|  |  |
| --- | --- |
| **Course Title:** | **Industrial Pharmacy** |
| **Course Code:** | **PHCU535** |
| **Program:** | **Pharmaceutical Sciences** |
| **Department:** | **Pharmaceutics** |
| **College:** | **Pharmacy** |
| **Institution:** | **Najran University** |

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# A. Course Identification

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **1. Credit hours:** | | | | **3 hours (2+1)** | | | | | | | | | | | | |
| **2. Course type** | | | | | | | | | | | | | | | | |
| **a.** | University | |  | | College | | | **√** | Department | | | |  | Others |  |  |
| **b.** | | Required | | | | **√** | Elective | | |  |  | | | | | |
| **3. Level/year at which this course is offered: 9th Level/ 5th year** | | | | | | | | | | | |  | | | | |
| **4. Pre-requisites for this course** (if any)**: None** | | | | | | | | | | | | | | | | |
| **5. Co-requisites for this course** (if any)**: None** | | | | | | | | | | | | | | | | |
|  | | | | | | | | | | | | | | | | |

## 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** | 0 |
| **4** | **Others** (specify) | 0 |
|  | **Total** | 60 |
| **Other Learning Hours\*** | | |
| **1** | **Study** | 30 |
| **2** | **Assignments** | 20 |
| **3** | **Library** | 0 |
| **4** | **Projects/Research Essays/Theses** | 0 |
| **5** | **Others** (specify) | 0 |
|  | **Total** | 50 |

**\*** 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 The course encompasses with the main pharmaceutical unit operation carrying out in pharmaceutical industry for manufacturing of various dosage form, equipment used as well as factors affecting the different pharmaceutical unit operations. It aware students related to the different unit operation involved in manufacturing of various dosage form in pharmaceutical industry. The various unit operations cover in the subject include: heat process and heat flow mechanisms, evaporation, distillation, extraction, filtration, centrifugation, crystallization, size reduction, size separation, mixing and drying. |
|  |
| 2. Course Main Objective 1- Familiarize the student to pharmaceutical unit operation carrying out in pharmaceutical industry for manufacturing of various dosage forms  2- Study industrial equipment used as well as factors that affecting the performance of different pharmaceutical unit operations. |
|  |

## 3. Course Learning Outcomes

| **CLOs** | | **Aligned****PLOs** |
| --- | --- | --- |
| 1 | **Knowledge:** |  |
| 1.1 | Describe the basic understanding of the principles and theories of industrial processes, techniques and equipment’s required for manufacturing the different dosage forms. | K3 |
| 1.2 | Outline the mixing processing. | K3 |
| 1.3 |  |  |
| 1... |  |  |
| **2** | **Skills :** |  |
| 2.1 | Prepare powder mixtures from different mixing methods | S1 |
| 2.2 | Compare between different industrial process and theory behind in its operation | S2 |
| 2.3 |  |  |
| 2... |  |  |
| **3** | **Competence:** |  |
| 3.1 | Work in group or individual using different mixing technique in preparing powder mixtures. | C1 |
| 3.2 |  |  |
| 3.3 |  |  |
| 3... |  |  |

