The School of Pharmacy
The School of Pharmacy

The School of Pharmacy was established in 1993 to promote pharmacy education, research, and pharmaceutical care.

MISSION

The school is responsible for producing pharmacists entrusted with the best standards to apply and disseminate new information about drugs and the ever-changing health care systems. Graduates will be competent to practice pharmacy in all settings. Additionally, they will have the values to serve society as caring and ethical professionals.

PROGRAM EDUCATIONAL GOALS

The goals of the program are to prepare pharmacy graduates to:

- Provide evidence-based patient centered care to optimize pharmacotherapy outcomes in various multidisciplinary health-care practice settings.
- Manage pharmacy operations in hospitals, community pharmacies, and industrial settings.
- Promote public health awareness and disease prevention, through innovation in the practice of pharmacy, for the benefit of the individual and the community being served.
- Perform pharmacy duties in accordance with legal, ethical, socio-economic and professional standards.
- Integrate scholarly research with clinical pharmacy practice and commit to self-directed lifelong learning.

The school offers two professional degrees: The entry-level Bachelor of Science (B.S.) in Pharmacy, requiring five academic years, and a Doctor of Pharmacy (Pharm.D.), requiring six academic years, including the B.S. in Pharmacy.

Completion of the B.S. in Pharmacy degree will qualify students to take the National Competency Assessment Examination (Colloquium) to practice in Lebanon.

Graduates of the Pharm.D. Program can sit for the North American Pharmacy Licensure Examination (NAPLEX) in the United States. Graduates who successfully pass the NAPLEX are entitled to become licensed pharmacists, capable of practicing the pharmacy profession in the United States.

The B.S. in Pharmacy consists of two years of pre-professional studies, and three years of professional courses. After receiving their B.S. in Pharmacy, LAU students may choose to apply for admission to the fourth professional year to earn the Pharm.D. degree.

The School of Pharmacy comprises two departments: Pharmaceutical Sciences (PS) and Pharmacy Practice (PP).

The PS Department provides foundations in basic and pharmaceutical sciences, including anatomy and physiology, biochemistry, medicinal chemistry, pharmacology, pharmaceutics, and pharmacoeconomics.

The PP Department provides the didactic and experiential component of the clinical program. The didactic courses include: pharmacotherapeutics, clinical pharmacokinetics, dispensing, and pharmaceutical care. Experiential training encompasses training in various practice settings, allowing students to gain skills in pharmacy management and experience in the community, hospitals, drug information, and clinical settings.

ACCREDITATION STATUS

The School of Pharmacy is a full member of the American Association of Colleges of Pharmacy (AACP). It is the only full member of AACP outside of the United States.

The Doctor of Pharmacy Program is accredited by the Accreditation Council for Pharmacy Education (ACPE). Currently, the Pharm.D. Program at LAU is the only ACPE-accredited program outside of the United States.
The School of Pharmacy

INTERIM DEAN
Pierre Zalloua, Ph.D.

ASSOCIATE DEAN FOR ACADEMIC AFFAIRS
Yolande Saab, Pharm.D., Ph.D.

ASSISTANT DEAN FOR STUDENTS AFFAIRS
Lydia Boutros Sholy, R. Ph., Pharm.D.

CHAIRS
Roy Kanbar, D.Pharm. Ph.D.
(Pharmaceutical Sciences)
Aline Saad, Pharm.D.
(Pharmacy Practice)
Rony Zeenny Pharm.D.
(Director of Experiential Education)

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R. Kanbar, D.Pharm. Ph.D.
L. Karam, D.Pharm.D., B.C.P.S.
G. Khoury, Pharm.D.
A. Milane, D.Pharm. Ph.D.
M. Mroueh, Ph.D.
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E. Ramia, Pharm.D.
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W. Faour, Ph.D.
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M. Jabra, Pharm.D., BCPP
M. Karam, Ph.D.
G. Karayakoupolou, D.Pharm.
G. Khayat, Pharm.D.
Z. Nassour, D.Pharm. R.Ph.
A. Saab, Ph.D.
L. Saad, Pharm.D.
R. Takchi, M.Sc.
S. Tokajian, Ph.D.
V. Loubnan, Pharm.D.
N. Zeeni, Ph.D.

VOLUNTEER ADJUNCT FACULTY

W. Abi Ghanem, R.Ph.
C. Abighosn
C. Abi-Khaled, R.Ph.
N. Abi Ghosn, R.Ph.
R. Abi Khalil
S. Addada, R.Ph.
Y. Akiki
A. Ali, R.Ph.
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C. Asmar, R.Ph.
R. Azzam, R.Ph.
M. Bawab, R.Ph.
C. Barbar, R.Ph.
R. Batrouni, R.Ph.
M. Bitar, R.Ph.
R. Bitar
M. Bsat
A. Bsatt, R.Ph.
R. Chaarani, R.Ph.
A. Cordahi, R.Ph.
L. Draiby, R.Ph.
N. Draiby, R.Ph.
R. El-Ali, R. Elkadoum, R.Ph.
M. El-Masri, R. Ph.N. Gbayi, R.Ph.
J. Ghsoub, R.Ph.
M. Hadi, R.Ph.
G. Haidar, R.Ph.
N. Hamadeh, R.Ph.
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A. Kouyoumji, R.Ph.
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The School of Pharmacy

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**PROGRAMS**

The curriculum below applies only to students who entered LAU in the fall 2007 semester. Students who joined the School of Pharmacy prior to the fall 2007 semester, and beyond, are advised to refer to the 2005 Academic Catalog available on the LAU website.

### Pre-Professional Year I

**Fall Semester (17 credits)**

- **ARA201** Appreciation of Arabic Literature 3
  - **CHM201** Chemical Principles 3
  - **BIO201** Biology I 4
  - **LAC–Arts** 3
  - **LAC–Social Sciences** 3

**Spring Semester (16 credits)**

- **PHV204** Computer Application to Pharmacy 2
  - **ENG202** Sophomore Rhetoric 3
  - **CHM311** Organic Chemistry I 3
  - **CHM313** Organic Chemistry I Lab 1
  - **PHV202** Medical Anatomy & Physiology 4

**Pre-Professional Year II**

**Fall Semester (14 credits)**

- **PHV209** Principles of Pathophysiology and Immunology 4
  - **CHM312** Organic Chemistry II 3
  - **CHM314** Organic Chemistry II Lab 1
  - **ENG203** Fundamental of Oral Communication 3
  - **PHV211** Microbiological Basis of Disease 3

**Spring Semester (17 credits)**

- **PHV208** Medical Biochemistry 4
  - **PHV205** Statistics for Health Profession Majors 3
  - **PHV210** Systems Pathophysiology 4
  - **LAC–Humanities** 3
  - **LAC–Micro/Macroeconomics** 3

**Professional Year I**

**Fall Semester (18 credits)**

- **PHV308** Pharmaceutical Analysis & Biotechnology 2
  - **PHV309** Pharmaceutical Analysis & Biotechnology, Lab 1
  - **PHV312** Medicinal Chemistry I 3
  - **PHV314** Dosage Forms I 3
  - **PHV315** