2 | Outline properties of different pharmaceutical dosage forms and drug delivery systems. | I | | **A3** |
| a3 | Discuss the principles of adsorption/desorption, interfacial tensions, and emulsifying, suspending and surface active agents. | E | | **A11** |
| a4 | Identifyprinciples and types of rheology. | E | | |
| a5 | Explain the reaction kinetics and drug stability | E | | |
| | **B. Intellectual Skills:** | | | |
| **b1-** | Relate the effect of physicochemical properties on formulation of pharmaceutical dosage forms. | **E** | | B1 |
| **b2-** | Predict the order of reaction kinetics and drug degradation pathways | **E** | | B3 |
| **b3-** | Explore the basics fundamentals of physical pharmacy in designing of different pharmaceutical dosage forms. | I | | B1 |
| | **C. Professional and Practical Skills:** | | | |

| | | | | |
|---|---|---|---|---|
| **c1-** | Apply the rheological properties of some pharmaceutical substance to develop pharmaceutical preparations | A | | C1 |
| **c2-** | Practice the solubility, partition coefficient and surface tension of some pharmaceutical substance. | A | | **C6** |
| **c3-** | Test the proper storage conditions based on drug degradation pathway | A | | **C6** |
| **c4-** | Calculate the reaction kinetic order and shelf life of some pharmaceutical substances | A | | **C6** |
| | **D. Transferable Skills:** | | | |
| **d1-** | Implement writing and presentation skills and demonstrate creativity and time management. | A | | **D2** |
| **d2** | Work independently or collaboratively as a teamwork member to prepare seminars/ presentations or write reports | A | | **D3** |

**(A) Alignment of Course Intended Learning Outcomes (Knowledge and Understanding) to Teaching Strategies and Assessment Methods:**

| | Course Intended Learning Outcomes | Teaching Strategies | Assessment Strategies |
|---|---|---|---|
| a1 | Illustrate the physicochemical properties of pharmaceutical and various substances which are used in preparation of different pharmaceutical dosage forms. | ▪ Lectures | Final Written Exam, homework, report, |
| a2 | Outline properties of different pharmaceutical dosage forms and drug delivery systems. | ▪ Lectures. | ▪ Final Written Exam, homework, report, Quizzes |
| a3 | Discuss the principles of adsorption/ desorption, interfacial tensions, and emulsifying, suspending and surface active agents. | ▪ Lectures, Problem-based learning. | ▪ Exam, homework, report, Quizzes |
| a4 | Identify principles and types of | ▪ Lectures, Discussions, Problem | ▪ Final Written Exam, |

| | | | |
|---|---|---|---|
| | rheology. | based learning. | homework, report, |
| a5 | Explain the reaction kinetics and drug stability | ▪ Lectures , Small group discussions. | ▪ Exam, homework, Quizzes. |

**(B) Alignment of Course Intended Learning Outcomes (Intellectual Skills) to Teaching Strategies and Assessment Methods:**

| | Course Intended Learning Outcomes | Teaching Strategies | Assessment Strategies |
|---|---|---|---|
| b1 | Relate the effect of physicochemical properties on formulation of pharmaceutical dosage forms. | Lectures, Discussions, brain storming, Solving Problem methods | ▪ Exam, Quizzes, |
| b2 | Predict the order of reaction kinetics and drug degradation pathways | ▪ Lectures, Discussions, brain storming | ▪ Homework, short answers and Written exam |
| b3 | Explore the basics fundamentals of physical pharmacy in designing of different pharmaceutical dosage forms. | ▪ Lectures, Discussions. | ▪ Exam, Quizzes, Homework |

**(C) Alignment of Course Intended Learning Outcomes (Professional and Practical Skills) to Teaching Strategies and Assessment Methods:**

| | Course Intended Learning Outcomes | Teaching Strategies | Assessment Strategies |
|---|---|---|---|
| **c1-** | Apply the rheological properties of some pharmaceutical substance to develop pharmaceutical preparations | ▪ Lectures and Group discussion | ▪ Homework, Written exam |
| **c2-** | Practice the solubility, partition coefficient and surface tension of some pharmaceutical substance. | ▪ Group learning and Problem-based learning. | Homework, Written exam |
| **c3-** | Test the proper storage conditions based on drug degradation pathway | ▪ Lectures and brain storming | Homework, Written exam |
| **c4-** | Calculate the reaction kinetic order and shelf life of some pharmaceutical substances | ▪ Lectures and brain storming | ▪ Homework, Written exam |

