

# **Bachelor Degree in Pharmaceutical Sciences (Clinical Pharmacy)**

## **Programme**

## CONTENTS

|  |           |
|--|-----------|
| <b>1. INTRODUCTION.....</b>                    | <b>2</b>  |
| <b>2. DEGREE AWARDED .....</b>                 | <b>3</b>  |
| <b>3. PROGRAMME STRUCTURE .....</b>            | <b>3</b>  |
| <b>4. LEARNING AND TEACHING CONCEPTS .....</b> | <b>3</b>  |
| <b>5. COURSES REGISTRATION .....</b>           | <b>3</b>  |
| <b>6. ATTENDANCE.....</b>                      | <b>4</b>  |
| <b>7. LANGUAGE OF INSTRUCTION.....</b>         | <b>4</b>  |
| <b>8. SUMMER TRAINING .....</b>                | <b>4</b>  |
| <b>9. ADMISSION POLICY .....</b>               | <b>4</b>  |
| <b>10. ASSESSMENT .....</b>                    | <b>4</b>  |
| <b>11. FAILURE IN COURSES.....</b>             | <b>6</b>  |
| <b>12. ACADEMIC DIFFICULTY .....</b>           | <b>6</b>  |
| <b>13. LEAVE OF ABSENCE .....</b>              | <b>6</b>  |
| <b>14. GRADUATION.....</b>                     | <b>6</b>  |
| <b>15. ACADEMIC INTEGRITY .....</b>            | <b>7</b>  |
| <b>16- STUDY PLAN.....</b>                     | <b>7</b>  |
| <b>17. PROGRAMME CURRICULUM.....</b>           | <b>9</b>  |
| <b>18. COURSE DESCRIPTIONS.....</b>            | <b>19</b> |

## **1. INTRODUCTION**

The Faculty of Pharmacy is committed to improving human health through the development of a new programme with the aim to educate pharmacy practitioners to meet the pharmaceutical care needs of the community.

This new program of clinical pharmacy offers a Bachelor Degree in Pharmaceutical Sciences with specialization in clinical pharmacy.

### **1.1. Faculty of Pharmacy Mission Statement**

To seek excellence in teaching, research and scholarship and contribute significantly to the national and international pharmaceutical community.

### **1.2. Vision**

To be a first-class School of Pharmacy, providing excellence and innovation in teaching, research and practice of pharmacy.

### **1.3. Objectives**

- Excellence in teaching and scholarship by students and staff
- Research in pharmaceutical science, education and professional practice and related disciplines
- Community partnerships
- Innovative application of technology

### **1.4. Careers in pharmacy**

The contemporary role of the pharmacist in society is to ensure that patients receive optimal medication therapy. There are three major employment areas for pharmacists:

#### 1. Community Pharmacy

- In community practice pharmacists are involved in:

- dispensing prescriptions
- primary health care
- health promotion

#### 2. Hospital Pharmacy

- Pharmacists are involved in:

- preparing and supplying medication for outpatients and patients in the wards, compounding and quality assessment of specialized dosage forms for use in the hospital environment

**Clinical Pharmacists** (Pharmacists who practice their profession in the wards) are directly involved in ensuring optimal medication therapy for patients by devising regimens specific to individual patients and monitoring patient's progress. Drug Information and Poisons Centers are staffed by pharmacists whose task is to provide information to other health care professionals to assist with therapeutic decision making.

#### 3. Industrial Pharmacy

- Pharmacists in industry are involved in:

- manufacturing products, quality control, marketing of pharmaceutical and medical products testing, research and development of new or improved products

## **2. DEGREE AWARDED**

The Faculty of Pharmacy awards its graduates the Bachelor Degree in Pharmaceutical Sciences (Clinical Pharmacy), after successful completion of the approved study programme.

Holders of the Bachelor degree are qualified to practice pharmacy and / or to study for higher degrees.

## **3. PROGRAMME STRUCTURE**

The Bachelor of Pharmacy programme can be completed in five years (ten semesters) of full-time study. It provides education in the biological, chemical and physical sciences together with professional instruction on material that is specific to the practice of pharmacy. The programme is structured into two semesters each year, each semester made up of 15 weeks. An optional 6 to 8 weeks summer semester is also offered.

The Faculty of Pharmacy implements the credit hours system. A credit hour represents an hour of lectures (L) or two hours of practical or tutorial (P/T) classes a week for a period of 15 weeks.

## **4. LEARNING AND TEACHING CONCEPTS**

The Bachelor of Pharmacy programme is designed to integrate the teaching, learning and understanding of pharmaceutical science in the context of pharmacy practice. The programme is delivered through lectures, practical classes, group tutorials, seminars, research, assignments and external cooperation with the community and industry.

## **5. COURSES REGISTRATION**

Academic advisers are available to help students choose the required courses from the list of the offered courses. Selection of courses for any given semester is conditional on the successful completion of the prerequisite courses of the preceding semester.

### **5.1. Course Load**

The Course load is the number of registered credit hours per student each semester.

- The academic load in each semester ranges from 12 to 22 credit hours.
- The academic load in the summer semester ranges from 4 to 10 credit hours.
- Credits acquired by the student are those of passed courses from the registered academic load.

### **5.2. Add, Drop and Withdrawal**

Students are allowed to add or drop a course or more during a specified time every semester. Students are allowed to withdraw from a course prior to a deadline set by the university. The course will carry a grade of “W” and students will be allowed to retake the course when available. Students who withdraw after the deadline will not be allowed to sit for the relevant exam and will carry a grade of “F” for that course.

## **6. ATTENDANCE**

Students are expected to attend the university on a full-time basis during each semester. Attendance is checked during seminars, tutorials and labs. Students must attend at least 75% of the tutorials and practical labs. If absence in a course exceeds the allowed percentage (25%) during the first ten weeks of the semester (either excused or unexcused), the student will not be allowed to sit for the exam of the relevant subject and will carry grade of "F".

## **7. LANGUAGE OF INSTRUCTION**

English is the official language of instruction; all communication, lectures, coursework, and documentation are performed using the English language.

## **8. SUMMER TRAINING**

Every student should complete at least 200 hours (100 credit hr.) of training in pharmacy settings such as community or hospital pharmacies, pharmaceutical firms or research institutes and universities and further 100 credit hr. of clinical training in a teaching hospital. Students commence training after the end of the second year.

## **9. ADMISSION POLICY**

The faculty complies with the admission regulations and requirements of the Egyptian Supreme Council of Universities (ESCU)

### **9.1 Admission of Graduate from other Faculties**

- Graduates from the Faculties of Medicine, Veterinary Medicine, Dentistry, Nursing, Science and Agriculture are admitted on space-available basis.
- Courses completed at another faculty are evaluated for equivalency to the Faculty of Pharmacy courses. A course waiver remains in effect for five years from the date the course waiver form was signed.

### **9.2. Transfer Admission Rules**

- Transfer students must fulfill the Faculty of Pharmacy admission requirements.
- Courses completed at another faculty are evaluated for equivalency to the Faculty of Pharmacy courses.
- The faculty from which the student is to be transferred should be accredited.

## **10. ASSESSMENT**

Student's performance is assessed by both coursework and examinations. Exams are held at the end of each course. Methods of assessment include written, oral and practical examinations, research papers, course assignments and practical work.

**10.1. Grading Scheme:**

- Grades are a measure of the performance of a student in an individual course.

| Grade Expression | Grade Scale | Grade Point Average Value* (GPA) | Numerical Scale of Marks |
|------------------|-------------|----------------------------------|--------------------------|
| Excellent        | A           | 4                                | $\geq 90\%$              |
|                  | A-          | 3.7                              | $85 - < 90\%$            |
| Very Good        | B+          | 3.3                              | $82.5 - < 85\%$          |
|                  | B           | 3                                | $77.5 - < 82.5\%$        |
|                  | B-          | 2.7                              | $75 - < 77.5\%$          |
| Good             | C+          | 2.3                              | $72.5 - < 75\%$          |
|                  | C           | 2                                | $67.5 - < 72.5\%$        |
|                  | C-          | 1.7                              | $65 - < 67.5\%$          |
| Satisfactory     | D+          | 1.3                              | $62.5 - < 65\%$          |
|                  | D           | 1                                | $60 - < 62.5\%$          |
| Fail             | F           | 0                                | $< 60\%$                 |

- \* The grade point values above apply to marks earned in individual courses; grade point averages are weighted sums of the grade points earned.
- Grade Point Average (GPA): The University calculates for each student, both at the end of each grading period and cumulatively, a grade point average (GPA) based on the ratio of grade points earned divided by the number of credits earned with grades of A-F (including pluses and minuses). Both the periodic and cumulative GPA appears on each student's record. Repeated courses will be counted once toward the calculation of accumulated credit hours. The best-achieved GPA will be used for calculating GPA. The cumulative GPA calculation starts from the first semester for each student and is updated each semester till his/her graduation. The semester GPA of the student is the weighted average of the grade points acquired in the courses passed in that particular semester.
  - The Board of Examiners will review and approve all final grades. The Board of Examiners is to be advised of any adjustment made and the reason for doing so. This pertains to grades adjusted for the overall class. (Any adjustments made for

individual students should be considered on an individual basis at Board of Examiners

4. Final grades shall not be reported or released to students as official until they are approved by the Faculty Council.

**Registration symbols that do not carry grade points or credit:**

- S: Represents achievement that is satisfactory.
- U: Represents achievement that is unsatisfactory
- T: Transfer, indicates credits transferred from another institution.
- W: Withdrawal prior to deadline indicates a student has officially withdrawn from a course.

**Progression of Students**

The student cannot progress to the next course without having passed its pre-requisite courses.

**11. FAILURE IN COURSES**

- Students who fail to attend the final exam.
- Students who fail to achieve 30 % of the marks in the final written exam.
- Students who fail to achieve 60% of the total marks.

Students are allowed to submit grade appeals to the registrar office requesting the rechecking of the total grade from the records available as well as confirming that the examiner has not missed any questions during the grading of the answer sheet.

**12. ACADEMIC DIFFICULTY**

A student who fails to maintain a minimum cumulative GPA of “1” for six consecutive semesters or for a total of ten semesters will be dismissed from the faculty.

Students are allowed to repeat courses with a grade of D and F under the supervision of an academic advisor in order to improve their cumulative GPA. The higher grade of any repeated course is used in the GPA calculation.

**13. LEAVE OF ABSENCE**

Students may apply for a leave of absence of two continuous semesters or for a total of three non-continuous semesters.

Students granted a leave of absence must meet the graduation requirements in effect at the time of graduation.

**14. GRADUATION**

Students receive the Bachelor of Pharmaceutical Sciences degree (Clinical Pharmacy) upon completion of:

1. The requisite number of credit hours (197 credit hours) with a cumulative GPA equivalent to 1 or above.
2. At least 200 hours (100 credit hr.) of training in pharmacy setting.
3. At least 100 credit hours of clinical training in teaching hospital

### **15. ACADEMIC INTEGRITY**

Any form of cheating, plagiarism, falsification, impersonation, evidence of concealment or fabrication of results are resisted and opposed by the University.

The minimum penalty for such cases is failing the course where this offence was committed. In some cases, the penalty may reach dismissal from the University for one semester or more based on the circumstances of the case.

### **16- STUDY PLAN**

The Bachelor degree of Pharmacy is granted to students who successfully complete a minimum of 197 credit hours divided as follows:

University requirements: 9 credit hours.

Faculty requirements: 182 credit hours.

Elective courses: 6 credit hours.

And at least 200 hours (100 credit hr.) of training in pharmacy setting and at least 100 credit hours of clinical training in a teaching hospital

### **Key for Course Abbreviations**

|        |   |
|--------|---|
| CS 000 | Computer Science                            |
| EN     | English language                            |
| HU     | Humanities                                  |
| MS     | Mathematics                                 |
| PB     | Biochemistry                                |
| PC     | Chemistry                                   |
| PG     | Pharmacognosy                               |
| PM     | Microbiology and Immunology                 |
| PO     | Pharmacology and Toxicology                 |
| PP     | Pharmacy Practice                           |
| PT     | Pharmaceutics and Pharmaceutical Technology |
| MD     | Medical Courses                             |

1. The Letter 'P' means that the courses are offered to students of Pharmacy only.
2. The first digit represents the semester number.
3. The second and third digits represent the course number.



### 16.1. University Requirements

| Course Code | Course Title     | Credit Hours* |     |       |
|-------------|------------------|---------------|-----|-------|
|             |                  | L             | P/T | Total |
| CP 101      | Computer Science | 1             | 1   | 2     |
| EN 101      | English Language | 2             | -   | 2     |
| HU 201      | Human Right      | 2             | -   | 2     |
| HU 302      | Psychology       | 2             | -   | 2     |
| HU 903      | Sociology        | 1             |     | 1     |
| Total       |                  | 8             | 1   | 9     |

L: Lecture; P/T: Practical or tutorial.