# C. Course Content

|  |  |  |  |
| --- | --- | --- | --- |
| **No** | | **List of Topics** | **Contact Hours** |
| **Lectures** | | | |
| 1 | | **General introduction of Industrial Pharmacy** | 2 |
| 2 | | **The industrial processes: heat flow, evaporation and distillation**  1. Heat flow: mechanisms and heaters  2.Evaporation: evaporation equipment’s and condensers  3. Distillation: definition, type of distillation and theory of distillation | 6 |
| 3 | | **The industrial processes: Crystallization**  Crystallization: theory, significance and types of crystallizers. | 4 |
| 4 | | The industrial processes: extraction  Extraction: types, applications and equipment’s | 4 |
| 5 | | The industrial processes: size reduction and size separation  1.Size reduction: theory, mechanisms and equipment’s.  2.Size separation: methods of measuring and equipment’s. | 4 |
| 6 | | The industrial processes: drying  1. Types of moisture content.  2. Mechanism of drying.  3. Theory of drying  4. Drying equipment’s: *batch and continuous dry* | 4 |
| 7 | | The industrial processes: filtration and centrifugation  1. Filtration: definition, theory, equipment’s, filter media and aids.  2. Centrifugation: theory, applications and types of centrifuge | 2 |
| 8 | | The industrial processes: mixing  1. Mixing equipment’s for powders, semisolids and liquids.  2. Factors affecting mixing. | 2 |
| 9 | | Revision | 2 |
| **Total** | | | 30 |
| **Practicl** | | | |
| 1 | Lab1. Size reduction and size separation. | | 4 |
| 2 | Lab2. Determination of Size reduction and Particle size analysisby sieve shaker method | | 2 |
| 3 | Lab3. Study filtration, centrifugation and crystallization equipment’s. | | 4 |
| 4 | Lab4. Rate factors in filtration: area, thickness and concentration | | 2 |
| 5 | Lab5. Determination of rate of crystal growth | | 2 |
| 6 | Draw and describe the schematic diagrams of dryers. | | 2 |
| 7 | Lab6. Determination of drying rate | | 2 |
| 8 | Draw and describe the schematic diagrams of heaters and evaporators | | 2 |
| 9 | Lab7. Determination of factors affecting rate of evaporation: surface area, viscosity and concentration. | | 2 |
| 10 | Lab8. Calculation of thermal conductivity through a plane wall, composite wall and insulated pipes. | | 4 |
| 11 | Lab9. Mixing of powders using different mixers. | | 2 |
| 12 | Determination of Humidity by using Humidity chart. | | 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 | Describe the principles and theories of industrial processes, techniques and equipment’s required for manufacturing the different dosage forms. | Lectures | 1. Theoretical exam 2. Assignments |
| 1.2 | Outline the mixing processing. | Lectures | 1. Theoretical exam 2. Assignments |
| … |  |  |  |
| **2.0** | **Skills** | | |
| 2.1 | Prepare powder mixtures from different mixing methods | Lectures, Practical  Problems solving | 1. Theoretical exam 2. Assignment 3. Observation Card |
| 2.2 | Compare between different industrial process and theory behind in its operation | Lectures, Practical  Problems solving | 1. Theoretical exam 2. Assignment 3. Observation Card |
| … |  |  |  |
| **3.0** | **Competence** | | |
| 3.1 | Work independentlyand professionally**.** | Practical  Refer to Library and internet resources | 1. Practical exam  2. Oral discussion |
| 3.2 |  |  |  |
| … |  |  |  |

## 2. Assessment Tasks for Students

| **#** | **Assessment task\*** | **Week Due** | **Percentage of Total Assessment Score** |
| --- | --- | --- | --- |
| **1** | Quarterly Exam-1 | 6-7th | 15% |
| **2** | Quarterly Exam-2 | 10-11th | 15% |
| **3** | Assignments | 4-12th | 5% |
| **4** | Quiz (Practical) | 13th | 5% |
| **5** | Observation card in lab | 14th | 5% |
| **6** | Practical Exam | 15th | 15% |
| **7** | Final Exam | 16-19th | 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 hours (5 hours per week+ appointments). * Tutorial session (problem solving and discussion 1 hour a week). |
|  |

# F. Learning Resources and Facilities

## 1.Learning Resources

|  |  |
| --- | --- |
| **Required Textbooks** | 1. The theory and practice of industrial pharmacy, Leon Lachman. 2. Introduction to industrial pharmacy, Adel M. Sakr& Hassan M. EL-Sabbagh |
| **Essential References Materials** | 1. Unit processes in pharmacy, David Gandderton.  2. Pharmaceutics –Dosage Form and Design, David Jones.  3. Pharmaceutical Compounding and Dispensing, Chris Langley & Dawn Belcher.  4. Pharmaceutical Technology, controlled drug release, M.H. Rubinstein |
| **Electronic Materials** | 1. <https://sdl.edu.sa/SDLPortal/en/Publishers.aspx> 2. <http://dlaf.nu.edu.sa/en/e-libraries> 3. http://www.nu.edu.sa/en/web/deanship-of-libraries-affairs/85 4. <http://lib.nu.edu.sa/DigitalLibbrary.aspx> 5. <http://www.tandfonline.com/action/journalInformation?show=aimsScope&journalCode=iphd20> |
| **Other Learning Materials** | Computer-based programs/CD, professional standards or regulations and software. |

## 2. Facilities Required

| **Item** | **Resources** |
| --- | --- |
| **Accommodation**  (Classrooms, laboratories, demonstration rooms/labs, etc.) | 1. Suitable lecture room equipped with data show and internet access   2. Suable labs equipped with health and safety tools. |
| **Technology Resources**  (AV, data show, Smart Board, software, etc.) | 1. Computer 2. Internet access 3. Data show |
| **Other Resources**  (Specify, e.g. if specific laboratory equipment is required, list requirements or attach a list) | 1. Cube mixer 2. Particle size analyzer 3. Sieves 4. Tablet machine 5. Water bath 6. Hardness tester 7. Friability tester 8. Multi check |

# G. Course Quality Evaluation

| **Evaluation**  **Areas/Issues** | **Evaluators** | **Evaluation Methods** |
| --- | --- | --- |
| Effectiveness of teaching and assessment | Head of department | Direct (group discussion) |
| Extent of achievement of course learning outcomes | Program Leaders | Indirect (course report) |
| Quality of learning resources | Students | Indirect (Questionnaires) |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**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 Depertment Committee |
| **Reference No.** | Committee No.1 |
| **Date** | 10/9/2019 |