**(D) Alignment of Course Intended Learning Outcomes (Transferable Skills) to Teaching Strategies and Assessment Methods:**

| | Course Intended Learning Outcomes | Teaching Strategies | Assessment Strategies |
|---|---|---|---|
| d1 | Implement writing and presentation | ▪ Lectures | Homework |

| | | | |
|---|---|---|---|
| | skills and demonstrate creativity and time management. | ▪ Group Working | |
| d2 | Work independently or collaboratively as a teamwork member to prepare seminars/ presentations or write reports. | ▪ Group Working<br>▪ Problem Solving<br>▪ | ▪ Homework |

## IV. Course Contents:

### A. Theoretical Aspect:

| No. | Units/Topics List | Sub Topics List | Number of Weeks | Contact Hours | Learning Outcomes (CILOs) |
|---|---|---|---|---|---|
| 1 | Introduction to physical pharmacy | Definition, orientation, process | 1 | 2 | a1, a2, b1,b3, c2, d2 |
| 2 | State of matter, Solids | Crystal structure and external appearance, polymorphism, crystal hydrates, wetting of solid surfaces and powders dissolution of drugs Solid dispersions | 1 | 2 | a1, a2, b1,b3, c1, d1,d2 |
| 3 | Solubility and solution | Solvents for pharmaceutical aerosols, pH of drug solutions, Buffers | 1 | 2 | a1,a2,a3, b1,b3, c2, d1,d2 |
| 4 | Factors influencing solubility | isotonic solutions, Diffusion of drugs in solution | 1 | 2 | a1,a2,a3, b1,b3, c2, d1,d2 |
| 5 | Drug stability | Definition, factors stability of liquid and solids dosage forms | 1 | 2 | a1, a2, a5, b1, b2,b3, c3,c4, d1,d2 |
| 6 | Reaction Kinetics and drug stability | Kinetics of chemical decomposition in solution Stability testing calculation of shelf-life | 1 | 2 | a1, a2, a5, b1, b2,b3, c3,c4, d1,d2 |

| No. | Units/Topics List | Sub Topics List | Number of Weeks | Contact Hours | Learning Outcomes (CILOs) |
|---|---|---|---|---|---|
| 7 | Surface and interfacial tensions | Definition , factors affecting Surface and interfacial tensions | 1 | 2 | a1, a1, a3, b1, b3, c2, d1,d2 |
| 8 | Mid-term exam | | 1 | 2 | a1, a1, a3, a5, b1-3, c2-4 |
| 9 | Surface active agents | Definitions Some typical surfactants, applications | 1 | 2 | a1, a1, a3, b1, b3, c2, d1,d2 |
| 10 | Emulsions, suspensions and other dispersed systems | Foams and defoamers | 1 | 2 | a1, a1, a3, b1, b3, c2, d1,d2 |
| 11 | Polymers, drug absorption | Properties, Solution properties of polymers, Routes of administration | 1 | 2 | a1,a2,a3, b1,b3, c2, d1,d2 |
| 12 | Physicochemical drug interactions and incompatibilities<br>Complexes; classification and use. | Solubility problems pH effects in vitro and in vivo, Analysis of complexes. | 1 | 2 | a1, a2, a3, a4, b3, c1-2, d1,d2 |
| 13 | Peptides, proteins and other biopharmaceuticals | Structure and solution properties of peptides and proteins, The stability of proteins and peptides | 1 | 2 | a1,a2,a3, b1,b3, c2, d1,d2 |
| 14 | Adsorption at solid and liquid interface. | Definition, types factors affecting Adsorption of drugs | 1 | 2 | a1, a1, a3, b1, b3, c2, d1,d2 |
| 15 | Rheology | Definition , classification and Application of polymers in drug delivery, Rheological | 1 | 2 | a1, a2, a3, a5, b1, b3, |

| No. | Units/Topics List | Sub Topics List | Number of Weeks | Contact Hours | Learning Outcomes (CILOs) |
|---|---|---|---|---|---|
| | | characteristics of products | | | c1, d2 |
| 16 | **Final Exam** | | 1 | 2 | a1-5, b1-3, c1-4 |
| **Number of Weeks /and Units Per Semester** | | | **16** | **32** | |

## V. Teaching Strategies of the Course:

Lectures , Discussions, Small group discussions, brainstorming, Group learning and Problem-based learning.

