جامعة الإمام عبد الرحمن بن فيصل
IMAM ABDULRAHMAN BIN FAISAL UNIVERSITY
College of Clinical Pharmacy | كلية الصيدلة الإكلينيكية

# Student Handbook
# PharmD Program

## College of Clinical Pharmacy

## 2020-2021

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## 1. Welcome to the College of Clinical Pharmacy!

Dear Student,

It is my pleasure to congratulate you for being a student in the College of Clinical Pharmacy, Imam Abdulrahman Bin Faisal University.

The years you spend with us as a student are so critical to your future as a pharmacist.

You will go through a well-structured curriculum that has all the essential knowledge and skills. In addition, you will have well organized training opportunities which will equip you for the years ahead.

It is important to highlight the importance of engaging in extracurricular activities during your years as a student since these activities enrich your personality and refine your soft skills.

Our academic advising and student support unit was established to help you at all levels. So please make sure you don't miss this opportunity.

You are the future leaders of pharmacy practice in the kingdom. That future starts today. So please work hard to make sure that our future is bright.

Dr. Asim Al-Ansari

Dean,

College of Clinical Pharmacy

## 2. College of Clinical Pharmacy History

Since its existence(1351H/1932CE), the Kingdom of Saudi Arabia has made the welfare and health care of its citizens a priority through establishment of the health institutions such as medical, dental, pharmacy as well as applied medical sciences colleges. With the advancement in the private and government hospitals, the pharmacist's role has been expanded from a mere dispenser of medicines to a clinical pharmacist in health set up for the care of patients. To cover this new clinical role of pharmacist, the existing curricula of pharmacy colleges is updated on regular basis.

All newly established colleges of pharmacy are designed as "colleges of clinical pharmacy" with the focus on patient care. One such example is the College of Clinical Pharmacy at Imam Abdulrahman Bin Faisal University, which was established by the Royal Decree no. 5088/MB dated 7/8/1432H (8/7/2011CE). The College since its birth strived to deliver the high-calibre PharmD program for pharmacy students in 1434/35H (2013/14CE) and proposed postgraduate programs, e.g. MSc/PhD in Clinical Pharmacy/Pharmacy Practice, MSc/PhD in Pharmaceutical Sciences, Residency or Fellowship programs for pharmacy graduates in the near future. In order to achieve this, the College's vision, mission, value statement and objectives have been clearly specified on the College's webpage.

## 3. College of Clinical Pharmacy Departments

Hereby we introduce PharmD Program where five departments have been established to cover all courses of the program. These departments include:

1. **Department of Pharmacy Practice**. It is the largest department that encompasses two areas: pharmacy practice and social and administrative pharmacy. The former is primarily concerned about pharmaceutical care (or medication therapy management) for patients and all aspects of practice in diverse settings, whereas the latter is involved in social and administrative services of pharmacy i.e. health psychology, pharmaco-epidemiology, pharmacoeconomics, public health and pharmacy management, etc.

2. **Department of Pharmaceutics**. This department teaches and trains students on the manufacture of various pharmaceutical dosage forms (e.g. tablets, capsules, suppositories and injections), biopharmaceuticals and pharmaceutical materials. It also performs quality tests on each preparation according to official formularies or guidelines.

3. **Department of Pharmaceutical Chemistry**. The department is responsible for chemistry topics related to pharmaceutical industry, chemical compositions, structure-activity relationships and analytical pharmaceutical chemistry.

4. **Department of Pharmacology and Toxicology**. This department educates on pharmaceutical and health products in terms of their mechanism of action, adverse effects (i.e. side effects and allergies), interactions with other medicines, food or diseases, including basic and applied pharmacokinetics and pharmacodynamics. Moreover, it deals with different types of toxic substances, causes of addiction and their management.

5. **Department of Natural Products and Alternative Medicine**. The department is related to herbal and medicinal products, chemical compositions and their impacts on the human body. Additionally, complementary and alternative medicine is also a crucial area of interest.

In addition to the five departments described above, some departments of the College of Medicine, i.e. Departments of Anatomy, Physiology, Pathology, Microbiology and Biochemistry, also help arrange many courses for the first two years of the PharmD Program as discussed in detail in the program outline and course descriptions.

## 4. Core Information

Program title: Bachelor of Clinical Pharmacy (**PharmD)**

Target award: **PharmD**

Interim or exit awards: **None**

Awarding body: Imam Abdulrahman Bin Faisal University

Local and international accreditation: **None**

Collaborative partners and models of collaboration: **None**

Location(s) at which program is delivered: **College of Clinical Pharmacy, hospitals and community pharmacies in Dammam and Al Khobar**

Modes of delivery and duration: **Full-time six years (06) years program (5 professional years plus one preparatory year) on campus**

## 5. College Vision, Mission and Values

**Vision:**

***Vision: A pre-eminent college of pharmacy recognized in pharmacy practice education, pharmaceutical services and research.***

**Mission:**

***Mission: Providing high quality pharmaceutical education and research to serve patients and the community.***

**Values:**

***Values: Equality, Diversity, Professional excellence, Creativity & Innovation, Teamwork, Lifelong learning and Social responsibility.***

## 6. PharmD program Vision, Mission and Values

**Vision:**

***A Pharm D program distinguished for its excellence in teaching and learning, research and community engagement.***

**Mission:**

***To prepare competent PharmD graduates capable of providing patient-centered care, engaging in the pharmaceutical industry, conducting quality research and serving the community.***

**Values:**

***Professionalism, Distinction, Accountability, Partnership working & Collaboration, Integrity, Leadership, Empathy, Social responsibility.***

## 7. Aims and Objectives and Program Learning Outcomes

**Aims:**

This PharmD Program and college aim to:

- Prepare students with the essential skills to join the labor market or post-graduate programs.
- Conduct quality scientific research.
- Achieve competency in community service and professional practice.

**Objectives:**

- Establish an up-to-date curriculum.
- Establish high quality experiential learning programs.
- Establish high quality learning resources and extracurricular activities.
- Attain accreditation from national and international accreditation agencies.

- Collaborate with pharmaceutical bodies at various capacities to inculcate necessary skills to develop competent pharmacists
- Recruit qualified faculty members in all disciplines.
- Establish laboratories containing all required tools to perform high quality research.
- Provide students with a solid foundation of basic and clinical research.
- Increase faculty and students' participation in community service.
- Collaborate with pharmaceutical bodies at various capacities including consultations.

**Program learning outcomes:**

Program Learning Outcomes, Assessment Methods, and Teaching Strategy work together and are aligned. They are joined together as one, coherent, unity that collectively articulate a consistent agreement between student learning and teaching.

The ***National Qualification Framework*** (NQF) provides five learning domains. Learning outcomes are required in the first four domains and some programs may also require the Psychomotor Domain.

On the table below are the five NQF Learning Domains, numbered in the left column.

**First**, insert the suitable and measurable learning outcomes required in each of the learning domains. **Second**, insert supporting teaching strategies that fit and align with the assessment methods and intended learning outcomes. **Third**, insert appropriate assessment methods that accurately measure and evaluate the learning outcome. Each program learning outcomes, assessment method, and teaching strategy ought to reasonably fit and flow together as an integrated learning and teaching process.

**Table 1. PharmD program learning outcomes**

| | NQF Learning Domains and Learning Outcomes | Teaching Strategies | Assessment Methods |
|---|---|---|---|
| **1.0** | **Knowledge** | | |
| 1.1 | Describe fundamental scientific knowledge and principles, as the basis of pharmaceutical and clinical sciences, to the pharmacy profession | • Lectures,<br>• tutorials,<br>• seminars/workshops,<br>• laboratory work,<br>• problem-based learning,<br>• small group discussion,<br>• role plays,<br>• case studies or multimedia instruction | • Quizzes,<br>• written exams with multiple-choice questions (MCQs) and short-answer questions,<br>• Assignments (using rubrics)<br>• Presentations (using rubrics) |
| 1.2 | Describe the role of pharmacist in the promoting health | | |
| **2.0** | **Cognitive Skills** | | |
| 2.1 | Apply the knowledge of biomedical sciences to the understanding of disease process, diagnosis and management. | • Active learning<br>• tutorials,<br>• seminars/workshops,<br>• laboratory work,<br>• problem-based learning,<br>• group discussion,<br>• role plays,<br>• case studies or multimedia instruction | • Quizzes,<br>• written exams with multiple-choice questions (MCQs) and short-answer questions,<br>• Assignments (using rubrics)<br>• Reports (using rubrics) |

| | | | |
|---|---|---|---|
| 2.2 | Correlate the basic principles of medicinal chemistry, drug development, formulation and bioequivalence studies that contribute to pharmaceutical industry and research institutes. | • Active learning<br>• tutorials,<br>• seminars/workshops,<br>• laboratory work,<br>• problem-based learning,<br>• group discussion,<br>• role plays,<br>• case studies or multimedia instruction<br>• field trip or visit to a hospital or pharmaceutical industry | • Presentations (using rubrics) |
| 2.3 | Apply the basic principles to the design and conduct of research in medicines or patient-specific areas. | • Active learning<br>• tutorials,<br>• seminars/workshops,<br>• laboratory work,<br>• problem-based learning,<br>• group discussion,<br>• role plays,<br>• case studies or multimedia instruction<br>• project-based learning with dissertations | • Quizzes,<br>• written exams with multiple-choice questions (MCQs) and short-answer questions,<br>• Presentations (using rubrics) a viva (oral examination),<br>• writing a report and/or a research paper (using rubrics) |
| 2.4 | Design and conduct a patient specific therapeutic plan based on best evidence. | • Active learning<br>• tutorials,<br>• seminars/workshops,<br>• laboratory work,<br>• problem-based learning,<br>• group discussion,<br>• role plays,<br>• case studies or multimedia instruction<br>• project-based learning with dissertations | • Quizzes,<br>• written exams with multiple-choice questions (MCQs) and short-answer questions,<br>• Assignments (using rubrics)<br>• Presentations (using rubrics)<br>• A viva (oral examination),<br>• writing a report and/or a research paper (using rubrics) |
| **3.0** | **Interpersonal Skills & Responsibility** | | |
| 3.1 | Demonstrate effective self-management in terms of time, planning, motivation, and personal initiative | • Practice sessions,<br>• case-assisted student-centered learning (CASCL),<br>• clerkships,<br>• problem-based learning,<br>• small group discussion,<br>• few lectures or tutorials | • Assignments (using rubrics)<br>• Presentations (using rubrics)<br>• Project-based assessment (using rubrics)<br>• Structured observation (using checklist)<br>• Reports (using rubrics) |
| 3.2 | Show the ability to work in groups and leadership skills within the scope of pharmacy practice | • Practice sessions,<br>• case-assisted student-centered learning (CASCL),<br>• clerkships,<br>• problem-based learning,<br>• small group discussion or projects. | • Assignments (using rubrics)<br>• Presentations (using rubrics)<br>• Project-based assessment (using rubrics)<br>• Structured observation (using checklist)<br>• Reports (using rubrics) |

| | | | |
|---|---|---|---|
| **4.0** | **Communication, Information Technology, Numerical** | | |
| 4.1 | Demonstrate effective communication with patients and health care professionals. | • Practice sessions,<br>• case-assisted student-centered learning (CASCL),<br>• clerkships,<br>• problem-based learning,<br>• small group discussion,<br>• few lectures or tutorials | • Presentations (using rubrics)<br>• Assignments (using rubrics)<br>• Structured observation (using checklist)<br>• Reports (using rubrics) |
| 4.2 | Demonstrate the ability to present ideas, plans, and data in appropriate written formats to succinctly and effectively communicate with various audiences. | • Active learning<br>• practice sessions,<br>• laboratory classes,<br>• personal tutor meetings,<br>• poster presentations and seminars | • Presentations (using rubrics)<br>• Problem solving exercises<br>• Assignments (using rubrics)<br>• Reports (using rubrics)<br>• Structured observation (using checklist) |
| **5.0** | **Psychomotor** | | |
| 5.1 | Demonstrate compounding, dispensing and quality control testing skills | • Practice sessions,<br>• tutorials or seminars/ workshops | • Practical exams<br>• Structured observation (using checklist) |

## 8. Program Outline and Contents

The PharmD Program is a full-time six-year (06) undergraduate pharmacy program, offered by the College of Clinical Pharmacy with the assistance of; College of Medicine, Deanship of Preparatory and Support Studies and other Deanships. The program is structured as semester system with a total of 179 credit hours where the medium of instruction is English. It includes theoretical and practical sessions over a period of five years following one preparatory year. The outline of the program is illustrated in Figure 1 as below.