**16.2 Faculty Requirements:** See programme curriculum (page 9)

### 16.3 Elective Courses

The faculty of Pharmacy offers elective courses from which the students are free to select six credits.

| Course Code | Course Title                                   | Credit Hours |   |       |
|-------------|--|--------------|---|-------|
|             |  | L            | P | Total |
| PC E11      | Drug Design                                    | 2            |   | 2     |
| PC E12      | Advanced Pharmaceutical Analysis -Spectroscopy | 2            | - | 2     |
| PG E8       | Alternative Medicinal Therapies                | 2            | - | 2     |
| PG E9       | Production & Manufacture of Medicinal plants   | 2            | - | 2     |
| PG E10      | Chromatography and Separation Techniques       | 2            | - | 2     |
| PT E10      | Quality Assurances and GMP                     | 2            | - | 2     |
| PT E11      | Applied Industrial Pharmacy                    | 2            | - | 2     |
| PT E12      | Good Manufacturing practices                   | 2            | - | 2     |
| PT E13      | Cosmetic Preparations                          | 2            | - | 2     |
| PM E5       | Biological Standardization                     | 2            | - | 2     |
| PM E6       | Antimicrobial Agents                           | 2            | - | 2     |
| PO E9       | Veterinary Pharmacology                        | 2            | - | 2     |

## 17. PROGRAMME CURRICULUM

**Table (1)**

### Semester (1)

| -Course Title                    | Course code | Credit hours |        |       | Prerequisite | Examination Marks* |        |     |      | Total. marks | Final Exam. (hrs) |
|----------------------------------|-------------|--------------|--------|-------|--------------|--------------------|--------|-----|------|--------------|-------------------|
|                                  |             | Lect.        | Pract. | Total |              | Period.            | Pract. | Wr. | Oral |              |                   |
| Physical & Inorganic Chemistry   | PC 101      | 2            | 1      | 3     | Registration | 10                 | 25     | 65  | -    | 100          | 2                 |
| Pharmaceutical Organic chemistry | PC102       | 2            | 1      | 3     | Registration | 10                 | 25     | 50  | 15   | 100          | 2                 |
| Biophysics                       | MD101       | 1            | 1      | 2     | Registration | 10                 | 25     | 65  | -    | 100          | 1                 |
| Botany and medicinal plants      | PG 101      | 2            | 1      | 3     | Registration | 10                 | 25     | 50  | 15   | 100          | 2                 |
| Cell Biology                     | MD 102      | 1            | 1      | 2     | Registration | 10                 | 25     | 65  | -    | 100          | 1                 |
| Mathematics and statistics       | MS 101      | 2            | -      | 2     | Registration | 10                 | -      | 90  | -    | 100          | 2                 |
| Computer sciences                | CS 101      | 1            | 1      | 2     | Registration | 10                 | 25     | 65  | -    | 100          | 1                 |
| English language                 | EN 101      | 2            | -      | 2     | Registration | 10                 | -      | 90  | -    | 100          | 2                 |
| Total                            |             | 13           | 6      | 19    |              |                    |        |     |      | 700          |                   |

Examination Marks:

Lect = Lecture

Period = Periodical Exam.

Practl = Practical Exam.

Wr. = Written Exam.

**Table (2)****Semester (2)**

| Course Title                          | Course code | Credit hours |        |       | Prerequisite                      | Examination Marks |        |     |      | Total marks | Final Exam. (hrs) |
|---------------------------------------|-------------|--------------|--------|-------|-----------------------------------|-------------------|--------|-----|------|-------------|-------------------|
|                                       |             | Lect.        | Pract. | Total |                                   | Period.           | Pract. | Wr. | Oral |             |                   |
| Pharmaceutical Organic chemistry-1    | PC 203      | 2            | 1      | 3     | Organic chemistry                 | 10                | 25     | 50  | 15   | 100         | 2                 |
| Pharmaceutical Analytical chemistry-1 | PC 205      | 2            | 1      | 3     | Physical & inorganic chemistry    | 10                | 25     | 50  | 15   | 100         | 2                 |
| Pharmacognosy -1                      | PG 202      | 2            | 1      | 3     | General botany & Medicinal plants | 10                | 25     | 50  | 15   | 100         | 2                 |
| Histology                             | MD 203      | 2            | 1      | 3     | Cell Biology                      | 10                | 25     | 65  | -    | 100         | 2                 |
| Physical pharmacy                     | PT 201      | 2            | 1      | 3     | Physical & inorganic chemistry    | 10                | 25     | 50  | 15   | 100         | 2                 |
| Pharmacy orientation                  | PT 202      | 2            | -      | 2     | Registration                      | 10                | -      | 90  | -    | 100         | 2                 |
| Human rights*                         | HU 201      | 2            | -      | 2     | Registration                      | 10                | -      | 90  | -    | 100         | 2                 |
| Total                                 |             | 14           | 5      | 19    |                                   |                   |        |     |      | 700         |                   |

**Table (3)****Semester (3)**

| Course Title                          | Course code | Credit hours |        |       | Prerequisite                          | Examination Marks |        |     |      | Max. marks | Final exam. (hrs) |
|---------------------------------------|-------------|--------------|--------|-------|---------------------------------------|-------------------|--------|-----|------|------------|-------------------|
|                                       |             | Lect.        | Pract. | Total |                                       | Period.           | Pract. | Wr. | Oral |            |                   |
| Pharmaceutical Organic chemistry-2    | PC 304      | 2            | 1      | 3     | Organic pharmaceutical chemistry-1    | 10                | 25     | 50  | 15   | 100        | 2                 |
| Pharmaceutical Analytical chemistry-2 | PC 306      | 2            | 1      | 3     | Analytical pharmaceutical chemistry-1 | 10                | 25     | 50  | 15   | 100        | 2                 |
| Pharmacognosy -2                      | PG 303      | 2            | 1      | 3     | Pharmacognosy -1                      | 10                | 25     | 50  | 15   | 100        | 2                 |
| Anatomy                               | MD 304      | 1            | 1      | 2     | Registration                          | 10                | 25     | 50  | 15   | 100        | 1                 |
| Physiology                            | MD 305      | 3            | 1      | 4     | Cell biology                          | 10                | 25     | 50  | 15   | 100        | 3                 |
| Medical Terminology                   | EN 302      | 2            | -      | 2     | English language                      | 10                | -      | 90  | -    | 100        | 2                 |
| Psychology                            | HU 302      | 2            | -      | 2     | Registration                          | 10                | -      | 90  | -    | 100        | 2                 |
| Total                                 |             | 14           | 5      | 19    |                                       |                   |        |     |      | 700        |                   |

**Table (4)****Semester (4)**

| Course Title                        | Course code | Credit hours |        |       | Prerequisite                           | Examination Marks |        |      |      | Max. marks | Final exam. (hrs) |
|-------------------------------------|-------------|--------------|--------|-------|--|-------------------|--------|------|------|------------|-------------------|
|                                     |             | Lect.        | Pract. | Total |  | Period.           | Pract. | Wr.. | Oral |            |                   |
| Biochemistry -1                     | PB 401      | 2            | 1      | 3     | Organic pharmaceutical chemistry-2     | 10                | 25     | 50   | 15   | 100        | 2                 |
| Phytochemistry                      | PG 404      | 2            | 1      | 3     | Pharmacogony-2                         | 10                | 25     | 50   | 15   | 100        | 2                 |
| Instrumental Analysis               | PC 407      | 1            | 1      | 2     | Analytical pharmaceutical chemistry -2 | 10                | 25     | 50   | 15   | 100        | 1                 |
| General Microbiology and Immunology | PM 401      | 3            | 1      | 4     | Cell biology                           | 10                | 25     | 50   | 15   | 100        | 3                 |
| Parasitology                        | MD 406      | 1            | 1      | 2     | Cell biology                           | 10                | 25     | 50   | 15   | 100        | 1                 |
| Pharmaceutical dosage forms-1       | PT 403      | 2            | 1      | 3     | Physical pharmacy                      | 10                | 25     | 50   | 15   | 100        | 2                 |
| Pharmacy legislation                | PT 404      | 1            | -      | 1     | Registration                           | 10                | -      | 90   | -    | 100        | 1                 |
| Total                               |             | 12           | 6      | 18    |  |                   |        |      |      | 700        |                   |

**Table (5)****Semester (5)**

| Course Title                  | Course code | Credit hours |        |       | Prerequisite                       | Examination Marks |        |     |      | Max. marks | Final exam. (hrs) |
|-------------------------------|-------------|--------------|--------|-------|------------------------------------|-------------------|--------|-----|------|------------|-------------------|
|                               |             | Lect.        | Pract. | Total |                                    | Period.           | Pract. | Wr. | Oral |            |                   |
| Medicinal chemistry-1         | PC 509      | 2            | 1      | 3     | Pharmaceutical Organic chemistry-2 | 10                | 25     | 50  | 15   | 100        | 2                 |
| Clinical microbiology         | PM 502      | 2            | 1      | 3     | General microbiology & immunology  | 10                | 25     | 50  | 15   | 100        | 2                 |
| Pharmaceutical dosage forms-2 | PT 505      | 2            | 1      | 3     | Pharmaceutical dosage forms -1     | 10                | 25     | 50  | 15   | 100        | 2                 |
| Biochemistry-2                | PB 502      | 2            | 1      | 3     | Biochemistry -1                    | 10                | 25     | 50  | 15   | 100        | 2                 |
| Phytochemistry-2              | PG 505      | 2            | 1      | 3     | Pharmacognosy-3                    | 10                | 25     | 50  | 15   | 100        | 2                 |
| Pathophysiology               | MD 507      | 2            | -      | 2     | Physiology                         | 10                | -      | 75  | 15   | 100        | 2                 |
| Pharmacy Administration       | PT 506      | 2            | -      | 2     | Registration                       | 10                | -      | 90  | -    | 100        | 2                 |
| Total                         |             | 14           | 5      | 19    |                                    |                   |        |     |      | 700        |                   |

**Table (6)****Semester (6)**

| Course Title                          | Course code | Credit hours |        |       | Prerequisite                    | Examination Marks |        |      |      | Max. marks | Final exam. (hrs) |
|---------------------------------------|-------------|--------------|--------|-------|---------------------------------|-------------------|--------|------|------|------------|-------------------|
|                                       |             | Lect.        | Pract. | Total |                                 | Period.           | Pract. | Wr.. | Oral |            |                   |
| Medicinal chemistry-2                 | PC 610      | 2            | 1      | 3     | Medicinal chem. -1              | 10                | 25     | 50   | 15   | 100        | 2                 |
| Pharmaceutical technology             | PT 607      | 2            | 1      | 3     | Registration                    | 10                | 25     | 50   | 15   | 100        | 2                 |
| Community pharmacy practice           | PT 608      | 2            | 1      | 3     | Registration                    | 10                | 25     | 50   | 15   | 100        | 2                 |
| Biopharmaceutics and pharmacokinetics | PT 609      | 2            | 1      | 3     | Pharmaceutical dosage forms-2   | 10                | 25     | 50   | 15   | 100        | 2                 |
| Quality Control of Herbal Drug        | PG 606      | 2            | 1      | 3     | Pharmacognosy & Phytochemistry  | 10                | 25     | 50   | 15   | 100        | 2                 |
| Pathology                             | MD 608      | 2            | 1      | 3     | Registration                    | 10                | 25     | 50   | 15   | 100        | 2                 |
| Tromas and First Aid                  | MD 609      | 2            | -      | 2     | Histology, anatomy & physiology | 10                | -      | 75   | 15   | 100        | 2                 |
| Total                                 |             | 14           | 6      | 20    |                                 |                   |        |      |      | 700        |                   |

**Table (7)****Semester (7)**

| Course Title                          | Course code | Credit hours |        |       | Prerequisite                          | Examination Marks |        |      |      | Max. marks | Final exam. (hrs) |
|---------------------------------------|-------------|--------------|--------|-------|---------------------------------------|-------------------|--------|------|------|------------|-------------------|
|                                       |             | Lect.        | Pract. | Total |                                       | Period.           | Pract. | Wr.. | Oral |            |                   |
| Pharmacology-1                        | PO 701      | 2            | 1      | 3     | Physiology                            | 10                | 25     | 50   | 15   | 100        | 2                 |
| Radiopharmaceuticals                  | PP 701      | 1            | -      | 1     | Registration                          | 10                | -      | 90   | -    | 100        | 1                 |
| Clinical pharmacy -1                  | PP 702      | 2            | 1      | 3     | Biopharmaceutics and pharmacokinetics | 10                | 25     | 50   | 15   | 100        | 2                 |
| Hospital pharmacy                     | PP 703      | 2            | 1      | 3     | Biopharmaceutics and pharmacokinetics | 10                | 25     | 50   | 15   | 100        | 2                 |
| Controlled drug delivery system       | PT 704      | 2            | -      | 2     | Pharmaceutical dosage forms-2         | 10                | -      | 75   | 15   | 100        | 2                 |
| Public health and preventive medicine | MD 710      | 2            | -      | 2     | Clinical Microbiology                 | 10                | -      | 75   | 15   | 100        | 2                 |
| Pharmaceutical Biotechnology          | PM 703      | 2            | 1      | 3     | Biochemistry-2                        | 10                | 25     | 50   | 15   | 100        | 2                 |
| Pharmaceutical microbiology           | PM 704      | 2            | 1      | 3     | General Microbiology and Immunology   | 10                | 25     | 50   | 15   | 100        | 2                 |
| Total                                 |             | 15           | 5      | 20    |                                       |                   |        |      |      | 800        |                   |



