|  |  |
| --- | --- |
| **Course Title:** | Physical Pharmacy |
| **Course Code:** | **PHCU 231** |
| **Program:** | **Pharmaceutical Sciences** |
| **Department:** | **Pharmaceutics** |
| **College:** | **College of Pharmacy** |
| **Institution:** | **Najran University** |

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# A. Course Identification

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1. Credit hours:** 3(2+1) | | | | | |  | | | | | | | | | | |
| **2. Course type** | | | | | | | | | | | | | | | | |
| **a.** | University | |  | College | | | | **√** | Department | | | |  | Others |  |  |
| **b.** | | Required | | | **√** | | Elective | | |  |  | | | | | |
| **3. Level/year at which this course is offered:** | | | | | | | | | | | | 3rd level | | | | |
| **4. Pre-requisites for this course** (if any)**:** MATH 150 | | | | | | | | | | | | | | | | |
| **5. Co-requisites for this course** (if any)**:** | | | | | | | | | | | | | | | | |
|  | | | | | | | | | | | | | | | | |

## 6. Mode of Instruction (mark all that apply)

| **No** | **Mode of Instruction** | **Contact Hours** | **Percentage** |
| --- | --- | --- | --- |
| **1** | **Traditional classroom** | 60 | 100 |
| **2** | **Blended** |  |  |
| **3** | **E-learning** |  |  |
| **4** | **Correspondence** |  |  |
| **5** | **Other** |  |  |

**7. Actual Learning Hours** (based on academic semester)

|  |  |  |
| --- | --- | --- |
| **No** | **Activity** | **Learning Hours** |
| **Contact Hours** | | |
| **1** | **Lecture** | 30 |
| **2** | **Laboratory/Studio** | 30 |
| **3** | **Tutorial** |  |
| **4** | **Others** (specify) |  |
|  | **Total** | 60 |
| **Other Learning Hours\*** | | |
| **1** | **Study** | 30 |
| **2** | **Assignments** | 15 |
| **3** | **Library** | 10 |
| **4** | **Projects/Research Essays/Theses** | 5 |
| **5** | **Others** (specify) | - |
|  | **Total** | 60 |

**\*** The length of time that a learner takes to complete learning activities that lead to achievement of course learning outcomes, such as study time, homework assignments, projects, preparing presentations, library times

# B. Course Objectives and Learning Outcomes

|  |
| --- |
| 1. Course Description |
| This course is designed to introduce the quantities and theoretical physical principles of science to pharmacy student that can be applied to pharmacy practice. Principles of chemistry, physics and mathematics are applied to pharmaceutical sciences:  The following subject will be covered:, Micromeritics, Rheology, Surface phenomenon, stability of pharmaceutical and basic reaction kinetics, Diffusion and dissolution phenomena, Buffered and isotonic solution |
| 2. Course Main Objective |
| The course aims to teach physical concepts needed in pharmacy practice and pharmaceutical preparation |

## 3. Course Learning Outcomes

| **CLOs** | | **Aligned****PLOs** |
| --- | --- | --- |
| 1 | **Knowledge:** |  |
| 1.1 | Define physicochemical properties of drugs and excipients in pharmaceutical dosage form design | K3 |
| 1.2 |  |  |
| 1.3 |  |  |
| 1... |  |  |
| **2** | **Skills:** |  |
| 2.1 | Evaluate physicochemical properties that govern dosage form design of pharmaceutical products | S1 |
| 2.2 | Interpret physicochemical property of pharmaceutical dosage forms through scientific data and information | S1 |
| 2.3 |  |  |
| 2... |  |  |
| **3** | **Competence:** |  |
| 3.1 | Use of advanced techniques in developing solutions to complex issues in field of work | C3 |
| 3.2 |  |  |
| 3.3 |  |  |
| 3... |  |  |

# C. Course Content (Theoretical)

|  |  |  |
| --- | --- | --- |
| **No** | **List of Topics** | **Contact Hours** |
| 1 | Micromeritics: Definition, general particle properties (size, shape, surface properties, density), particle size distribution curve | 3 |
| 2 | Micromeritics: Histogram, specific particle properties, applications of micromeritics. | 3 |
| 3 | Rheology: Definition, concept of viscosity, Newtonian and non-Newtonian systems (plastic, pseudoplastic and dilatant systems), | 3 |
| 4 | Rheology: Measurement of viscosity, types of Viscometers, kinematic viscosity, fluidity, rheograms, thixotropy and antithixotropy and applications of rheology. | 2 |
| 5 | Buffers and isotonic solution: Definition, types, components, buffer capacity and factors affecting it, calculation of pH and applications of buffers. | 2 |
| 6 | Surface and interfacial phenomenon: Surface and interfacial tension, surface free energy, | 2 |
| 7 | Surface tension and interfacial phenomenon: Determination of surface tension, spreading coefficient, HLB, wetting, wetting agent. | 4 |
| 8 | Coarse dispersion: Suspension, deflocculated suspension, flocculated suspension, theory of sedimentation, sedimentation parameter, Emulsion | 4 |
| 9 | Stability of pharmaceutical and basic reaction kinetics: Rates, Order, and Molecularity of Reactions. Rate Constants. | 4 |
| 10 | Stability of pharmaceutical and basic reaction kinetics: Half-Life, Shelf Life, and Apparent or Pseudo-order and Accelerated Stability and Stress Testing | 4 |
| 11 | Revision | 2 |
| **Total** | | 30 |