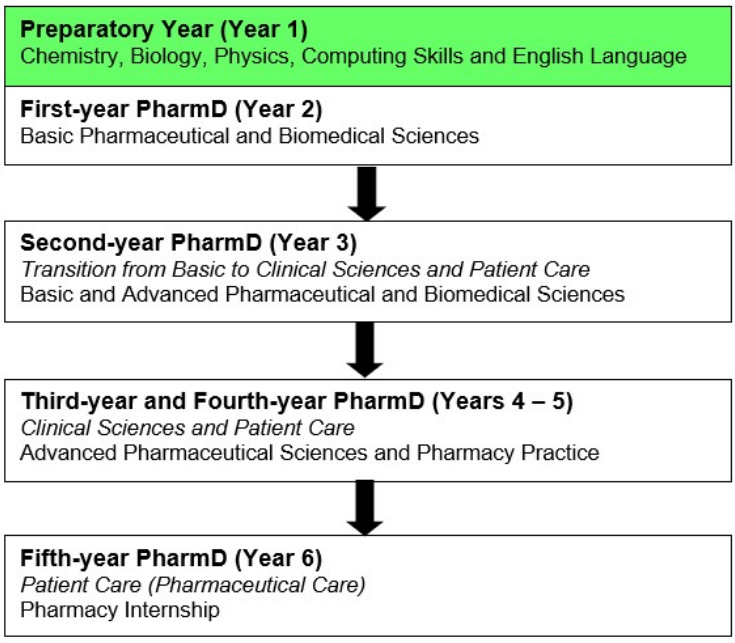


**Figure 1. The outline of the PharmD Program.**

Preparatory year (PYP); based on the admission requirements, initially the students are enrolled in the PYP, as shown in Figure 1, being managed by the Deanship of Preparatory Year and Support Studies (DPYSS). All students attend this one-year PYP along with other students in the Colleges of Health Path, i.e. Medicine, Dentistry, Pharmacy, Nursing, Public Health and Applied Medical Science. The aim of PYP is; to prepare students to move from the general education stage to the professional level as well to help them integrate into the university environment. It comprises two semesters that cover all basic courses in *Chemistry, Biology, Physics, Computing Skills, Communication Skills* and *English Language*. An example of the academic plan for the preparatory year of the Colleges of Health Path is shown in Appendix 2. Students who pass PYP will be able to select the PharmD Program of the College of Clinical Pharmacy, or other programs in Health Colleges.

PharmD program; each academic year contains two main semesters with the addition of summer training sessions in Years 4 and 5 only.

**Year 2;** the study starts with basic pharmaceutical sciences, such as *Pharmacy Orientation*, *Fundamentals of Pharmaceutics* and *Pharmaceutical Organic Chemistry*, and basic biomedical sciences including *Physiology, Anatomy and Histology, Biochemistry* and *Pharmacology*.

**Year 3;** second year is the transition from basic 'hard' sciences to clinical sciences and patient care. Students are taught different courses related to *Pharmaceutical Care*, *Pharmaceutical Dosage Forms*, *Pathophysiology*, *Microbiology* and *Clinical Biochemistry and Nutrition*.

**Year 4;** in third year, students acquire more knowledge and skills in clinical sciences and patient care, i.e. *Therapeutics, Pharmaceutical Delivery Systems, Institutional Pharmacy Practice, Natural Products and Alternative Medicine*, and *Biopharmaceutics*. The students also have an opportunity to select an elective course (02 credit hours) and attend a course on *Community Pharmacy Practice* during the Summer Training.

**Year 5;** this year contains courses involved in pharmacy practice and patient care, i.e. *Law and Ethics in Pharmacy Practice, Evidence-based Practice, Clinical Pharmacokinetics, Self-care and Non-prescription Drugs,* and *Drug Information Services*. Furthermore, a graduation project i.e. research, is also mandatory for student to fulfil degree requirements. As with Year 4, they can choose a 2-credit elective course in year 4.

**Year 6;** students need to complete all four years of study (or Years 2 – 5) successfully in order to join the 12-month clerkships, or Pharmacy Internship, for attachment training and practice in hospitals in the region. The overall objectives of the clerkships are to enable students to:

1) effectively deliver pharmaceutical care (or medication therapy management) to patients or the public;
2) strengthen their scientific knowledge and skills necessary for the pursuit of graduate studies;
3) choose a specialization to pursue their study at a higher level as a sub-specialty;
4) develop professional behaviours, teamwork skills and a commitment to the ethics of the profession;
5) Follow the programs of continuing education and acquire skills in managing diseases and pharmaceuticals.

From the Year 5 summer to the whole Year 6, students have to attend 10 rotations of the Pharmacy Internship. These include seven core rotations [Hospital pharmacy (inpatient and outpatient), Internal Medicine; Critical care, ambulatory care, paediatrics, drug information] and three elective rotations [Total Parenteral nutrition, Oncology, Psychiatry and Pharmacy [research or administration or industry]). Students with successful completion of Pharmacy Internship are awarded with PharmD degree and are authorized to practice as clinical pharmacists in any healthcare settings.

## 9. Course Distribution

The PharmD Program consists of 179 credit hours, i.e. 36 required by the University and 141 by the College with detail distribution of the credit hours per each course as summarized and presented in Table 2 and Figure 2, respectively. The course distribution according to department, as shown in Table 3, clearly describes that half of the courses are arranged by the Department of Pharmacy Practice and the rest by other departments. To further clarify the courses in each study year and semester, the academic plan for the 5-year PharmD Program is presented in the Appendix. As a whole, students in every semester need to study average 6 – 8 courses (or 15 – 20 credit hours). Most semesters have 2-4 laboratories, seminars or practice sessions, each of which lasts for 2 – 3 hours. Look at other modes of teaching and learning in the next heading.

**Table 2. Courses required by the University and the College.**

| Course title/Subject | Number of courses | Credit hours |
|---|---|---|
| **University requirements** (10 credit hours) | | |
| Creed and family in Islam | 1 | 2 |
| Arabic language skills | 1 | 2 |
| Islamic ethics and values | 1 | 2 |
| History and civilization of KSA | 1 | 2 |
| Entrepreneurship (not this year) | 1 | 2 |
| **Total** | **5** | **10** |
| **College requirements** | | |
| **Core courses** (137 credit hours) | | |
| Preparatory year | 9 | 28 |
| Pharmacy Practice | 21 | 53 |
| Pharmaceutics | 5 | 14 |
| Pharmaceutical Chemistry | 6 | 19 |
| Pharmacology and Toxicology | 4 | 14 |
| Natural Products and Alternative Medicine | 2 | 6 |
| Biomedical Sciences | 12 | 31 |
| **Total** | **59** | **165** |
| **Electives** (04 credit hours) | | |
| Pharmacogenomics (Pharmacy Practice) | 1 | 2 |
| Industrial Pharmacy (Pharmaceutics) | 1 | 2 |
| Pharmaceutical Biotechnology (Pharmaceutics) | 1 | 2 |
| Principles of Drug Design (Pharmaceutical Chemistry) | 1 | 2 |
| Instrumental Analysis (Pharmaceutical Chemistry) | 1 | 2 |
| **Total** | **(2)** | **(4)** |
| **Grand total** | **66** | **179** |