**Table (8)****Semester (8)**

| Course Title                                 | Course code | Credit hours |        |       | Prerequisite   | Examination Marks |        |     |      | Max. marks | Final exam. (hrs) |
|--|-------------|--------------|--------|-------|--|-------------------|--------|-----|------|------------|-------------------|
|  |             | Lect.        | Pract. | Total |  | Period.           | Pract. | Wr. | Oral |            |                   |
| Pharmacology -2                              | PO 802      | 2            | 1      | 3     | Pharmacology -1  | 10                | 25     | 50  | 15   | 100        | 2                 |
| Clinical pharmacy -2                         | PP 805      | 2            | 1      | 3     | Clinical pharmacy-1  | 10                | 25     | 50  | 15   | 100        | 2                 |
| Phytotherapy                                 | PG 807      | 2            | 1      | 3     | Evaluation of natural products & their preparations                        | 10                | 25     | 50  | 15   | 100        | 2                 |
| Pharmaceuticals analysis and quality control | PC 808      | 2            | 1      | 3     | Pharmaceutical Analytical chem.-2 and pharmaceutical medicinal chemistry-2 | 10                | 25     | 50  | 15   | 100        | 2                 |
| Clinical biochemistry                        | PB 803      | 2            | 1      | 3     | Biochemistry-2   | 10                | 25     | 50  | 15   | 100        | 2                 |
| Drug marketing                               | PP 806      | 1            | -      | 1     | Clinical pharmacy-1 and hospital pharmacy                                  | 10                | -      | 90  | -    | 100        | 1                 |
| Drug interactions                            | PO 803      | 2            | -      | 2     | Pharmacology-1, clinical pharmacy-1  | 10                | -      | 75  | 15   | 100        | 2                 |
| Elective course                              | PE          | 2            | 1      | 3     | Registration   | 10                | 25     | 50  | 15   | 100        | 2                 |
| Total  |             | 15           | 6      | 21    |  |                   |        |     |      | 800        |                   |

**Table (9)****Semester (9)**

| Course Title                      | Course code | Credit hours |        |       | Prerequisite                                      | Examination Marks |        |     |      | Max. marks | Final exam. (hrs) |
|-----------------------------------|-------------|--------------|--------|-------|---|-------------------|--------|-----|------|------------|-------------------|
|                                   |             | Lect.        | Pract. | Total |   | Period.           | Pract. | Wr. | Oral |            |                   |
| Toxicology and forensic chemistry | PO 904      | 2            | 1      | 3     | Pharmacology -2                                   | 10                | 25     | 50  | 15   | 100        | 2                 |
| Therapeutics -1                   | PO 905      | 2            | 1      | 3     | Pharmacology-2                                    | 10                | 25     | 50  | 15   | 100        | 2                 |
| Clinical pharmacokinetics         | PP 907      | 2            | 1      | 3     | Biopharmaceutics and pharmacokinetics             | 10                | 25     | 50  | 15   | 100        | 2                 |
| Oncology                          | PP 908      | 2            | 1      | 3     | Pathology & pharmacology-2                        | 10                | 25     | 50  | 15   | 100        | 2                 |
| Clinical nutrition                | PP 909      | 1            | 1      | 2     | Biochemistry-2 and pharmaceutical dosage forms -2 | 10                | 25     | 50  | 15   | 100        | 1                 |
| Clinical pharmacology             | PO 906      | 2            | 1      | 3     | Pharmacology -2                                   | 10                | 25     | 50  | 15   | 100        | 2                 |
| Sociology                         | HU 903      | 1            | -      | 1     | Registration                                      | 10                | -      | 90  | -    | 100        | 2                 |
| Elective course                   | PE          | 2            | 1      | 3     | Registration                                      | 10                | 25     | 50  | 15   | 100        | 2                 |
| Total                             |             | 14           | 7      | 21    |   |                   |        |     |      | 800        |                   |

**Table (10)****Semester (10)**

| Course Title  | Course code | Credit hours |        |       | Prerequisite                            | Examination Marks |        |      |      | Max. marks | Final exam. (hrs) |
|---|-------------|--------------|--------|-------|---|-------------------|--------|------|------|------------|-------------------|
|   |             | Lect.        | Pract. | Total |   | Period.           | Pract. | Wr.. | Oral |            |                   |
| Therapeutics -2                                       | PO 007      | 2            | 1      | 3     | Therapeutics -1                         | 10                | 25     | 50   | 15   | 100        | 2                 |
| Treatment of dermatological and reproductive diseases | PP 010      | 1            | 1      | 2     | Pathology & pharmacology-2              | 10                | 25     | 50   | 15   | 100        | 1                 |
| Treatment of Pediatrics diseases                      | PP 011      | 2            | 1      | 3     | Pathology pharmacology-2                | 10                | 25     | 50   | 15   | 100        | 2                 |
| Treatment of Cardiovascular diseases                  | PP 012      | 2            | 1      | 3     | Pathology pharmacology-2                | 10                | 25     | 50   | 15   | 100        | 2                 |
| Gastroenterology                                      | PP 013      | 2            | 1      | 3     | Pathology pharmacology-2                | 10                | 25     | 50   | 15   | 100        | 2                 |
| Treatment of Respiratory system diseases              | PP 014      | 2            | 1      | 3     | Pathology pharmacology-2                | 10                | 25     | 50   | 15   | 100        | 2                 |
| Drug information                                      | PP 015      | 1            | -      | 1     | Pharmacology -2<br>Clinical pharmacy -2 | 10                | -      | 75   | 15   | 100        | 2                 |
| Elective course                                       | PE          | 2            | 1      | 3     | Registration                            | 10                | 25     | 50   | 15   | 100        | 2                 |
| Total   |             | 14           | 7      | 21    |   |                   |        |      |      | 800        |                   |

## 18. COURSE DESCRIPTIONS

### **PC 101 Physical and Inorganic Chemistry**

Matter; its properties and measurement, electromagnetic spectrum, atomic structure, chemical bonding and intermolecular forces. Gases, liquids, and solids. Man and his environment and nuclear chemistry.

### **PC 102 Pharmaceutical Organic Chemistry**

Nature of organic compounds and structures. Nomenclature, aliphatic (saturated and unsaturated) hydrocarbons. Organic reactions (substitutions, additions, eliminations and condensations). Chemistry of the different organic classes: halogenated hydrocarbons, alcohols, ethers, carbonyl compounds, mono- and dibasic carboxylic acids and derivatives, amino acids.

### **PC 203 Pharmaceutical Organic Chemistry (1)**

Chemistry of aromatic organic compounds including aromatic hydrocarbons, halogen and nitro derivatives, amines and diazonium salts, phenols, aromatic carboxylic acids, aromatic aldehydes, aromatic ketones, sulfonic acids and polynuclear aromatic hydrocarbons. Introduction to use of spectroscopic methods in organic chemistry (UV, IR, MS, NMR).

### **PC 304 Pharmaceutical Organic Chemistry (2)**

Stereochemistry and Stereoisomerism. Organic reaction mechanisms (substitutions, additions, eliminations and condensations). Heterocyclic compounds including monocyclic monoheteroatom and fused bicyclic compounds.

### **PC 205 Pharmaceutical Analytical Chemistry (1)**

Mixtures (suspensions, colloids and solutions), colligative properties of solutions (vapour pressure, osmotic pressure, effects on boiling and freezing points), Analytical chemistry Quantitative analytical chemistry comprises; acid base titrations and buffer solution, precipitometry and gravimetry.

### **PC 306 Pharmaceutical Analytical Chemistry (2)**

An introduction to statistical analysis, Oxidation-reduction titrations,( electrical properties of redox systems, factors affecting oxidation potential, redox titration curves). Complexometry (importance complexones stability titration curves, application, direct EDTA titrations, masking and demasking, non EDTA titrations)

### **PC 407 Instrumental Analysis**

Spectrophotometric methods of analysis including; ultra-violet, visible and flame photometry, spectrofluorometry, atomic absorption & flame, electrochemistry (potentiometry, conductimetry, polarography), chromatography.