# Course Content (Practical)

|  |  |  |
| --- | --- | --- |
| **No** | **List of Topics** | **Contact Hours** |
| 1 | Particle size distribution and histogram | 2 |
| 2 | Flow Properties-Angle of repose method | 2 |
| 3 | Determination of Bulk density and Tapped density | 2 |
| 4 | Flow Properties-Carr's index and Hausner ratio | 2 |
| 5 | Determination of the Density of unknown liquid | 2 |
| 6 | Determination of viscosity of unknown liquid by Ostwald Viscometer | 2 |
| 7 | Determination of surface tension by drop weight method | 2 |
| 8 | Determination of surface tension by drop count method | 2 |
| 9 | Determination of CMC of given Surfactant | 2 |
| 10 | Sedimentation volume | 2 |
| 11 | Stability of suspension by sedimentation volume method | 2 |
| 12 | Stokes law | 2 |
| 13 | Preparation of buffer and different types of solution | 2 |
| 14 | Numerical problem related to practical | 2 |
| 15 | Revision | 2 |
| **Total** | | 30 |

# D. Teaching and Assessment

## 1. Alignment of Course Learning Outcomes with Teaching Strategies and Assessment Methods

| **Code** | **Course Learning Outcomes** | **Teaching Strategies** | **Assessment Methods** |
| --- | --- | --- | --- |
| **1.0** | **Knowledge** | | |
| 1.1 | Define physicochemical properties of drugs and excipients in pharmaceutical dosage form design | Lectures | 1. Written exam  2. MCQ  3. Assignments |
| 1.2 |  |  |  |
| … |  |  |  |
| **2.0** | **Skills** | | |
| 2.1 | Evaluate physicochemical properties that govern dosage form design of pharmaceutical products | 1.Lectures  2. Practical experiments | Written exam  Observation cards |
| 2.2 | Interpret physicochemical property of drugs/excipients through scientific data and information | 1. Lectures  2. Practical experiments | 1. Written exam  2. Practical exam  3. Observation cards |
| … |  |  |  |
| **3.0** | **Competence** | | |
| 3.1 | Demonstrate practical working in group with guidance or independence | Practical experiments | Practical exam  Observation cards |
| 3.2 |  |  |  |
| … |  |  |  |

## 2. Assessment Tasks for Students

| **#** | **Assessment task\*** | **Week Due** | **Percentage of Total Assessment Score** |
| --- | --- | --- | --- |
| **1** | Midterm Theoretical Exam 1 | 6 | 15 |
| **2** | Midterm Theoretical Exam 2 | 11 | 15 |
| **3** | Assignments | 12 | 5 |
| **4** | Quiz Practical | 13 | 5 |
| **5** | Observation card | 14 | 5 |
| **6** | Final practical Examination | 14 | 15 |
| **7** | Final Written Exam | 16-17 | 40 |
| **8** | Total |  | 100 |

**\*Assessment task** (i.e., written test, oral test, oral presentation, group project, essay, etc.)

# E. Student Academic Counseling and Support

|  |
| --- |
| **Arrangements for availability of faculty and teaching staff for individual student consultations and academic advice :** |
| Office hour : (8 hour per week + appointment with student)  Help session : (Problem solving): As required per week |

# F. Learning Resources and Facilities

## 1.Learning Resources

|  |  |
| --- | --- |
| **Required Textbooks** | a). Martin’s Physical Pharmacy and Pharmaceutical Sciences, Ed., Sinko, PJ, 5th ed., Lippincott Williams & Wilkins, Philadelphia. |
| **Essential References Materials** | a). Pharmaceutics- The Science of Dosage Form Design, M.E. Aulton, 6th edition, 2015, Elsevier Publication, USA  b). Physical Pharmacy, David Attwood and Alexander T. Florence. Pharmaceutical Press, 3rd edition, USA |
| **Electronic Materials** | <https://sdl.edu.sa/SDLPortal/ar/Publishers.aspx>  http://dlaf.nu.edu.sa/en/e-libraries  http://www.nu.edu.sa/en/web/deanship-of-libraries-affairs/85  http://lib.nu.edu.sa/DigitalLibbrary.aspx |
| **Other Learning Materials** |  |

## 2. Facilities Required

| **Item** | **Resources** |
| --- | --- |
| **Accommodation**  (Classrooms, laboratories, demonstration rooms/labs, etc.) | (a). A lecture hall containing at least 25 seats for student  (b). A laboratory containing at least 25 seats for the student. |
| **Technology Resources**  (AV, data show, Smart Board, software, etc.) | Projector for power point presentations with internet. |
| **Other Resources**  (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list) | 1. Beaker  2. Measuring cylinder  3. Ostwald viscometer  4. Stalaganmometer  5. Sieve shaker |

# G. Course Quality Evaluation

| **Evaluation**  **Areas/Issues** | **Evaluators** | **Evaluation Methods** |
| --- | --- | --- |
| Effectiveness of teaching and assessment | Faculty | Direct |
| Quality of learning resources | Students | Direct |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**Evaluation areas** (e.g., Effectiveness of teaching and assessment, Extent of achievement of course learning outcomes, Quality of learning resources, etc.)

**Evaluators** (Students, Faculty, Program Leaders, Peer Reviewer, Others (specify)

**Assessment Methods** (Direct, Indirect)

# H. Specification Approval Data

|  |  |
| --- | --- |
| **Council / Committee** | Pharmaceutics department committee |
| **Reference No.** | Department meeting No.1 |
| **Date** | 2019/09/10 |