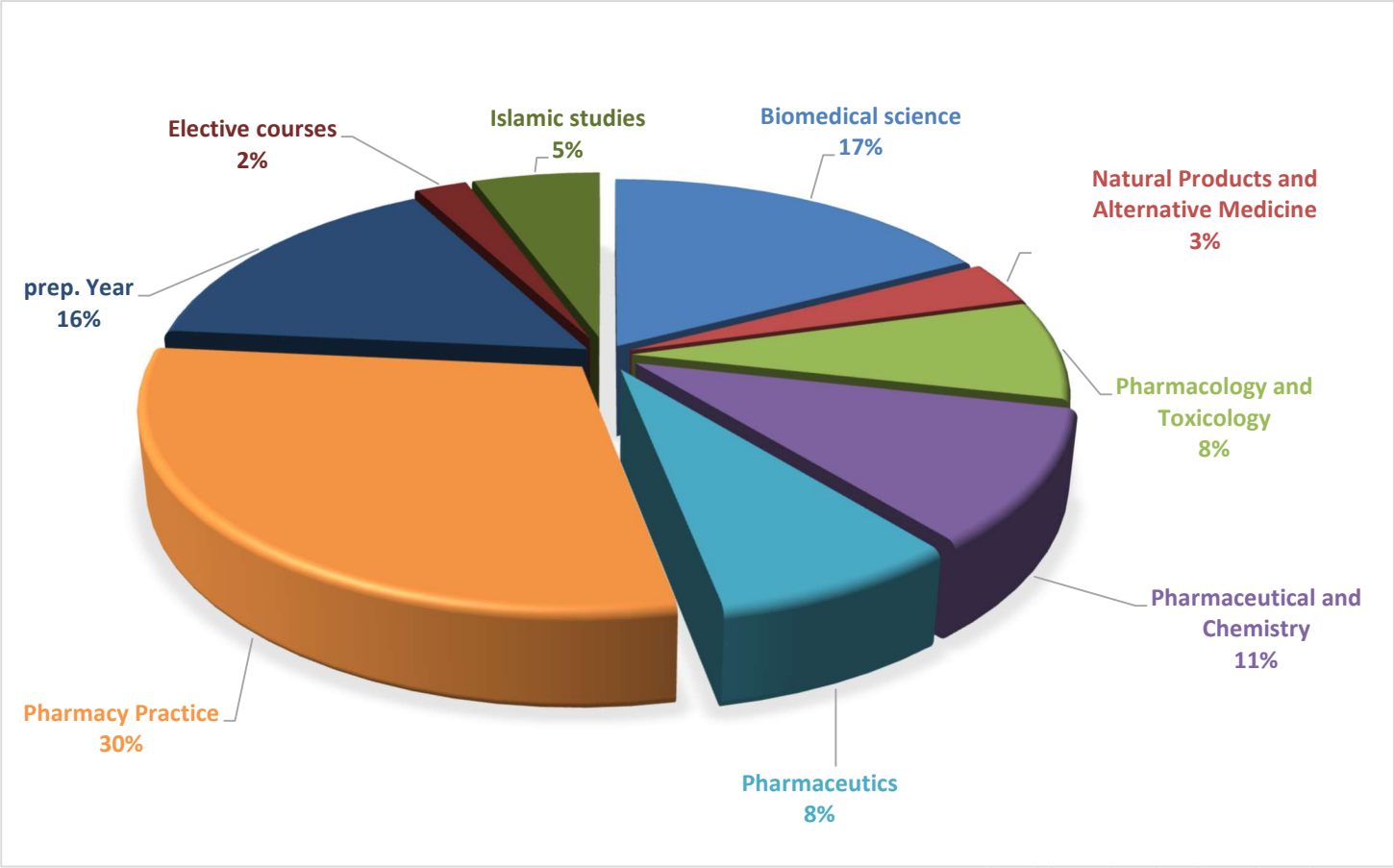


**Figure 2. Courses credit hours percentage**

**Table 3. Courses distribution categorized by departments.**

| No. | Course title | Course type | Course code & no. | Credit hours |
|---|---|---|---|---|
| | **Department of Pharmacy Practice** (Core 53 cr hrs & Elective 2 cr hrs) | | | |
| 1 | Pharmacy Orientation | Core | CLPH 201 | 2 |
| 2 | Pharmaceutical Care-1 | Core | CLPH 313 | 1 |
| 3 | Therapeutics-1 | Core | CLPH 405 | 5 |
| 4 | Pharmaceutical Care-2 | Core | CLPH 406 | 2 |
| 5 | Therapeutics-2 | Core | CLPH 407 | 5 |
| 6 | Pharmaceutical Care-3 | Core | CLPH 408 | 3 |
| 7 | Institutional Pharmacy Practice | Core | CLPH 409 | 1 |
| 8 | First Aid and Emergency Medicine | Core | CLPH 410 | 1 |
| 9 | Communication skills for Pharmacists | Core | CLPH 411 | 2 |
| 10 | Hospital Pharmacy Practice | Core | CLPH415 | 3 |
| 11 | Law and Ethics in Pharmacy Practice | Core | CLPH 501 | 1 |
| 12 | Therapeutics-3 | Core | CLPH 502 | 5 |
| 13 | Evidence-based Practice and Drug Information Services | Core | CLPH 503 | 2 |
| 14 | Clinical Pharmacokinetics | Core | CLPH 504 | 3 |
| 15 | Total Parenteral Nutrition | Core | CLPH 505 | 1 |
| 16 | Phamacoeconomics | Core | CLPH 506 | 2 |
| 17 | Graduation Project | Core | CLPH 507 | 4 |
| 18 | Therapeutics-4 | Core | CLPH 509 | 5 |
| 19 | Pharmacy Management | Core | CLPH 510 | 2 |
| 20 | Self-care and Non-prescription Drugs | Core | CLPH 511 | 1 |
| 21 | Pharmacoepidemiology | Core | CLPH 512 | 2 |
| 22 | *Pharmacogenomics* | Elective | CLPH 514 | 2 |
| | **Department of Pharmaceutics** (Core 14 cr hrs & Elective 4 cr hrs) | | | |
| 1 | Fundamentals of Pharmaceutics | Core | PHCT 202 | 3 |
| 2 | Physical Pharmacy | Core | PHCT 207 | 3 |
| 3 | Pharmaceutical Dosage Forms. | Core | PHCT 309 | 3 |
| 4 | Pharmaceutical Delivery System | Core | PHCT 402 | 2 |
| 5 | Biopharmaceutics | Core | PHCT 412 | 3 |
| 6 | *Industrial Pharmacy* | Elective | PHCT 413 | 2 |
| 7 | *Pharmaceutical Biotechnology* | Elective | PHCT 513 | 2 |

**Table 3. Courses distribution categorized by departments (cont.).**

| No. | Course title | Course type | Course code & no. | Credit hours |
|---|---|---|---|---|
| | **Department of Pharmaceutical Chemistry** (Core 19 cr hrs & Elective 4 cr hrs) | | | |
| 1 | Pharmaceutical Organic Chemistry-1 | Core | PHCH 203 | 4 |
| 2 | Pharmaceutical Analytical Chemistry | Core | PHCH 208 | 3 |
| 3 | Pharmaceutical Organic Chemistry-2 | Core | PHCH 209 | 3 |
| 4 | Medicinal Chemistry-1 | Core | PHCH 302 | 3 |
| 5 | Medicinal Chemistry-2 | Core | PHCH 308 | 3 |
| 6 | Medicinal Chemistry-3 | Core | PHCH 403 | 3 |
| 7 | *Principles of Drug Design* | Elective | PHCH 414 | 2 |
| 8 | *Instrumental Analysis* | Elective | PHCH 515 | 2 |
| | **Department of Pharmacology and Toxicology** (Core 14 cr hrs) | | | |
| 1 | Pharmacology-1 | Core | PHTX 301 | 4 |
| 2 | Pharmacology-2 | Core | PHTX 307 | 4 |
| 3 | Pharmacology-3 | Core | PHTX 401 | 3 |
| 4 | Clinical Toxicology | Core | PHTX 508 | 3 |
| | **Department of Natural Products and Alternative Medicine** (Core 6 cr hrs) | | | |
| 1 | Pharmacognosy | Core | NPAM 304 | 3 |
| 2 | Natural Products and Alternative Medicine | Core | NPAM 311 | 3 |
| | **Departments Relating to Biomedical Sciences** (Core 31 cr hrs) | | | |
| 1 | Physiology-1 | Core | PHYL 204 | 3 |
| 2 | Anatomy and Histology-1 | Core | ANAT 205 | 2 |
| 3 | Biochemistry-1 | Core | BIOCH 206 | 2 |
| 4 | Physiology-2 | Core | PHYL 210 | 3 |
| 5 | Anatomy and Histology-2 | Core | ANAT 211 | 3 |
| 6 | Biochemistry-2 | Core | BIOCH 212 | 3 |
| 7 | Pathophysiology-1 | Core | PATH 303 | 2 |
| 8 | Clinical Biochemistry and Nutrition | Core | BIOCH 305 | 3 |
| 9 | Molecular Biology | Core | BIOCH 306 | 2 |
| 10 | Pathophysiology-2 | Core | PATH 310 | 2 |
| 11 | Immunology | Core | IMNUN 311 | 2 |
| 12 | Microbiology | Core | MICRO 312 | 4 |

## 10. Teaching and Learning

The PharmD program provides students with didactic teaching and facilitative learning including lectures, tutorials, seminars or laboratory work in numerous courses. Learning facilitation is arranged mostly as;

- Active learning
- Problem-based learning
- Small group discussion
- Role plays
- Multimedia instructions
- Case-assisted student-centred learning (CASCL)
- Case study
- Journal clubs and literature review
- Self-directed study.

In addition, students experience interprofessional learning with other students in the Colleges of Health. The clerkships in Pharmacy Internship enable students to acquire clinical and pharmaceutical care skills. During the clerkship rotations, they become acquaint with the skills to participate in group activities, i.e. attending ward rounds, bed-side discussions about medication along with case presentation, and patient-centred activities particularly patient counselling on diseases and medication use. In the fourth as well as fifth year, students need to complete dissertation or small research project, as part of project-based learning. To broaden their knowledge and career experience, students are asked to join a field trip or a visit to a hospital or pharmaceutical industry in the region. Finally; with the aforementioned combinations of teaching and learning modes, students will be able to achieve the program as well as individual course outcomes as elaborated in the course descriptions.

## 11. Assessments

The program uses a wide range of assessment methods to ensure that students experience both *summative* and *formative* assessment techniques and their learning outcomes for courses (or course outcomes) can effectively be evaluated. The assessments include:

1) **Examination questions**; either in the forms of unseen or open-book exam papers, are primarily used to test students' knowledge and understanding, but their ability to apply, analyse, synthesize or evaluate some issues can partly be assessed. They can be in the form of multiple-choice questions (MCQs) or short-answer questions.
2) **Objective Structured Clinical Examinations (OSCEs);** are used to assess their skills in pharmacy practice, i.e. clinical skills, communication, counselling and pharmaceutical care.
3) **Assignments**; e.g. subject-specific reports, case reports, reflective reports and portfolios, are utilized to assess their ability of writing reports and constructing longer presentations (essays) as well as short concise pharmaceutical care plans.

4) **Quizzes**; are arranged in each course to check students' understanding before or after a lesson or course. This may also help them revise the teaching material over a period of time and better prepare for the final examination.
5) **Oral presentations**; are used to test their ability in order to organise their work, prepare visual material and present the findings in a timely manner in a controlled environment.
6) **Viva (oral examination);** as an alternative method for research project assessments, may be utilized to assess their dissertation in terms of research methodology, statistics and writing ability.
7) **Projects Defence;** the students are asked to present respective proposals and dissertations in front of research committee during research projects for successful evaluation.
8) **Progress reports; a**part from project defence the students submit three research progress reports at specified time as set by the research committee of the faculty.

All types of assessments with weighted scores are specified for each course as shown in the course description.

## 12. Student Support and Guidance

Pharmacy students are mainly supported by the College and the University for their six-year Study. At the College level, there will be an orientation program to help them settle into the university environment. Academic advisers are allocated to give some academic guidance about the PharmD study, further study or career planning to individual students. Moreover, studies advice is offered by the program and course co-ordinators to assist students with relevant information about the PharmD Program and relevant courses. Regarding the University's support, the Deanship of Student Affairs provide counselling services in terms of study problems, financial advice on loans and aids, student employment and interesting activities. Similarly, for female students, the Deanship of Female University Studies also provides some support and guidance for personal and academic issues.

## 13. Admissions and Regulations

The regulations on the PharmD study can be divided into five areas, i.e. admissions, registration, program study, assessments and graduation, which are aligned with the University's Regulations on the Study and Assessments. Some important regulations include:

### Admissions

- Applicants for this programme must meet the entry requirements set by the College of Clinical Pharmacy and the Deanship of Admissions and Registration. They are required to:
  1) provide the ***Saudi Secondary School Certificate*** (scientific track) or equivalent;
  2) Submit the result of the ***Aptitude Test*** held by the National Centre of Qiyas and Assessment.
  3) pass the ***Competence Test*** held by the National Centre of Qiyas and Assessment;

4) meet any other criteria specified by the University Council.

- After entering the University, students will need to attend a preparatory year arranged by the Deanship of Preparatory Year and Support Studies and pass it in order to move onto the first-year PharmD study. Requirements for passing this one-year program are as follows:
  1) Students pass all courses provided in the preparatory year program.
  2) They obtain a minimum grade of $C^+$ in the English Language course.
  3) They obtain a minimum grade of $C^+$ in Chemistry, C in Physics and Biology

- Students are to be dismissed from the preparatory year program if they receive GPA less than 2.00. After completing the program, students will have a chance to select a college of choice however; priority is given to students based on their GPA and academic credentials. With respect to transfer and visiting students, they may be allowed to study the PharmD Program.

**Registration**

- According to the University's regulations, all students need to register 12 – 20 credits per semester. However, for the PharmD Program they will be provided with courses ranging from 16 to 18 credits per semester.
- Students with a grade point average (GPA) less than 2.00 are to enrol less than 12 credits in a semester.

**Student attendance**

A regular student should attend all classes and laboratory sessions. A student may be discontinued from a course and denied entrance to the final examination if his/her attendance is less than the limit determined by the University Board. This limit cannot be less than 85% of classes and laboratory sessions assigned to each course during the semester. A student who is denied entrance to the examination due to excessive absences will be considered as having failed that course and will be assigned a DN grade.

The College Board — or, whatever bodies it delegates its authority to — may exempt a student from the provisions of attendance, and, allow him/her to attend the final examination if he provides an excuse acceptable to the Board. For such an exemption granted by the University Board, the minimum attendance requirement is not less than 50% of the lecture and laboratory sessions scheduled for the course.