### **PC 808 Pharmaceutical Analysis and Quality Control**

Control and quality assurance, inprocess control and validation, sampling process prior to analysis, analysis of raw materials and finished products using reference standards, pharmacopeial methods of stability and stability testing of drugs, performance and calibration

of instruments used in pharmaceutical analysis, validation of analytical methods and ISO and BSI

**PC 509 Medicinal Chemistry (1)**

Introduction to pharmaceutical and medicinal chemistry, physicochemical properties of drugs in relation to biological action, chemotherapeutic agents, synthetic antimicrobial agents, malaria chemotherapy, antibacterial antibiotics and cancer chemotherapy.

**PC 610 Medicinal Chemistry (2)**

Central nervous system depressants, central nervous system stimulants, cardiovascular agents, analgesic agents, steroids and related compounds.

**PC E11 Drug Design**

Structure activity relationships, quantum mechanical approaches, molecular connectivity, pharmacophore generation, molecular modification by isosteric replacement. Natural products leading to new pharmaceuticals, mathematical treatment serving prediction, defining sites and targets, molecular modeling, prodrugs and drug latentiation.

**PC E12 Advanced Pharmaceutical Analysis -Spectroscopy**

Applications of instrumental methods of analysis (ultraviolet and infrared spectroscopy; NMR; mass spectrometry; atomic absorption spectroscopy) to pharmaceutical compounds.

**PG 101 Botany and Medicinal Plants**

Plant Kingdom; classification and systematic botany of some lower and higher plants with examples of medically active plants; Cytology, morphology and anatomy of different plant organs, plant physiology,. A general introduction of medicinal plants (cultivation, collection, drying, packing, storage, and adulteration)

**PG 202 Pharmacognosy (1)**

An introduction to pharmacognosy and a detailed pharmacognostical study of drugs composed of leaves, flowers, barks, galls and woods and unorganized drugs.

**PG 303 Pharmacognosy (2)**

Detailed pharmacognostical study of drugs composed of seeds, fruits, herbs, rhizomes and roots and animal drugs

**PG 404 Phytochemistry (1)**

Devoted to the study of plants therapeutically active principles; volatile oils, carbohydrates, resins and resin combinations, bitter principles and tannins

**PG 505 Phytochemistry (2)**

Detailed study of phytochemicals; alkaloids and glycosides, in addition to hallucinating and anticancer drugs. Introduction to chromatography and separation technique.

**PG 606 Quality Control of Herbal Drugs**

Quality control of herbal drugs including; herbal adulteration, detection of common pollutants in herbal medicine such as pesticide residues, heavy metal, radioactive contaminants, aflatoxins, bacteria and fungi.

**PG 807 Phytotherapy**

Guidelines for prescribing herbal medicines, drugs affecting digestive system, cardiovascular system, respiratory system, nonspecific enhancement of resistance, urinary system, rheumatic conditions, nervous system, gynaecological conditions, cancer, skin diseases, eye diseases, wounds and other injuries.

**PG E8 Alternative Medicinal Therapies**

The study of herbal preparations, nutritional supplements, and homeopathies. The study of herbal preparations that are widely used by the general public as self-selected OTC (over-the-counter) products/NPDs (nonprescription drugs). Food items for therapeutic, disease prevention, or health promotion purposes. Emphasis will be placed on the role of the pharmacist to help clients make an informed choice and counsel them on the selection of useful and safe products.

**PG E9 Productions and Manufacture of Medicinal Plants**

Commercial production of medicinal plants, cultivation, collection, drying, preservation, extraction, quality control, and final packaging of entire or powdered forms or extracts.

**PG E10 Chromatography and Separation Techniques**

Introduction and modes of separation, gel filtration and permeation, ion exchange chromatography, type properties, ion exchange and non-ion exchange manifestation and applications. High-pressure liquid chromatography, gas liquid chromatography and their applications.

**PT 201 Physical Pharmacy**

Principles of physical pharmacy, rheology and the flow of fluids, surface and interfacial phenomena, solutions and their properties, solubility and dissolution rate, disperse systems

**PT 202 Pharmacy Orientation**

Topic covered: History of pharmacy practice with particular emphasis on Arab impact, roles of the pharmacist, pharmacy organizations, systems of medicine, ethics of pharmacy, system for weights and measures, routes of drug administration, introduction to pharmaceutical dosage forms, types of prescription, and Incompatibilities, pharmaceutical terminology.

**PT 403 Pharmaceutical Dosage Forms (1)**

Includes, pharmaceutical calculation, pharmaceutical solutions, colloids and macromolecular system, coarse dispersions, suspensions and emulsions. Formulation, preparation and evaluation of solid forms, micromeritics, powders and granules, tablets, coating, hard capsules, soft capsules and microencapsulation

**PT 404 Pharmacy Legislation**

A detailed presentation of law that governs and affects the practice of pharmacy, legal principles for non-controlled and controlled prescriptions, over-the-counter drug requirements, opening new pharmacies, opening medical stores, opening factories, opening scientific offices, medicine registration, pharmacies and medicine stores management. Pharmacist duties and responsibilities, pharmacist-patient relationship, patient's rights and ethical principles and moral rules.

**PT 505 Pharmaceutical Dosage Forms (2)**

Formulation, preparation and evaluation of semisolids and related dosage forms, transdermals, topical Drugs and Suppositories.; Parenteral medications, ophthalmic preparations

**PT 506 Pharmacy Administration**

Capital requirements, purchasing and financing a new pharmacy, location analysis, pharmacy layout design, space management for pharmacy practice, inventory purchasing and control, OTC merchandising, advertising, interpersonal communication, inter-professional relations and patient consultation

**PT 607 Pharmaceutical Technology**

Heat transfer, evaporation, drying, extraction, crystallization, filtration, centrifugation and distillation; Mixing, emulsification, homogenization, size reduction, size separation, size enlargements, materials for plant constructions, packaging materials, good manufacturing practice, flow of fluids, mass transfer, safety measures and validation

**PT 608 Community Pharmacy Practice**

Concept and techniques of pharmaceutical care, the pharmacy profession, professional communication, patient counseling, problem solving skills, role of the pharmacist in management of symptoms of certain disease of cardiovascular system, GIT, kidney, respiratory tract, eye, skin and certain rheumatic and metabolic disease.

**PT 609 Biopharmaceutics and Pharmacokinetics**

Factors affecting drug absorption, factors affecting drug elimination, product development, pharmacokinetics models, pharmacokinetics following I.V. administration, pharmacokinetics following oral dosage forms, kinetics of drug absorption, clearance, bioavailability and bioequivalence, absolute and relative bioavailability, assessment of bioavailability and correlation between in vitro dissolution and in vivo absorption.