## VI. Assessment Methods of the Course:

Quizzes, Homework , short answers and Written exam

## VII. Assignments:

| No. | Assignments | Week Due | Mark | Aligned CILOs (symbols) |
|---|---|---|---|---|
| 1 | Assignment 1: Home works | 9th | 5 | a2,a3, a5, b2,b3, c3, d2 |
| 2 | Assignment 1: Reports | 13th | 5 | a1-4, b1 c3,c4,d1, d2 |
| **Total** | | | **10** | |

## VIII. Schedule of Assessment Tasks for Students During the Semester:

| No. | Assessment Method | Week Due | Mark | Proportion of Final Assessment | Aligned Course Learning Outcomes |
|---|---|---|---|---|---|
| 1 | Assignments | 9th,13th | 10 | 10% | a1-5, b1-3, c3,c4, d1,d2 |
| 2 | Quizzes 1 & 2 | 2th and 11th | 10 | 10% | a2, a3, a5, b1, b3, c2 |
| 3 | Mid-Term Theoretical Exam | 8th | 20 | 20% | **a1, a1, a3, a5, b1-3, c2-4** |
| 4 | Final Theoretical Exam | 15th | 60 | 60% | **a1-5, b1-3, c1-4** |
| **Total** | | | **100** | **100%** | |

## IX. Learning Resources:

- *Written in the following order:* Author, Year of publication, Title, Edition, Place of publication, Publisher.

**1- Required Textbook(s) ( maximum two ):**

1. Notes on Physical Pharmacy prepared by the department staff.
2. Florence, A.T. and Attwood, D., 2008, "FASTtrack physical pharmacy" 1st edition, Pharmaceutical Press, London.
3. Martin, A., 2006, 'Physical Pharmacy – physical chemical principles in pharmaceutical scien 5th edition, Lippincott Williams & Wilkins., Philadelphia.

**1- Recommended Readings and Reference Materials**

1. Florence, A.T. and Attwood, D., 2006, "Physicochemical principles of pharmacy", 4th edition Pharmaceutical Press, London.
2. Loyd, V Allen J, 2013, Remington: The Science and Practice of Pharmacy 22nd edition, Pharmaceutical Press, London.
3. Ansel; H.C, (2011) Pharmaceutical Dosage Forms and drug Delivery Systems'. 9thed , Lea &Febiger; Philadelphia; London.
4. Aulton, M.E, (2013) Pharmaceutics, the design and manufacture of medicines. 4th edition, Churchill Livingstone, Edinburgh.

**3- Electronic Materials and Web Sites etc.:**

www.pubmed.com

http://www.sciencedirect.com

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| | X. Course Policies: (Based on the Uniform Students' By law (2007) |
|---|---|
| 1 | **Class Attendance:** Class Attendance is mandatory. A student is considered absent and shall be banned from taking the final exam if his/her absence exceeds 25% of total classes. |
| 2 | **Tardiness:** A student will be considered late if he/she is not in class after 10 minutes of the start time of class. |
| 3 | **Exam Attendance/Punctuality:** No student shall be allowed to the exam hall after 30 minutes of the start time, and shall not leave the hall before half of the exam time has passed. |
| 4 | **Assignments & Projects:** Assignments and projects must be submitted on time. Students who delay their assignments or projects shall lose the mark allocated for the same. |
| 5 | **Cheating:** Cheating is an act of fraud that results in the cancelation of the student's exam or assignment. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply. |
| 6 | **Forgery and Impersonation:** Forgery/Impersonation is an act of fraud that results in the cancelation of the student's exam, assignment or project. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply. |
| 7 | **Other policies:** The University official regulations in force will be strictly observed and students shall comply with all rules and regulations of the examination set by the Department, Faculty and University Administration. |