A student who fails to attend the final examination will be given zero in that examination. In this case, his/her course grade will be calculated on the basis of the class work score he earned in the course.

If a student fails to attend the final examination of any of his scheduled courses due to circumstances beyond his/her control, the College Board, in exceptional cases, may accept the excuse and arrange a make-up examination for the student within a period not exceeding the end of the next semester. In such cases, the course grade will be assigned to the student after the make-up examination.

A student may be allowed to withdraw from the University for a semester and not be considered as having failed if he/she furnishes an acceptable excuse to the authorized body as determined by the

University Board, during the stipulated period determined by the executive rules approved by the University Board. His/her grade in each course is then determined as W.
The semester is considered a part of the required duration to fulfill graduation requirements.
A student may submit an application to discontinue study in a particular semester and withdraw from one course or more, according to the executive rules approved by the University Board, provided he has an acceptable excuse.

### Program study

- Student must attend at least 85% of both lectures and practice/laboratory sessions in order to take a final examination. The student whose' attendance is less than 85% would be referred to the college council or authorized person for giving him/her status “denied (NP)”.

**Assessments and marks distribution:** The general distribution of marks and assessment method followed for each course is as follows;

- **Theory based courses**; final exam should exceed 40 – 50% of the total mark.
- **Practical based courses**; final exam (final written and final practical exams) should constitute 40 -50% of the total mark.
- continuous assessment will comprise 50-60% of the total course grade and it will include;
    a. Quizzes (2-3) per course.
    b. One midterm exam, comprising 20 - 30% of the total course grade (approximately half of the CA).
    c. Practical sessions based on the course nature.
    d. Presentation.
    e. Students reports are required in field experience-based courses.
- Type of questions in continuous assessment should include a variety of questions in addition to multiple choice questions (MCQs), such as; extended matching questions (EMQ), and short answer questions (SAQ).

**Grades and GPA (Grade point assessment);** the College follows the criteria-based assessments like other colleges. The criteria with percentages, description and estimated GPA are demonstrated in Table 4 below.

**Table 4. Criteria for the PharmD program assessments.**

| Percentage | Grade/mark | Description | GPA range |
|---|---|---|---|
| 95 – 100 | A+ | Exceptional | 4.00 – 5.00 |
| 90 – 94 | A | Excellent | 3.75 – 4.75 |
| 85 – 89 | B+ | Superior | 3.50 – 4.50 |
| 80 – 84 | B | Very good | 3.00 – 4.00 |
| 75 – 79 | C+ | Above average | 2.50 – 3.50 |
| 70 – 74 | C | Good | 2.00 – 3.00 |

| | | | |
|---|---|---|---|
| 65 – 69 | D+ | High pass | 1.50 – 2.50 |
| 60 – 64 | D | Pass | 1.00 – 2.00 |
| < 60 | F | Fail | 0.00 – 1.00 |
| | IP | In-progress | |
| | IC | Incomplete | |
| | DN | Denied (disappear or class attendance <75% for lectures or 60% for practice/labs) | |
| | NP | Pass with No Grade | |
| | NF | Fail with No Grade | |
| | W | Withdraw | |

- If students fail a course and retake the exam, their overall mark will be capped at Grade D (or 60%).
- In every semester, students need to pass the courses with the GPA of at least 2.00. In case of students with the 'probation' or GPA less than 2.00, they will be given three warnings; for example, the first for Semester 1, the second for Semester 2 and the last for Semester 1 of the following year. They will be retired after the third warning. However, they might have an opportunity to do the fourth semester with the approval of the College committee.
- For an examination: students who turn up after 30 minutes from the start are not permitted to take the examination unless they seek permission from the Invigilator in charge. Additionally, they are not allowed to leave the room within 30 minutes at the end of the examination, as this might disturb other classmates.
- Plagiarism and cheating for any assessments or examinations are regarded as an 'academic crime' and must be punished accordingly.
- If students are not satisfied and in doubt with the assessment results, they can appeal for that within two weeks after the release of the marks.

**Student Grade Reporting & Appeals**

Grade reports for each course are uploaded at the Student Information System (SIS) at the end of each semester by a date and time determined by the Vice Dean for Academic Affairs (VDA). Once a grade has been posted it becomes part of the student's permanent record and can be changed only by the course coordinator after being approved by the VDA.

Student evaluation and assignments of final course grades are the responsibility of the course coordinator. The course coordinator is accountable for any grades assigned to students; therefore, each coordinator shall maintain records to support student evaluation and grades. Students who have reasons which can be substantiated to request grade changes must:

- write a formal letter to the course coordinator or to the Vice Dean of academic Affairs requesting a re-evaluation of their performance in the course.
- provide the following information in the letter: name and student ID, course number, title, and section; semester and year taken; name of the Instructor and a clear statement of the grade change request and reasons which justify the request.

**Grading and Testing Disputes**

a) Complaints regarding grades and testing must first be discussed with the Course Coordinator.
b) If the dispute is not resolved, the student must then discuss the matter with the department chair.
c) If the matter remains unresolved at that level, the Vice Dean for Academic Affairs should be notified in writing. It will be shared with the appropriate committee, and a meeting will be established for further discussion. The student will have the opportunity to discuss the complaint directly with the committee.
d) The committee will then make a recommendation to the Vice Dean for Academic Affairs, who will make a final decision on the disposition of the complaint. Disputes, requests and complaints must be submitted and resolved according to announced deadline each semester.
e) Faculty members, upon receiving of a student's request for a grade change, will review their records. If it is determined that a student's request is justified, the faculty member will prepare a Grade Change Authorization Form, with appropriate documentation and submit it to the Vice Dean and to the Dean for authorization.
f) The grade change is forwarded to the Office of the Registrar. A faculty member may not change an F grade to a W grade in those cases in which the student did not follow the proper procedures for withdrawing from the course.
g) The student can appeal a negative decision of a faculty member. The steps in the appeal process are as follows:
    i. Present the appeal to the VDA who refer the appeal to a committee for hearing and decision.
    ii. Based on committee decision, the Dean shall authorize a grade change, and must notify the involved individual of his action, i.e. the Dean must notify the student and the faculty member of his decision.

**Policy for a Review of Exam Sheet**

The student submits a review of course grade appeal to the Dean during two weeks from the date when the students' GPA's have been submitted according to university academic calendar or the announcement of the results. In the Appeal, the student states reasons for the change, and he/she pledges that the information he/she provided are all correct. The college prepares a form including the following data: student name; university ID number; course code and name; the grade of the continuous assessment; the semester; the student's GPA; number of academic warnings (if any); name of the instructor and date of having the exam.

The Academic Affairs Committee may take a decision concerning the appeal submitted by the student. Reviewing the test answer sheet must be done in time not exceeding two weeks from the beginning of the following semester. If the appeal has been accepted, the Board forms a committee to revise the test sheets. Then the committee submits the acceptance report to the College Board to take its decision which is the final decision.

**Procedures**

The general procedures for reviewing a grade is as follows:

1. The student, who has questioned his/her grade, submits exam review request form no longer than two weeks from the announcement of the grade concerned. The form is submitted to the concerned department. By that, his/her request enters the academic system and he/she is given a notice (using the review form attached).
2. The head of the department shows the student his answers in comparison to the model answer sheet. If the student is convinced of the correctness of the review, he/she signs a waiver, and then the file is saved after being signed by the head of the department.
3. In the case that the student is not convinced of the result of the review, the head of the department forms a committee includes three faculty members from the department- the teacher of the course concerned is not one of them. Then the committee submits a report to the head of the department to take his/her decision of either changing the grade or not, within five business days. Then the student will immediately be informed.
4. In the case that the student is still not convinced, he/she may re-appeal to the college Board within two weeks from the date he/she is informed. The appeal is submitted officially to the Dean explaining reasons and justifications of this appeal. The students shall support his/her case with tangible and convincing set of evidence. The appeal should also include a statement from the Deanship of Admission and Registration showing the previous requests of review submitted by the student if any, along with the decisions taken concerning them.
5. If the College Board rejects the case once more and does not agree on the grade change, it takes the decision to close the case.
6. If the College Board agreed on the grade change, a committee will be formed of at least three faculty members, one of them is to be from outside the department, and the teacher of the course should not be one of them.
7. The committee gathers to re-correct the student's answer sheet. Then it submits its report to the College Board within fifteen days from the day of its establishment. Then the appeal is discussed by the Board to take the final decision in its next meeting.

**Make-Up Exams**

8. A student who is unable to take an examination due to unavoidable circumstances (e.g., hospitalization, car accident, major illness) is expected to:
    a) Contact the Office of the Vice Dean for Academic Affairs prior to the time of the examination (except during unexpected circumstances), to notify the College about his/her absence.
    b) The documents to support the reason why the student was not able to write the exam in the originally assigned dates must be provided.
    c) At the discretion of the Course Coordinator, the student may make-up the examination at an alternative pre-arranged time only when the unavoidable circumstances have been substantiated by the Office of the Vice Dean for Academic Affairs in concert with the Course Coordinator.
    d) Make-up exams are to be completed within 5 working days of the student's return to the College.
    e) Make-up exams should cover the same content area of the missed examination, but should not be the same exam that was administered to other students.

**Procedure**

a) The student shall make the request in writing and in a timely manner before the scheduled exam, to request an opportunity to set for a makeup exam.
b) The student shall provide the course coordinator with the required originally-signed document, regarding the reason he/she was not able to write the test on the originally scheduled exam date. Without this document, the student will not be granted a permission to set for a makeup exam and will be assigned a zero grade for this exam. No incomplete (IC) grade can be assigned in this situation.

**Graduation projects (assessment methods and marks distribution);**

A research project is mandatory for graduation and required for the course 'Graduation project' in Year 5. The course is to focus on skills in research, scientific writing, presentations and participation in journal clubs.

The course is designed to provide students with an overview of writing scientific manuscripts, including case reports, research articles, review articles, grant proposal and dissertations. As the scientific writing is based on research outcomes, the basic principles of research methodology and biostatistics are also included and research projects conducted by students will be mandatory before graduation.

**Assessment criteria – Graduation Project**

| Research project | | | Assignments | Midterm | Final (Written) | Total |
|---|---|---|---|---|---|---|
| Proposal[1] | Poster[2] | Supervisor evaluation[3] | | | | |
| 15% | 30% | 10% | 5% | 20% | 20% | 100% |

[1]*Proposal will be presented as an oral presentation to the concerned department and will be evaluated according to rubrics*

[2] *Rubrics for evaluation of poster*

[3] *Supervisor's Evaluation Form*

## Graduation

- Students with cumulative GPA (GPAX) greater than 2.00 can graduate from the University. They will be awarded with the following criteria:

| GPAX | Academic award |
|---|---|
| ≥4.75 | Excellent on the First Dean List (or first-class honour) (Note: no F grades for any courses complete the program within 5 years and study at the University at least 60%) |
| 4.25 – 4.74 | Excellent on the Second Dean List (or second-class honour) (Note: no F grades for any courses complete the program within 5 years and study at the University at least 60%) |

| | |
|---|---|
| 3.75 – 4.24 | Very good |
| 2.75 – 3.74 | Good |
| 2.00 – 2.74 | Pass |

- Students who wish to attend the graduation ceremony need to register with the University within the period of time specified.

## 14. Program Management and Quality Assurance

The PharmD program is managed and quality assured through the University's standard processes according to the Deanship of Quality and Academic Accreditation and the University Council. All courses in the program are overseen by the PharmD Program Committee or the College Board. The program will be reviewed every 3 – 6 years based on the current evidence and feedback obtained from academic staff, students and independent experts (or external examiners). Students' views are sought through a course evaluation or questionnaire. Additionally, the views, comments and suggestions will be sought from clerkship preceptors, the members of healthcare professions, and employers so as to ensure appropriate curriculum development and program delivery.