**PT E10 Quality Assurances and GMP**

Quality control and assurance organization, analytical control, inspection control, documentation, environmental control, GMP regulations, statistical quality control.

**PT E11 Applied Industrial Pharmacy**

Good manufacturing practice regulations and quality assurance with emphasis on process validation and sampling techniques.

**PT E12 Good Manufacturing practices**

Concepts, objectives and applicability, general provisions, organization and personal, Building and facilities, materials, equipment, production and process controls, packing and labeling, control, distribution, laboratory controls, records and reports, returned and salvaged drug products, repackaging , inspections and recalls

**PT E13 Cosmetic Preparations**

Definition and concepts, classification, hair preparation, bath preparation, fragrance preparation, make-up preparation, nail lacquers, shaving preparations, after-shave preparations, skin care, anal hygiene products, antiperspirants and deodorants, quality control tests and evaluation of cosmetic products.

**PM 401 General Microbiology and Immunology**

Eukaryotic and prokaryotic cells, nomenclature of microorganisms, structure and form of the bacterial cells, spores, mycoplasma or PPLO, actinomycetes. Rickettsiae, viruses, eukaryotic microorganisms (fungi), bacterial genetics, molecular genetics, physiology of microorganisms, the growth curve microbial metabolism.

**PM 502 Clinical Microbiology**

Topic covered include: Bacteriology; gram positive bacteria, the mycobacterium group, Gram negative bacteria, Chlamydia and Rickettsiae. Mycology: Ringworm, Moniliasis, Maduromycosis and Sporotrichosis. Virology: RNA viruses and DNA viruses  
Immunology: Host parasite relationship, Non-specific and specific immunity, Mechanism of protective immunity, Hypersensitivity and in vitro antigen antibody reactions, Autoimmunity and auto-immune disease, Immune deficiency disorders, Transplantation immunology, Cancer immunology, Immunological tolerance

**PB 703 Pharmaceutical Biotechnology**

Introduction, biology of industrial micro-organisms, biophysical and biochemical processes, introduction to tissue culture and genetic engineering techniques. Techniques for the improvement of the economically important plants and animals and for the development of micro-organisms to act on the environment. Manipulation of living organisms, especially at the molecular genetic level, to produce new products, such as hormones, vaccines or monoclonal antibodies.  
production of pharmaceuticals by microorganisms. Gene therapy.

**PM 704 Pharmaceutical Microbiology**

Sterilization, sterilization indicators, sterility testing, microbial contamination of pharmaceutical products, aseptic area, the microbiological quality of pharmaceuticals. Antimicrobial agents: classification, mechanism of action of antimicrobial drugs, drug combination, resistance of microorganisms to antimicrobial agents, assessment of a new antibiotic, microbiological assay of antibiotics, microbiological assay of vitamins, amino acids and growth factor, mode of action of nonantibiotic antimicrobial agents. Chemical disinfectants, antiseptics and preservatives.

**PM E5 Biological Standardization**

Assays of hormones, sera, vaccines, toxins, antitoxins, antibiotics and vitamins.

**PM E6 Antimicrobial Agents**

Factors affecting choice of antimicrobial agent, types of antimicrobial compounds, types of antibiotics and synthetic antimicrobial agents, clinical uses of antimicrobial drugs, manufacturing of antibiotics and other synthetic antimicrobial agents, principle methods of assaying antibiotics, mechanism of action antibiotics, bacterial resistance t



**PO 701 Pharmacology (1)**

The general principles of pharmacology, pharmacokinetics, pharmacodynamics, receptor theory and drug interaction. This is followed by a comprehensive study of drugs acting on the autonomic nervous system, cardiovascular system and renal system and autacoids.

**PO 802 Pharmacology (2)**

Drugs affecting the central nervous system, the gastrointestinal system, the blood and blood forming elements, as well as the drugs acting locally; the course deals with the chemotherapy of microbial diseases, neoplastic diseases and parasitic infestation and the study of hormones and hormone antagonists.

**PO 803 Drug Interactions**

Mechanism of drug interaction, significance of drug-drug interaction, management of drug-drug interaction, drug interaction of antibiotics, antiarrhythmics, anticoagulants, anticonvulsants, barbiturates, beta-agonists and antagonists, calcium channel antagonists, sulfonamides, drug-food interaction, drug-smoking interaction, drug-environment interaction.

**PO 904 Toxicology and Forensic Chemistry**

Introduction to toxicology, general principles of toxicology, disposition of toxicants, poisoning with common drugs, poisoning with common chemicals, chemical and biological warfare agents, radiation and radioactive material toxicity, general management of poisoning, clinical toxicology of specific drug groups, management of envenomation with natural toxins, maternal, foetal and neonatal toxicity.

therapeutic regimens for important prevalent diseases, including non-pharmacological approaches, pharmacotherapeutic requirements for treatment of pediatric and geriatric patients, and for pregnant and lactating mothers, immuno-compromised patients, patients with reduced organ function, and those with multi-morbidities, importance of form and route of administration, dialysis procedures, characteristics of certain therapeutic regimens, particularly with regard to anti-infective therapy, oncological therapy, and supportive therapy, anticoagulant therapy, immuno- and gene therapy and therapy of patients in intensive care

**PO 906 Clinical Pharmacology**

General principles of pharmacotherapy, principles of pharmacotherapy in special patients, impact of drug interactions on therapeutics, pharmacotherapy for infectious diseases, cardiovascular disorders, respiratory disorders, gastrointestinal tract disorders and neurological and psychiatric disorders.

**PO 007 Therapeutics (2)****PO E9 Veterinary Pharmacology**

The commonly used veterinary biological and pharmaceutical preparations; general sanitary and management procedures for the prevention and control of livestock diseases; a brief review of infectious diseases and animal parasites

**PB 401 Biochemistry (1)**

Subcellular organelles and membranes. Biological and biochemical properties of proteins, nucleic acids, carbohydrates, lipids, porphyrins and enzymes. Biological oxidations, and related biochemical processes.

**PB 502 Biochemistry (2)**

Metabolic map, regulation of metabolism, metabolism of carbohydrates, metabolism of lipids, nitrogen metabolism, integration of metabolism.

**PB 803 Clinical Biochemistry**

The course covers the analysis of blood and body fluid tests for the functional state of liver, kidney, heart, bone, gastrointestinal tract, endocrine glands, and interpretation of the results in relation to health and disease.

**MD 101 Biophysics**

Cell membrane structure, method of transport, channel types, receptors. Application of action potential, electrocardiogram and electroencephalogram identification and waves elucidation.

**MD 102 Cell Biology**

The cell theory, membranous organelles, non-membranous organelles, the cell inclusions, the nucleus, cell growth and proliferation, apoptosis, apoptosis and cancer, apoptosis and AIDS, apoptosis and organ transplants, cellular aging.

**MD 203 Histology**

Cytology, various tissues (epithelial, connective, muscular and nervous), heart, blood vessels, lymphatic organs, skin and its appendages, systems (digestive and associated glands, respiratory, urinary, reproductive, central nervous system), endocrine glands and eye.