## Faculty of Medicine & Health Sciences.

## Department of Pharmacy

Bachelor of Pharm D

# Course Plan (Syllabus) of Physical pharmacy

## Course No.( PHYP 105)

| I. Information about Faculty Member Responsible for the Course: | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Name of Faculty Member:** | Dr/ Sami Ahmed Al Sammit | **Office Hours** | | | | | | |
| **Location& Telephone No.:** | 773817898 | | | | | | | |
| **E-mail:** | sami.alsammit@gmail.com | SAT | SUN | MON | TUE | WED | THU | |

## II. Course Identification and General Information:

| | | | | | |
|---|---|---|---|---|---|
| 1 | **Course Title:** | Physical Pharmacy | | | |
| 2 | **Course Code & Number:** | PHYP 105 | | | |
| 3 | **Credit Hours:** | **Credit Hours** | **TheoryHours** | | **Lab. Hours** |
| | | | **Lecture** | **Exercise** | |
| | | 2 | 2 | -- | -- |
| 4 | **Study Level/ Semester at which this Course is offered:** | 1st Level / 2nd Semester | | | |
| 5 | **Pre –Requisite (if any):** | - | | | |
| 6 | **Co –Requisite (if any):** | None | | | |
| 7 | **Program (s) in which the Course is Offered:** | Bachelor of Pharm D | | | |
| 8 | **Language of Teaching the Course:** | English | | | |
| 9 | **Study System:** | Semester based System | | | |
| 10 | **Mode of Delivery:** | Full Time | | | |
| 11 | **Location of Teaching the Course:** | **Faculty of Medicine & Health Sciences** | | | |
| 12 | **Prepared by:** | Dr/ Sami Ahmed Al Sammit | | | |
| 13 | **Date of Approval:** | | | | |

## III. Course Description:

The course aims to provide students with basic principles of the physicochemical properties of pharmaceutical and various substances that are used in designing and preparation of different pharmaceutical dosage forms.

## IV. Course Intended Learning Outcomes (CILOs) :

**Upon successful completion of the Course, student will be able to:**

| | |
|---|---|
| | A. **Knowledge and Understanding:** |
| a1 | Illustrate the physicochemical properties of pharmaceutical and various substances which are used in preparation of different pharmaceutical dosage forms. |
| a2 | Outline properties of different pharmaceutical dosage forms and drug delivery systems. |
| a3 | Discuss the principles of adsorption/desorption, interfacial tensions, and emulsifying, suspending and surface active agents. |
| a4 | Identifyprinciples and types of rheology. |
| a5 | Explain the reaction kinetics and drug stability |
| | B. **Intellectual Skills:** |
| b1- | Relate the effect of physicochemical properties on formulation of pharmaceutical dosage forms. |
| b2- | Predict the order of reaction kinetics and drug degradation pathways |
| b3- | Explore the basics fundamentals of physical pharmacy in designing of different pharmaceutical dosage forms. |
| | **C. Professional and Practical Skills:** |
| **c1-** | Apply the rheological properties of some pharmaceutical substance to develop pharmaceutical preparations |
| **c2-** | Practice the solubility, partition coefficient and surface tension of some pharmaceutical substance. |
| **c3-** | Test the proper storage conditions based on drug degradation pathway |
| **c4-** | Calculate the reaction kinetic order and shelf life of some pharmaceutical substances |
| | **D. Transferable Skills:** |
| d1- | Implement writing and presentation skills and demonstrate creativity and time management. |
| d2 | Work independently or collaboratively as a teamwork member to prepare seminars/ presentations or write reports |