## 15. Learning Environment and Resources

All resources are provided for PharmD students to facilitate their learning, practice and research. These include:

***Responsible staff*;** academics in this programme are working at five departments of College of Clinical Pharmacy, some departments of College of Medicine and healthcare settings. They are very experienced in teaching, research and practice. Numerous support staff, e.g. assistant instructors and demonstrators, also helps with teaching and training for PharmD students.

***Facilities* (e.g. equipment, labs, library, etc.);** Students have access to the full use of central and hospital libraries provided by the Deanship of Library Affairs and all other University resources and facilities, including e-mails and computer facilities, which are supported by the Deanship of Information and Communication Technology. All lecture halls and laboratories are equipped with the state-of-the-art technology that enhance student learning and practice experiences. In addition, students can get the most out of resources provided by King Fahad University Hospital when they do their Pharmacy Internship at the hospital.

***Students' activities*;** Students are able to take part in academic and sport clubs, as part of their extracurricular activities, and use the student restaurant and cafeterias. The Deanship of Student Affairs usually organizes some cultural, social, artistic and sports activities for students to participate.

On the whole, students enrolled in the PharmD Program are provided with high-quality resources that help facilitate their learning, and all faculty members are supportive of their study throughout the five-year program.

# APPENDIX

## Appendix 1

### Academic plan for the preparatory year of the Colleges of Health Path

### Year 1 (Preparatory Year)

| Course code & no. | Course title | Total cr hrs | Lecture hours | Practice hours | Contact hours | Require-ment |
|---|---|---|---|---|---|---|
| **First Semester (Semester 1)** | | | | | | |
| ENGL 101 | English Language* | 5 | **B** - 18<br>**I** - 16<br>**A** - 12 | 2<br>2<br>2 | **B** - 20<br>**I** - 18<br>**A** - 14 | Admission to the program |
| BIOL 101 | Biology* | 2 | 2 | 0 | 2 | |
| CHEM 101 | General & Organic Chemistry * | 1 | 1 | 0 | 1 | |
| PHYS 101 | Physics* | 1 | 1 | 0 | 1 | |
| COMP 131 | Computer Skills | 2 | 0 | 4 | 4 | |
| LRSK 142 | Communication Skills | 2 | 2 | 0 | 2 | |
| ISLM 181 | Creed and family in Islam | 2 | 2 | 0 | 2 | |
| Total | | **15** | | | **B** - 32<br>**I** - 30<br>**A** - 28 | |
| **Second Semester (Semester 2)** | | | | | | |
| ENGL 101 | English Language* | 2 | 0 | 0 | **B** - 8<br>**I** - 7<br>**A** - 5 | Admission to the program |
| ENGL 102 | English for Academic and Specific Purposes* | 3 | 8 | 0 | 8 | |
| BIOL 101 | Biology* | 3 | 2 | 2 | 4 | |
| CHEM 101 | General & Organic Chemistry* | 2 | 1 | 2 | 3 | |
| PHYS 101 | Physics* | 2 | 1 | 2 | 3 | |
| LRSK 141 | Learning and Searching skills | 2 | 2 | 0 | 2 | |
| PHEDU152 | Health and Physical Education | 1 | 0 | 2 | 2 | |
| ARB 182 | Arabic language skills | 2 | 2 | 0 | 2 | |
| Total | | **17** | | | **B** - 32<br>**I** - 31<br>**A** - 29 | |

* Taught course based on the annual system.
**B**: Beginners level students.
**I** : Intermediate level students.
**A** – 5: Advanced level students.

## Appendix 2 Academic plan for 5 years of PharmD Program

### Year 2

| Course code & no. | Course title | Total cr hrs | Lecture cr hrs | Practice cr hrs | Contact hours | Prere-quisite |
|---|---|---|---|---|---|---|
| **First Semester (Semester 3)** | | | | | | |
| CLPH 201 | Pharmacy Orientation | 2 | 2 | 0 | 2 | - |
| PHCT 202 | Fundamentals of Pharmaceutics | 3 | 2 | 1 | 5 | - |
| PHCH 203 | Pharmaceutical Organic Chemistry-1 | 4 | 3 | 1 | 6 | - |
| PHYL 204 | Physiology-1 | 3 | 2 | 1 | 5 | - |
| ANAT 205 | Anatomy and Histology-1 | 2 | 1 | 1 | 4 | - |
| BIOCH 206 | Biochemistry-1 | 2 | 2 | 0 | 2 | - |
| ISLM 282 | Islamic ethics and values | 2 | 2 | 0 | 2 | - |
| Total | | **18** | 14 | 4 | **26** | |
| **Second Semester (Semester 4)** | | | | | | |
| PHCT 207 | Physical Pharmacy | 3 | 2 | 1 | 5 | - |
| PHCH 208 | Pharmaceutical Analytical Chemistry | 3 | 2 | 1 | 5 | - |
| PHCH 209 | Pharmaceutical Organic Chemistry-2 | 3 | 3 | 0 | 3 | PHCH 203 |
| PHYL 210 | Physiology-2 | 3 | 3 | 0 | 3 | - |
| ANAT 211 | Anatomy and Histology-2 | 3 | 2 | 1 | 5 | - |
| BIOCH 212 | Biochemistry-2 | 3 | 2 | 1 | 5 | - |
| HIST 281 | History and civilization of KSA | 2 | 2 | 0 | 2 | - |
| Total | | **20** | 16 | 4 | **28** | |

### Year 3

| Course code & no. | Course title | Total Cr hrs | Lecture cr hrs | Practice cr hrs | Contact hours | Prere-quisite |
|---|---|---|---|---|---|---|
| **First Semester (Semester 5)** | | | | | | |
| PHTX 301 | Pharmacology-1 | 4 | 3 | 1 | 6 | - |
| PHCH 302 | Medicinal Chemistry-1 | 3 | 3 | 0 | 3 | PHCH 209 |
| PATH 303 | Pathophysiology-1 | 2 | 2 | 0 | 2 | PHYL 210 |
| NPAM 304 | Pharmacognosy | 3 | 2 | 1 | 5 | - |
| BIOCH 305 | Clinical biochemistry and Nutrition | 3 | 2 | 1 | 5 | BIOCH212 |
| BIOCH 306 | Molecular Biology | 2 | 2 | 0 | 2 | - |
| | Entrepreneurship (not this year) | 2 | 2 | 0 | 2 | - |
| Total | | **19** | 16 | 3 | **25** | |
| **Second Semester (Semester 6)** | | | | | | |
| PHTX 307 | Pharmacology-2 | 4 | 4 | 0 | 4 | PHTX 301 |
| PHCH 308 | Medicinal Chemistry-2 | 3 | 3 | 0 | 3 | PHCH 302 |
| PHCT 309 | Pharmaceutical Dosage Forms | 3 | 2 | 1 | 5 | PHCT 202 |
| PATH 310 | Pathophysiology-2 | 2 | 2 | 0 | 2 | PATH 303 |

| | | | | | | |
|---|---|---|---|---|---|---|
| NPAM 311 | Natural Products and Alternative Medicine | 3 | 3 | 0 | 3 | NPAM 304 |
| MICRO312 | Microbiology | 4 | 3 | 1 | 6 | - |
| CLPH 313 | Pharmaceutical Care-1 | 1 | 0 | 1 | 3 | - |
| Total | | **20** | 16 | 3 | **26** | |

## Year 4

| Course code & no. | Course title | Total cr hrs | Lecture cr hrs | Practice cr hrs | Contact hours | Prere-quisite |
|---|---|---|---|---|---|---|
| **First Semester (Semester 7)** | | | | | | |
| PHTX 401 | Pharmacology-3 | 3 | 3 | 0 | 3 | PHTX 307 |
| PHCT 402 | Pharmaceutical Delivery System | 2 | 2 | 0 | 2 | PHCT 202 |
| PHCH 403 | Medicinal Chemistry-3 | 3 | 3 | 0 | 3 | PHCH 308 |
| IMMUN404 | Immunology | 2 | 2 | 0 | 2 | - |
| CLPH 405 | Therapeutics-1 | 5 | 4 | 1 | 7 | PHTX 301 |
| CLPH 406 | Pharmaceutical Care-2 | 2 | 2 | 0 | 2 | CLPH 313 |
| Total | | **17** | 15 | 2 | **19** | |
| **Second Semester (Semester 8)** | | | | | | |
| CLPH 407 | Therapeutics-2 | 5 | 4 | 1 | 7 | PHTX 307 |
| CLPH 408 | Pharmaceutical Care-3 | 3 | 2 | 1 | 5 | CLPH 406 |
| CLPH 409 | Institutional Pharmacy Practice | 1 | 1 | 0 | 1 | - |
| CLPH 410 | First Aid and Emergency Medicine | 1 | 0 | 1 | 3 | PHTX 401 |
| CLPH 411 | Communication Skills for Pharmacists | 2 | 2 | 0 | 2 | - |
| PHCT 412 | Biopharmaceutics | 3 | 2 | 1 | 5 | PHCT 207 |
| **Electives: Select ONE course (2 cr hrs each)** | | | | | | |
| ---------- | Elective group-1 | 2 | 2 | 0 | 2 | ------- |
| Total | | **17** | 13 | 4 | **25** | |
| **Summer Training** | | | | | | |
| CLPH 415 | Hospital Pharmacy Practice | 3 | - | - | - | - |
| Total | | **3** | - | - | **-** | |

## Year 5

| Course code & no. | Course title | Total cr hrs | Lecture cr hrs | Practice cr hrs | Contact hours | Prere-quisite |
|---|---|---|---|---|---|---|
| **First Semester (Semester 9)** | | | | | | |
| CLPH 501 | Law and Ethics in Pharmacy Practice | 1 | 1 | 0 | 1 | CLPH 409 |
| CLPH 502 | Therapeutics-3 | 5 | 4 | 1 | 7 | PHTX 401 |
| CLPH 503 | Evidence-based Practice and Drug Information Services | 2 | 2 | 0 | 2 | - |
| CLPH 504 | Clinical Pharmacokinetics | 3 | 2 | 1 | 5 | PHCT 412 |
| CLPH 505 | Total Parenteral Nutrition | 1 | 1 | 0 | 1 | BIOCH 305 |
| CLPH 506 | Pharmacoeconomics | 2 | 2 | 0 | 2 | - |
| CLPH 507 | Graduation project (AN)* | 4 | 2 | 2 | 8 | - |
| Total | | **18** | 14 | 4 | **26** | |
| **Second Semester (Semester 10)** | | | | | | |
| PHTX 508 | Clinical Toxicology | 3 | 3 | 0 | 3 | PHTX 401 |
| CLPH 509 | Therapeutics-4 | 5 | 4 | 1 | 7 | PHTX 401 |
| CLPH 510 | Pharmacy Management | 2 | 2 | 0 | 2 | - |
| CLPH 511 | Self-care and Non-prescription Drugs | 1 | 1 | 0 | 1 | CLPH 409 |
| CLPH 512 | Pharmacoepidemiology | 2 | 2 | 0 | 2 | PHTX 401 |
| **Electives: Select ONE course (2 cr hrs each)** | | | | | | |
| ---------- | Elective group-2 | 2 | 2 | 0 | 2 | ------- |
| Total | | **15** | 14 | 1 | **17** | |

* Taught course based on the annual system.