**MD 304 Anatomy**

Introduction, skeletal system, muscular system, articular system, fascia, cardio-vascular system, lymphatic system, nervous system, digestive system, respiratory system, uro-genital system, endocrine glands, cytology, blood, structure of liver, spleen, lungs, kidney, lymph nodes, cardiac muscle, stomach, intestine and aorta

**MD 305 Physiology**

Introduction ( body water, homeostasis, transport of materials), nervous system (autonomic nervous system), neuron structure and function (reflex arc), cardiovascular system, blood, respiratory cycle, gastrointestinal system, reproduction system, renal system, endocrine glands and body temperature regulation

**MD 406 Parasitology**

Introduction, protozoology; amoebae; ciliate; flagellates; blood and tissue sporozoa. Medical helminthology; nematodes; cestodes; trematodes, and arthropods

**MD 507 Pathophysiology**

Introduction to pathophysiology, cell injury, inflammation and immune response, autonomic nervous system in health and disease, endocrine disorders, pancreatic

disorders, fluid and electrolyte imbalance, vascular and haematological disorders, disease of urinary, pulmonary and digestive systems.

**MD 608 Pathology**

The study of the etiology, principle diagnostic features, and main characteristics of diseases of the cardiovascular system, respiratory tract, central nervous system and other important organ systems of the body.

**MD 609 First AID**

Basic Life Support, bleeding, shock, medical emergencies, poisoning, bones and joints, soft tissue injuries, rescue and transportation

**MD 710 Public Health**

Introduction, epidemiology, communicable and non-communicable diseases, control of communicable diseases, immunization, infections, occupational medicine, environmental health, water-borne and food borne diseases, milk-borne diseases, nutrition and family health, environmental pollution, waste water treatment, waste disposal

**PP 701 Radiopharmaceuticals**

Basic principles involving the application of radiation and radioactive compounds in medical diagnosis, therapy and industry. Rationale for utility, preparation and quality control of radiopharmaceuticals. Biologic effects of various radiations

**PP 702 Clinical Pharmacy (1)**

Definition and concepts, case history, patient management approach, patient history taking, clinical problem solving. Topics of discussion include, clinical drug-interactions, adverse drug reactions, drugs interference and clinical laboratory data.

**PP 703 Hospital Pharmacy**

Organisation and structure of a hospital pharmacy, hospital pharmacy department and dispensing, hospital formulary, radio-pharmaceuticals and nuclear pharmacy, surgical dressing and sutures, plasma substitute, central sterile supply unit and its management, manufacture of sterile and non-sterile products, I.V. admixtures, pharmacy and therapeutic committee and manufacturing units in hospitals.

**PP 704 Controlled Drug Delivery**

Controlled and Modulated release drug delivery systems, theory, methods.  
eg. Microcapsules – Bioadhesives.

**PP 805 Clinical Pharmacy (2)**

Clinical pharmacy in obstetrics, gynaecology, neonates, paediatrics, geriatrics, blood disease and CNS disease. Nutritional deficiencies, energy and nutritional needs, enteral and parenteral nutrition

**PP 806 Drug Marketing**

Marketing analysis, orientation to decision making, management of new product venture, advertising distribution, marketing information system.

**PP 907 Clinical Pharmacokinetics**

Introduction, applied clinical pharmacokinetics, therapeutic drug monitoring, mono and multi-exponential pharmacokinetics, Non-compartmental pharmacokinetics and moment analysis. Drug distribution and drug clearance mechanisms, IV infusion kinetics and kinetics following extra-vascular dosing, metabolite kinetics, multiple dose kinetics, non-linear pharmacokinetics, dosage regimen design, dosage individualization of drugs of low therapeutic index, especially in patients with compromised renal and hepatic function.

**PP 908 Oncology**

Cancer etiology, risk factors, prognosis, types of tumors, systems affected, treatment, adjuvant therapy, patients factors and patient's support measures.

**PP 909 Clinical Nutrition**

The course focuses on the kinds and amounts of macronutrients (carbohydrates, fat, and proteins) and micronutrients (vitamins and minerals) that are needed to maintain optimal health and prevent chronic disease in adults. Fluid and electrolyte therapy and acid-base balance.

**PP 010 Treatment of Dermatological and Reproductive Disease**

Most popular skin diseases, types, bacterial, viral and fungal diseases, differentiation.

**PP 011 Treatment of Pediatrics Disease**

Nutritional requirements in neonates and infants, Nutritional disorders, neonatology, infectious diseases in pediatrics, congenital heart diseases, endocrine disorders, neurological disorders, pediatric emergencies.

**PP 012 Treatment of Cardiovascular Disease**

Diseases comprising the cardiovascular system, symptoms, prognosis drugs, selection, patients advice with hospital setting practice.

**PP 013 Gastroenterology**

GIT diseases, epidemiological aspects, symptoms, treatment, patient advice, case reports.

**PP 014 Treatment of Respiratory System Disease**

Infections, occupational, immunological diseases. Assessment of respiratory efficiency treatment, O<sub>2</sub> supply with case study reports.

**PP 015 Drug information**

Drug information and poison information centres, drug-drug interactions, drug-food interactions, drug disease interactions, and intravenous incompatibilities. Use of the Internet for drug and research information.

**MS 101 Mathematics and Statistics**

Functions and graphs, limits and continuity, differentiation, exponential, logarithmic, and trigonometric functions, integration, basic differential equations, functions of several variables and problems related to them, probability and random variables, hypothesis testing.

**CS 101 Computer Science**

Introduction to computer technology. Computer hardware, software and operating systems. Using various input/output devices and operating systems, data organization. Practice on major application software packages such as word processing, spreadsheets, database, and presentation graphics. How to use the Internet (searching and finding topics) and accessing e-mail.

**EN 101 English Language**

Training in reading, comprehension, basic grammatical rules, writing and translation. The course adopts a systematic approach to proper essay writing, such as idea development, paragraph structure, introductions, support, and conclusions.

**EN 302 Medical Terminology**

Train the students to understand medical and pharmaceutical terminologies, medical abbreviations, medical idioms, suffixes and prefixes.

**HU 201 Human right****HU 302 Psychology**

The objective of this course is to help understand the behavior of the people around us. Topics include: Contemporary psychology: Psychological processes, sensation, perception, conditioned learning, motivation. Secondary psychological processes: learning, memory, language and cognition, intelligence, personality, developmental psychology, environmental and child psychology. Behavior dynamics: Groups, the individual, environmental, group problems, differentiation, density, handicaps, aggression, the media. Mental Health: signs of good mental health and disturbances (neuroses and psychoses), conflicts and frustration as precursors to the neuroses, genetic predisposition and diseases as precursors to the psychoses, some of the main therapies in psychology.

**HU 903 Sociology**

Culture ethnicity, ethnocentrism, prejudice, race and stereotype subculture, skills of communication (verbal and non verbal)