## V. Course Contents:

**A. Theoretical Aspect:**

| No. | Units/Topics List | Sub Topics List | Number of Weeks | Contact Hours |
|---|---|---|---|---|
| 1 | Introduction to physical pharmacy | Definition, orientation, process | 1 | 2 |
| 2 | State of matter, Solids | Crystal structure and external appearance, polymorphism, crystal hydrates, wetting of solid surfaces and powders dissolution of drugs Solid dispersions | 1 | 2 |
| 3 | Solubility and solution | Solvents for pharmaceutical aerosols, pH of drug solutions, Buffers | 1 | 2 |
| 4 | Factors influencing solubility | isotonic solutions, Diffusion of drugs in solution | 1 | 2 |
| 5 | Drug stability | Definition, factors stability of liquid and solids dosage forms | 1 | 2 |
| 6 | Reaction Kinetics and drug stability | Kinetics of chemical decomposition in solution<br>Stability testing<br>calculation of shelf-life | 1 | 2 |
| 7 | Surface and interfacial tensions | Definition , factors affecting Surface and interfacial tensions | 1 | 2 |
| 8 | Mid-term exam | | 1 | 2 |
| 9 | Surface active agents | Definitions Some typical surfactants, applications | 1 | 2 |
| 10 | Emulsions, suspensions and other dispersed systems | Foams and defoamers | 1 | 2 |
| 11 | Polymers, drug absorption | Properties, Solution properties of polymers, Routes of administration | 1 | 2 |
| 12 | Physicochemical drug interactions and incompatibilities<br>Complexes; classification and use. | Solubility problems pH effects in vitro and in vivo, Analysis of complexes. | 1 | 2 |
| 13 | Peptides, proteins and other biopharmaceuticals | Structure and solution properties of peptides and proteins, The stability of proteins and peptides | 1 | 2 |
| 14 | Adsorption at solid and liquid | Definition, types factors affecting | 1 | 2 |

| No. | Units/Topics List | Sub Topics List | Number of Weeks | Contact Hours |
|---|---|---|---|---|
| | interface. | Adsorption of drugs | | |
| 15 | Rheology | Definition , classification and Application of polymers in drug delivery, Rheological characteristics of products | 1 | 2 |
| 16 | **Final Exam** | | 1 | 2 |
| **Number of Weeks /and Units Per Semester** | | | **16** | **32** |

## VI. Teaching Strategies of the Course:

Lectures , Discussions, Small group discussions, brainstorming, Group learning and Problem-based learning.

## VII. Assessment Methods of the Course:

Quizzes, Homework , report, short answers and Written exam

## VIII. Assignments:

| No. | Assignments | Week Due | Mark | Aligned CILOs (symbols) |
|---|---|---|---|---|
| 1 | Assignment 1: Homeworks | 9th | 5 | a2,a3, a5, b2,b3, c3, d2 |
| 2 | Assignment 1: Reports | 13th | 5 | a1-4, b1 c3,c4,d1, d2 |
| **Total** | | | **10** | |

## IX. Schedule of Assessment Tasks for Students During the Semester:

| No. | Assessment Method | Week Due | Mark | Proportion of Final Assessment | Aligned Course Learning Outcomes |
|---|---|---|---|---|---|
| 1 | Assignments | 9th, 13th | 5 | 10% | a1-5, b1-3, c3,c4, d1,d2 |

| No. | Assessment Method | Week Due | Mark | Proportion of Final Assessment | Aligned Course Learning Outcomes |
|---|---|---|---|---|---|
| 2 | Quizzes 1 & 2 | 2th and 11th | 5 | 10% | a2, a3, a5, b1, b3, c2 |
| 3 | Mid-Term Theoretical Exam | 8th | 20 | 20% | a1, a1, a3, a5, b1-3, c2-4 |
| 4 | Final Theoretical Exam | 15th | 70 | 60% | a1-5, b1-3, c1-4 |
| Total | | | 100 | 100% | |

## X. Learning Resources:

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| | XI. Course Policies: (Based on the Uniform Students' By law (2007) |
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| 2 | **Tardiness:** A student will be considered late if he/she is not in class after 10 minutes of the start time of class. |
| 3 | **Exam Attendance/Punctuality:** No student shall be allowed to the exam hall after 30 minutes of the start time, and shall not leave the hall before half of the exam time has passed. |
| 4 | **Assignments & Projects:** Assignments and projects must be submitted on time. Students who delay their assignments or projects shall lose the mark allocated for the same. |
| 5 | **Cheating:** Cheating is an act of fraud that results in the cancelation of the student's exam or assignment. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply. |
| 6 | **Forgery and Impersonation:** Forgery/Impersonation is an act of fraud that results in the cancelation of the student's exam, assignment or project. If it takes place in a final exam, the penalties stipulated for in the Uniform Students' Bylaw (2007) shall apply. |
| 7 | **Other policies:** |

| | |
|---|---|
| | The University official regulations in force will be strictly observed and students shall comply with all rules and regulations of the examination set by the Department, Faculty and University Administration. |