AN = Annual course & its credits (4 cr hrs = 2 per semester) will be added in the first semester in the table. It will be open for registration in both semesters. Its assessment in the first semester will be (IP = in progress) and will be finalized & credited in the second semester after completion of the graduation project.

## Year 6

| Course code & no. | Course title | Total cr hrs | Lecture cr hrs | Practice cr hrs | Contact hours | Prere-quisite |
|---|---|---|---|---|---|---|
| **First and Second Semesters (Semesters 11-12)** | | | | | | |
| CLPH 601 | Pharmacy Internship | - | - | - | - | Complete Years 1-5 courses |
| Total | | - | - | - | - | |

## Electives

| | | | | | | |
|---|---|---|---|---|---|---|
| **Electives (Group-1): Select one course with 2 cr hr** | | | | | | |
| PHCT 413 | Industrial Pharmacy | 2 | 2 | 0 | 2 | PHCT207 |
| PHCH 414 | Principles of Drug Design | 2 | 2 | 0 | 2 | PHCH 403 |
| **Electives (Group-2): Select one course with 2 cr hr** | | | | | | |
| PHCT 513 | Pharmaceutical Biotechnology | 2 | 2 | 0 | 2 | - |
| CLPH 514 | Pharmacogenomics | 2 | 2 | 0 | 2 | - |
| PHCH 515 | Instrumental Analysis | 2 | 2 | 0 | 2 | - |

## Appendix 3

## Course Descriptions

### Year 2: First Semester (Semester 3)

**Pharmacy Orientation (CLPH-201)**

This course covers details of the PharmD Program, i.e. the objectives, scope and requirements of the PharmD program, introduction to various courses, compulsory and electives, mode of teaching, learning and training (e.g. problem based learning, objective structured clinical examination (OSCE), institutional pharmacy training and experiential learning, college disciplinary rules and regulation for the examination; pharmacy profession, i.e. the definition of pharmacy, different areas of pharmacy profession, history of pharmacy, pharmacy in Islam, evolution of pharmacy education, introduction to pharmacopoeia, formularies, regulatory control and drug management, roles of clinical pharmacists in community and health care setting, introduction to clinical pharmacy, and career pathways for pharmacists; drug discovery and development including new drug approval and post-marketing surveillance; medical and pharmacy terminology related to Body systems needed for complete understanding of other courses.

**Fundamentals of Pharmaceutics (PHCT-202)**

This course covers parts and types of prescriptions, abbreviations, model prescriptions, controlled substances, labelling techniques, pharmaceutical calculations for weighing and measuring and compounding extemporaneous preparation, related incompatibilities, introduction to various pharmaceutical dosage forms and basic guidelines (e.g. solid, liquid, Semisolids, suspensions and emulsions).

**Practice/lab:** Handling of balances and other equipment based on standard operating procedures (SOPs), simple calculations involved in compounding and dispensing of pharmaceutical Preparations, compounding, labelling and dispensing of pharmaceutical preparations.

**Pharmaceutical Organic Chemistry-1 (PHCH-203)**

This course covers the basic fundamentals of hydrocarbon, substituted hydrocarbon and its chemistry, pharmaceutical importance and applications: acid base theories, nomenclature and properties of alkanes, alkyl halides, alcohols, phenols, ethers, epoxides and sulphides; bonding and structural isomerism; stereochemistry and its biological applications.

**Practice/lab:** covers basic synthetics (solution phase chemistry), purification (crystallization and extraction) and structural elucidation skills like elemental analysis, functional group analysis including chemical and spectrometric methods like FT-IR, $^{1}$H-NMR and Mass.

**Physiology-1 (PHYL-204)**

The basic skill of clinical pharmacist is analytical knowledge of medicines, ways of Administration, and patterns of use and drugs effects on the patients. This skill is entwined with extensive knowledge about diseases. Disease is an abnormality in either structure or function or both. Knowledge about disease and its pathophysiology is incomplete without in depth knowledge of normal function of body systems. Understanding of mechanism of abnormal function helps in identifying the Physiological basis of signs and symptoms of disease. This then leads to choosing the proper treatment and predicting response to treatment. This knowledge is finally applied in monitoring of prognosis. If the function does not return back to normal, the treatment

has to be readjusted or modified. With this background, learning of Physiology becomes very important for a clinical pharmacist.

***Practice/lab:*** Lab and tutorial activities relating to autonomic nervous, cardiovascular, respiratory and digestive systems

**Anatomy and Histology-1 (ANAT-205)**

This course introduces the student to anatomical terminology related to body systems needed for complete understanding of other courses. This course introduces the student to the structure of the human body and its relationship to function. Following an introduction to basic human histology, the course uses a systemic approach to the study of anatomy of different systems of human body.

***Practice/lab:*** The lab work includes the examination of cadaveric specimens, histological (microscopic) slides and plastic models.

**Biochemistry-1 (BIOCH-206)**

This course covers the basic fundamentals of biochemistry and its pharmaceutical importance and applications: carbohydrates, amino acids and proteins, lipids, enzymes, vitamins and gene information.

## Year 2: Second Semester (Semester 4)

**Physical Pharmacy (PHCT-207)**

*This course covers fundamentals of physical pharmacy/pharmaceutics, physical properties of drug molecules, rheology, adsorption, surfactants, solubility, solvent, effect on solubility, dissolution, pH and buffering, concept of complexation, thermodynamics, enthalpy and free energy, reaction kinetics and drug stability.*

***Practice/lab:*** *Determination of various physical properties of solids and liquids (experiment); calculation, tabulation and graphical presentation of data obtained (statistical presentation)*

**Pharmaceutical Analytical Chemistry (PHCH-208)**

This course covers the introduction and applications of chemical and physical methods of analysis of pharmaceutical substances; fundamental concepts and applications of quantitative analysis utilizing different methods of instrumental analyses such as ultraviolet spectroscopy, flame photometry, atomic absorption spectrophotometry and introduction to chromatography.

**Practice/laboratory:** covers quantitative analysis of drugs using volumetric, spectroscopic and chromatographic analyses.

**Pharmaceutical Organic Chemistry-2 (PHCH-209)**

This course covers the basic fundamentals of unsaturated hydrocarbons and its chemistry and its pharmaceutical importance and applications: Alkenes and alkynes, aromaticity and benzene, substituted benzene, aldehydes and ketones, carboxylic acids and derivatives (amides, anhydrides, esters), amines and heterocyclic compounds; the effects of the chemical properties on biological activities.

**Physiology-2 (PHYL-210)**

The basic skill of clinical pharmacist is analytical knowledge of medicines, ways of administration, and patterns of use and drugs effects on the patients. This skill is entwined with extensive knowledge about diseases. Disease is an abnormality in either structure or function or both. Knowledge about disease and its pathophysiology is incomplete without in depth knowledge of normal function of body systems. Understanding of mechanism of abnormal function helps in identifying the Physiological basis of signs and symptoms of disease. This then leads to choosing the proper treatment and predicting response to treatment. This knowledge is finally applied in monitoring of prognosis. If the function does not return back to normal, the treatment has to be readjusted or modified. With this background, learning of Physiology becomes very important for a clinical pharmacist.

**Anatomy and Histology-2 (ANAT-211)**

This course introduces the student to the structure of the human body and its relationship to function. Following an introduction to basic human histology, the course uses a systemic approach to the study of anatomy of different systems of human body.

***Practice/lab:*** The lab work includes the examination of cadaveric specimens, histological (microscopic) slides and plastic models.

**Biochemistry-2 (BIOCH-212)**

This course covers the metabolic pathways of biomolecules: carbohydrate amino acids, Proteins, Nucleoprotein, Nucleic acids, Lipids, Steroids, Haemoproteins, Xenobiotics, Free radicals, & Antioxidants and their regulations.

**Practice/lab:** covers basics of biochemical units of measurements; different methods of urine analysis as well as qualitative and quantitative principle of analysis of carbohydrate, lipid, protein & enzyme.

## Year 3: First Semester (Semester 5)

**Pharmacology-1 (PHTX-301)**

This course deals with the fundamentals of general pharmacology. The students should have a thorough understanding of these fundamentals in order to apply these in understanding the system based pharmacology, and to identify, analyse a clinical condition and find a solution to it. The main purpose is to provide a thorough understanding of the basic principles of pharmacology, including pharmacodynamics, pharmacokinetics, and drugs used in the autonomic nervous system and cardiovascular system.

***Practice/lab:*** Handling of animals, effects of agonists and antagonists on smooth muscle, dose-response curves; effects of drugs on blood pressure and cardiovascular physiology.

**Medicinal Chemistry-1 (PHCH-302)**

This course provides an introduction to medicinal chemistry and pharmacological activity of drugs: pharmacokinetics, metabolism, pharmacodynamics, introduction to drug discovery and development; drugs acting on autonomic nervous system, cardiovascular system as well as antihypertensive, diuretics, antiulcer and antihistamines,

**Pathophysiology-1 (PATH-303)**

The course aims to introduce students to the basic principles of cell pathology, inflammation, neoplasia, metabolic diseases, cardiovascular diseases, respiratory disorders, skin and sexually transmitted diseases.

**Pharmacognosy (NPAM-304)**

This course describes the main drugs obtained from natural sources, their indications, side-effects, classifications and relevant information. The course also includes identification and classification of natural drugs from the plant kingdom as well as their proper collection, storage and marketing according to official texts. Assess the quality of crude drugs supplied and will also be able to identify and check the adulterants in supplied drugs or in its natural form in either entire or powdered using advanced pharmacognostical and phytochemical techniques. Finally, the course also describes the herbal drugs used in medicine and able to monitor its safety and efficacy.

***Practice/lab:*** Chemical tests and few experiments related to drug evaluation and identification of naturally occurring powders and given drugs.

**Clinical Biochemistry and Nutrition (BIOCH-305)**

This course covers the following main topics

1) Biochemical changes in the human body in normal and disease state.
2) Metabolic disorders of macromolecules like carbohydrates, lipids, Amino acids and proteins
3) Metabolic disorders of micro-molecules like electrolytes and trace aliments
4) Metabolic disorders of organelles.
5) Diagnostic tests
6) Nutrition status of the body such as obesity and malnutrition and related diseases.

Practice/lab:

- Metabolic disorders: Biochemical changes
- Accuracy and precision of analysis
- Liver function tests
- Lipid profile
- Blood chemistry

**Molecular Biology (BIOCH-306)**

This course is intended to provide students with the basic knowledge of molecular biology and bioinformatics.

## Year 3: Second Semester (Semester 6)

**Pharmacology-2 (PHTX-307)**

Pharmacokinetic and pharmacodynamics principles governing the drug actions, adverse drug reactions and drug interactions both in clinical pharmacy practice as well as in basic and clinical research that include drugs used in the central nervous system (antipsychotic, antidepressants, anxiolytic, sedative and hypnotic agents, Parkinsonism and other movement disorders, Alzheimer's disease, epilepsy, local and general anaesthetics, drugs of abuse and opioid analgesics), nonsteroidal anti-inflammatory drugs, drugs used in rheumatoid arthritis and gout, hormonal drugs (pituitary and hypothalamic hormones), corticosteroids, male and female sex steroids, contraceptive and fertility drugs, drugs acting on bone and mineral homeostasis, drugs used in asthma and chronic obstructive pulmonary disease (COPD), antitussives and mucolytic agents, drugs used in genitourinary system, diuretics and oxytocic agents.

**Medicinal Chemistry-2 (PHCH-308)**

This course provides an introduction to medicinal chemistry and pharmacological activity of drugs acting on the central nervous system (analgesics, anaesthetics, psychotropic drugs, antiepileptic's and ant parkinsonism), non-steroidal anti-inflammatory, antihistaminic, local aesthetic agents, prostaglandins, steroidal and non-steroidal hormones, adrenocorticoids, oral hypoglycaemic and anti-thyroid.

**Pharmaceutical Dosage Forms (PHCT-309)**

The course is designed to provide pharmaceutics lessons concerning the formulation, manufacturing and evaluation of solid, liquid and semisolid pharmaceutical dosage forms. This course forms a foundation of therapeutics, as no drug can be administered to patients without an appropriate dosage form and different dosage forms can result in different pharmacokinetics and therapeutic outcomes. It also forms a basis for various novel drug delivery systems (NDDS), such as sustained release drug delivery, targeted drug delivery, etc. Additionally, it will equip students with fundamental knowledge about the various excipients and additives used in the formulation of pharmaceutical dosage forms, which will be useful for their studies on NDDS, pharmacokinetics and pharmacotherapeutics.

**Pathophysiology-2 (PATH-310)**

The course focus on diseases of immune disorders, gastrointestinal disorders, renal diseases, endocrine disorders, haematological disorders and neurological disorders.

**Natural Products and Alternative medicines (NPAM-311)**

The course mainly emphasizes on the application of different natural products. The treatment systems available in different communities and how they utilizes these natural products are the main theme which this course will apply. Apart from this the contents of the course also includes the use, side effects, adverse effects and most widely observed herb-herb, herb-drug & herb-food interactions of different natural products. The nutraceutical's as important part of life and the development of new drugs from herbs and their marketing is also the subject of interest in this course for the students to be familiarized with.

**Microbiology (MICRO-312)**

It covers the introduction to microbiology (i.e. history and its requirements in pharmacy), general principles of microbial concepts including terminology, host-parasite relationship and normal flora, pathogenicity of micro-organisms, principles of infectious diseases, bacterial structure and classification, bacterial growth, metabolism and its genetics, important pathogenic bacteria and mechanisms of disease processes, fungi, protozoa and helminths, introduction to virology including viral classification and important human diseases caused by viruses.

Practice/lab: Orientation to microbiology laboratory, microbiological techniques, bacterial
stains, antimicrobial tests and other microbiological procedures

**Pharmaceutical Care-1 (CLPH-313)**

This course is mainly lab/hospital work and composed of introductory foundation to pharmaceutical care practice by providing students with an experience in retrieving information directly from patients regarding their health problems and drug therapy (medical and treatment history taking) as well as from medical chart, database, and from the caregivers 4 using effective communication in oral and written forms. They will learn the practical techniques in small groups during laboratory exercises in interviewing supervised by the instructors followed by clinical rotations. Additionally, they will have a chance to observe the hospital pharmacy organization in this course.

## Year 3: Summer Training

**Community Pharmacy Practice**

***Practice/lab:*** The course provides students with basic knowledge and skills in community pharmacy in terms of management and practice.

## Year 4: First Semester (Semester 7)

**Pharmacology-3 (PHTX-401)**
This course deals with utilizing the pharmacokinetic (ADME) and pharmacodynamics (MOA) information of drugs to predict their therapeutic usage, adverse effects, and interactions with herbs/food/other drugs to better justify their prescription in patients. The scope of coverage would be drugs used in the treatment of ailments affecting the gastrointestinal system, and drugs used in infectious disease states and that for treatment and management of cancer.

**Pharmaceutical Delivery Systems (PHCT-402)**
This course deals with Novel drug delivery systems (NDDS), these varied systems, provide the manufacturing pharmacist with the challenges of formulation and the physician with the choice of drug and drug delivery systems to prescribe. Through this course students are provided with reasonable basic knowledge concerning the design and development of NDDS such as liposomes, niosomes, nanoparticles, resealed erythrocytes, and novel pulmonary and ocular drug delivery systems and also their role in maximizing therapeutic benefits and minimizing adverse effects of drugs in the body.

**Medicinal Chemistry-3 (PHCH-403)**
This course covers the chemistry and mode of action of antibacterial, antivirals, antifungals, antiparasitics and antineoplastic. The following topics will be addressed: chemistry of antibiotics (beta-lactams, tetracycline's, macrolides, rifamycins, chloramphenicol, aminoglycosides, antifungal and polypeptide), antibacterial, antimycobacterials, antivirals, antifungals, antimalarial, anthelmintic, antiscabious, antipedicular agents, antiprotozoal, antibilharazial agents and antineoplastic as well as drugs acting on the GIT.

**Immunology (IMMUN-404)**
This course covers the basic and clinical concepts in immunology including adaptive and innate immunity, immunological products and their applications in prophylaxis, therapy and diagnosis; antigen-antibody reactions, immune-regulation, immunological memory and tolerance, peculiarities of the immune system including autoimmunity, transplantation and rejection; specific topics including anatomy of the immune system, organs, tissues, cells and soluble factors of immune system; the immune response, system, humoral immunity, cell-mediated immunity, hypersensitivity reactions, immune deficiency disorders, transplantation and tumour immunology.

**Therapeutics-1 (CLPH-405)**
The course focuses on management of common cardiovascular diseases like hypertension, heart failure, dyslipidaemia, atrial fibrillation, chronic stable angina, acute coronary syndromes, stroke, and venous thromboembolism. In addition, the course cover management of common respiratory diseases like bronchial asthma and chronic obstructive pulmonary disease, and the prevailing blood diseases in KSA like iron deficiency anaemia and sickle cell disease. The course emphasizes on the role of the pharmacist in the individualization of the patient's medication regimen and the formulation of pharmaceutical care plans. The methods of learning in the course include lectures and problem-based learning in terms of the following:

1. Identifying pathophysiology, clinical presentation and diagnosis of the disease;
2. Determining the desired therapeutic outcome;
3. Indicating appropriate management of the disease;
4. Evaluating therapeutic outcomes;
5. Providing patient education.

Practice/lab: Clinical case studies related to the same topics described above. Students are asked to:

1. Identify actual or potential problems;
2. Determine the desired therapeutic outcome;
3. Evaluate therapeutic alternatives;
4. Design an optimal individualized pharmacotherapeutic plan;
5. Develop methods to evaluate the therapeutic outcome (monitoring);
6. Provide patient education.

**Pharmaceutical Care-2 (CLPH-406)**

This Course majorly emphasized on **expose the students to comprehensive process of pharmaceutical care like Medication history, Medication Reconciliation, management of Adverse drug reaction, drug** interaction and enhance the physical assessment skill. It also provide the essence of clinical management based on the therapeutic guidelines to provide the pharmaceutical care in special population in a professional manner. Which will enable the undergraduate students to understand his/her responsibilities as a pharmaceutical care practitioner and prepare them for the advanced pharmacy practice experience (APPE).

## Year 4: Second Semester (Semester 8)

**Therapeutics-2 (CLPH-407)**

This course focuses on neurological, psychiatric, rheumatoid, endocrine disorders (i.e., diabetes mellitus, rheumatoid and osteoarthritis, osteoporosis, gout & hyperuricemia, thyroid disorders, epilepsy, Parkinson's disease, Alzheimer's disease, anxiety and sleep disorders, schizophrenia, depression, bipolar disorders) in terms of the following:

1. Identifying pathophysiology, clinical presentation and diagnosis of the disease;
2. Determining the desired therapeutic outcome;
3. Indicating appropriate management of the disease;
4. Evaluating therapeutic outcomes;
5. Providing patient education.

Practice/lab: Clinical case studies related to the same topics described above. Students are asked to:

1. Identify actual or potential problems;
2. Determine the desired therapeutic outcome;
3. Evaluate therapeutic alternatives;
4. Design an optimal individualized pharmacotherapeutic plan;
5. Develop methods to evaluate the therapeutic outcome (monitoring);
6. Provide patient education.

**Pharmaceutical Care-3 (CLPH-408)**

After completion of the course the students will be able to practice the five basic core elements of medication therapy management, namely; comprehensive medication review (CMR), personal medication list (PML), medication action plan (MAP), intervention and/or referral and documentation and follow-up. In addition, the course main focus is to equip the students with the skills needed to provide medication therapy management for patients with different endocrine diseases, bone diseases and mental health diseases.

| List of Topics |
|---|
| Medication therapy management for patients with Dementia-Related Disorders |
| Medication therapy management for patients with depression |
| Medication therapy management for patients with Bipolar Disorder |
| Medication therapy management for patients with schizophrenia |
| Medication therapy management for diabetic patients |
| Medication therapy management for patients with peripheral neuropathy |
| Medication therapy management for patients with Thyroid disorders |
| Medication therapy management for patients with osteoporosis |
| Medication therapy management for patients with Epilepsy |
| Medication therapy management for patients with rheumatoid arthritis |

Practice/lab: Patient assessments and equipment, practical demonstration of techniques of physical examination and clinical assessment in disease states, both in the simulation lab and clinical setting. Students have to retain the log book of case studies (portfolio).

**Institutional Pharmacy Practice (CLPH-409)**

The course includes the introduction of hospital pharmacy, hospital formulary, inpatient/ outpatient and satellite/floor pharmacies, hospital pharmacy supplies and storage, inventory control methods and distribution systems, automation in pharmacy practice, unit-dose system, intravenous admixtures, controlled drugs/substance management, investigational drugs in the hospital pharmacies, prescriptions and medication errors, medication safety, Pharmacy and Therapeutics Committee, education and training for healthcare professionals.

**First Aid and Emergency Medicine (CLPH-410)**

*The course aims to introduce the basic principles of first aid and emergency medicine, which is of paramount importance in practice.*

**Communication Skills for Pharmacists (CLPH-411)**

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

1. Describe the techniques and theories used interpersonal communication and patient counselling.
2. Demonstrate an ability to communicate with other people effectively.
3. Communicate special medication techniques as part of patient counselling.

**Biopharmaceutics (PHCT-412)**

It includes the principles of biopharmaceutics, clearance, volume of distribution, orders of kinetics, compartmental models, plasma protein binding; first-pass and second-pass metabolism; physicochemical and dosage form factors influencing bioavailability; assessment and measurement of key biopharmaceutical properties, bioequivalence, and biopharmaceutical classification scheme (BCS); influence of dosage regimens on the plasma concentration-time profile of a drug in the body and factors involved in steady-state plasma concentration of a drug. Practice/lab: Dissolution, bioavailability, bioequivalence and relevant calculations; may use semi-log graph paper or software for computation.

**Industrial Pharmacy (PHCT-413)**

This course describes the manufacturing facilities, main unit operations that take place in the pharmaceutical industry and related equipment carrying out such operations. These operations include heat transfer, mixing, filtration, size reduction, size enlargement, tabletting and related pharmaceutical process, such as freeze drying, sprays drying and drug stability studies, United States Pharmacopeia (USP), FDA

guidelines and fundamental considerations of good manufacturing practice (GMP) and quality control.

**Principles of Drug Design (PHCH-414)**

This course provides an introduction to the principles of drug design and development of new therapeutic agents from prototype compounds: pharmacophore: definition, classes, common features and models; finding a lead, optimizing pharmacodynamics and pharmacokinetics; molecular properties in drug design; Lipinski's Rule of 5; molecular modelling and computer aided rug design (CADD): impact and approaches; combinatorial and parallel synthesis; Introduction to thermodynamics of drug-receptor binding and QSAR.

## Year 4: Summer Training

**Hospital Pharmacy Practice *(Summer training-CLPH 415)***

The course includes the first interaction between students and the hospitals in order to see and practice (under preceptors' supervision) the real life work of the hospital pharmacists. They will be introduced to the application of what they have learned theoretically in the pharmacy practice courses so far.

## Year 5: First Semester (Semester 9)

**Law and Ethics in Pharmacy Practice (CLPH-501)**

This course deals with governmental laws, regulations, detailed laws that govern and affect the practice of pharmacy, such as drugs, narcotics and medical devices; general legal principles, non-controlled prescription requirements and over- the- counter (OTC) drug requirements; responsibilities of pharmacists on care for patients; professional code of conduct, common ethical issues and considerations, Identification of ethical problems and their workup.

**Therapeutics-3 (CLPH-502)**

This course will explain the role of clinical pharmacist in choosing the right antibacterial agents for the proper infectious diseases. The course will emphasize the role of pharmacist to prevent antibiotic overprescribing in order to reduce antibiotic resistance. Moreover, this course will explain the principles and the updated guidelines to treat the most common infectious diseases like pneumonia, tuberculosis, upper respiratory tract infections and urinary tract infections. In addition, this course will cover the most common gastrointestinal disorders like nausea, vomiting, constipation, diarrhoea, peptic ulcer and irritable bowel syndrome.

***Practice/lab:*** Clinical case studies, case-assisted student-cantered learning (CASCL), case presentation in actual clinical settings (in hospitals) followed by case discussion. Students will be required to retain case histories log book (portfolio).

**Evidence-based Practice & Drug Information Services (CLPH-503)**

This course focuses on the introduction to evidence-based practice/medicine (EBP/EBM), fundamentals of research and statistics (including measures, reliability, validity, and ethical concerns), evaluation of clinical research proposals and reports, an overview of the FDA drug approval processes, five steps of EBP (i.e. identify/formulate answerable questions, searching for information using active search strategies, critically appraisal the evidence, apply the evidence in practice and evaluate EBP). It also introduces basic concepts of drug information services, drug information request,

sources of drug Information, evaluating health information on the internet, concepts and implementation of telemedicine, pharmacy information system, drug use evaluation, limitations of study designs, quality use of medicine, drug audit, continuing pharmacy and medical education, formulary management, using micro-medics and up-to-date databases.

**Clinical Pharmacokinetics (CLPH-504)**

This course focuses on the basic principles of pharmacokinetics for the purpose of optimizing drug therapy, therapeutic drug monitoring with the emphasis on pharmacokinetics of high-risk drugs, e.g. aminoglycosides antibiotics, carbamazepine, cyclosporine, digoxin, ethosuximide, lidocaine, lithium, methotrexate, phenobarbital, phenytoin, procainamide, quinidine, salicylates, theophylline, tricyclic antidepressants, valproic acid and vancomycin.

Practice/lab: Practice sessions in TDM lab for experiential learning and solving the clinical
problems by using appropriate software, such as Data-Kinetics

**Total Parenteral Nutrition (CLPH-505)**

This course covers the introduction to nutrition support, principles of healthy nutrition, nutritional assessment and calculations for TPN for different clinical situations requiring parenteral nutrition (i.e. critically ill patients, patients with renal and hepatic failures, patients with metabolic and GI disorders), complications of TPN, facilities and design of TPN preparation room. The students will be provided with clinical scenarios for calculation of various components of TPN, during interactive sessions as well as in the exams, to assess their level of understanding

**Pharmacoeconomics (CLPH-506)**

Introduction to pharmacoeconomics (PE), Implications of PE in pharmacy, PE research and literature evaluation, costs and prices, cost-minimization analysis, cost-effectiveness analysis, cost utility analysis (including the quality of life and quality-adjusted life years (QALYs), cost-benefit analysis, sensitivity analysis, decision analysis and relevant calculations.

**Graduation Project (CLPH-507)**

This course will be taught over one year (2 semesters) and covers the introduction to scientific, peer-reviewed journal, critical steps in the selection of the research article, introduction to databases, methodological approaches in medical science and pharmacy, reference citations, criteria for the effective presentation. Emphasis will be on the evaluation of drug literature, articles for proper research, design and data interpretation, scientific method of quoting the references. The course will also include journal club meetings. For the oral presentation, every student has to select a relevant topic in pharmacy practice and include the logical and critical discussion of previously published articles.

Research methods (research process, scales of measurement, accuracy of data, validity and reliability, research design (objective, literature review, sampling, types of design), clinical trial design (controlled multi-cantered studies, random allocation (randomization), study types, blindness, placebo effect, retrospective and case studies, data collection forms), individual variation, biostatistics (statistical terminology, errors of sampling, probability concepts, distribution of random variables, non-parametric methods, validity of results, analysis of variance and tests for significance, choice of proper tests for significance, statistical methods applied to biological assays and proper experimental design), introduction to SPSS and other statistics computer programs and scientific writing. During the course of study the students are divided in groups and each group is assigned a topic to develop a research proposal, collect and analyse data,

interpret the results and defend it. This will be submitted as a graduation project and will be mandatory for course completion and graduation of the students.

## Year 5: Second Semester (Semester 10)

### Clinical Toxicology (PHTX-508)

The course focuses on general principles of toxicity, organ toxicity like cardiovascular toxicity, hepatotoxicity and nephrotoxicity, and the general management of acute toxicity. The course covers the management of common drug toxicities like toxicity with acetaminophen, salicylates, sedative hypnotics, antipsychotics, anticholinergic/antihistaminic, anticonvulsants, antidepressant, lithium, digoxin, beta-blockers, and calcium channel blockers. The course also emphasizes on problems in drug user of cannabis, khat, amphetamines, cocaine, opioids and hallucinogens. The course addressed the management of toxicity with substances like solvents, caustics/detergents, cyanide, toxic gases, alcohols, insecticides, rodenticides, heavy metal, bites and stings, and food born toxins. The role of the environmental toxicity is also highlighted.
The course emphasizes on the role of the pharmacist in the individualization of the patient's medication regimen and the formulation of pharmaceutical care plans. The methods of learning in the course include lectures and case-studies

### Therapeutics-5 (CLPH-509)

This course mainly focuses on common Hemato-Oncology malignancies (i.e., Breast cancer, prostate cancer, colon cancer, lymphomas and leukaemia and emphasizes role of pharmacist in optimization of anti-neoplastic agents. In addition this course will also cover viral hepatitis, hepatic encephalopathy, renal failure, pancreatitis and common paediatric and geriatric disorders and role of pharmacist in dose adjustments.
This following areas will be covered:

1. Identifying pathophysiology, clinical presentation and diagnosis of the disease;
2. Determining the desired therapeutic outcome;
3. Indicating appropriate management of the disease;
4. Evaluating therapeutic outcomes;
5. Providing patient education.

Practice/lab: Clinical case studies related to the same topics described above. Students are asked to:

1. Identify actual or potential problems;
2. Determine the desired therapeutic outcome;
3. Evaluate therapeutic alternatives;
4. Design an optimal individualized pharmacotherapeutic plan;
5. Develop methods to evaluate the therapeutic outcome (monitoring);
6. Provide patient education.

### Pharmacy Management (CLPH-510)

This course introduces basic principles and methods of pharmacy management in pharmacy practice, organizational principles, fundamentals of financial accounting, managerial accounting, finance management approaches, behaviour and forms, personnel, purchasing and inventory control, pricing, professional fees, pharmacy services and patronage, techniques and applications of marketing in health care and health insurance plan

**Self-care and Non-prescription Drugs (CLPH-511)**

The course is concerned about the use of evidence-based approach to establish the efficacy and safety of self-care options for particular disorders and pharmacist's roles in self-medication, studies on health products used by the self–medicating public (including material on the symptoms for which patients seek self-treatment, evaluation and selection of products used to treat them), aspects of patient counselling on the effective and safe use of products and various legal considerations relating to this class of drugs.

**Pharmacoepidemiology (CLPH-512)**

The course covers pharmacoepidemiology and its importance in pharmacy practice, principles of epidemiology applied to the study of medication use, study designs (observational study, experimental study, meta-analysis and case report), data sources (pharmacy claims data, validity of data, defining exposure, defining outcomes), medication safety pharmacovigilance (use of pharmacoepidemiology to study beneficial and adverse drug effects), continual monitoring for unwanted drug effects (post-marketing surveillance), applications in Pharmacy practice, medication adherence, statistics in pharmacopeia's, international perspectives (global drug surveillance), other methodological issues (causality and confounding factors), future issues, case studies and some examples.

**Pharmaceutical Biotechnology (PHCT-513)**

Pharmaceutical Biotechnology course includes: human intracellular signal transduction, transcription factors, applied enzymology, introduction to proteomics, gene manipulation and recombinant DNA technology to produce recombinant proteins, various expression systems, introduction to tissue culture, applications of recombinant DNA technology in the pharmaceutical fields, large-scale production of therapeutic biomolecules, web resources for biotechnology, gene therapy, DNA vaccines, biotechnology and drug discovery, pharmacist's roles in biotechnology and dispensing biotechnological products.

**Pharmacogenomics (CLPH-514)**

This course covers the genetic basis of human genetics and genetic variability in drug response that can contribute to drug efficacy and toxicity, adverse drug reactions and drug-drug interactions. Also included are genomic variations among human beings, web resources for bioinformatics, applications of genomics in human health and complex diseases, pharmacogenomics of drug metabolizing enzymes, pharmacogenomics of drug transporting proteins and drug receptors, pharmacogenetics of drug metabolism and its clinical applications, pharmacogenomics of drug interactions and their adverse effects, cancer pharmacogenomics and pharmacogenomics in drug discovery and development.

**Instrumental Analysis (PHCH-515)**

This course covers the principles of different instrumental analytical techniques such as spectroscopy and chromatography. In addition to the principles of different sample preparation methods. Recent applications of instrumental techniques in chemical, biochemical, clinical, pharmaceutical and environmental analysis will be discussed. This course will overview the recent developments in separation techniques such as liquid chromatography and gas chromatography.

## Year 6: First and Second Semesters (Semesters 11 and 12)

**Pharmacy Internship (CLPH-601)**

The 12-month training course with 10 rotations is an experiential learning that integrates knowledge learned in the classroom with practical application and development of skills in professional settings. It focuses on pharmaceutical care (medication therapy management) for patients mainly in hospitals. Students will learn how to provide advanced clinical pharmacy services in various medical specialty environments under the direct supervision of clinical preceptors. They will gain some experiences in professional judgments, accountability and the following clinical skills:

- Professional communication with patients and healthcare providers, while working in pharmacies as well as in the clinical departments
- Patient care including therapeutic decision making by selecting appropriate drug therapy and monitoring the therapy. Students will be actively involved in the management of diseases, patients' monitoring, care planning and follow-up, patients chart review including the patients' lab data, medication history, drug information and discharge medication counselling.
- Organizational and professional skills required to work in community as well as institutional pharmacy settings.

**A. Mandatory rotations (7 rotations – 35 weeks)**

| No. | Clerkship | No. of weeks |
|---|---|---|
| 1 | Hospital Pharmacy (inpatient) | 5 |
| 2 | Hospital Pharmacy (outpatient) | 5 |
| 3 | Internal Medicine | 5 |
| 4 | Critical Care | 5 |
| 5 | Ambulatory Care | 5 |
| 6 | Drug Information | 5 |
| 7 | Paediatrics | 5 |
| | Total | 35 |

**B. Elective rotations (choose only three of these – 15 weeks)**

| No. | Clerkship | No. of weeks |
|---|---|---|
| 1 | Total Parenteral Nutrition (TPN) | 5 |
| 2 | Oncology | 5 |
| 3 | Pharmacy research or administration or industry | 5 |
| 4 | Psychiatry | 5 |

Hospital Pharmacy Practice: 3 credit hours.
Pharmacy Internship: NA

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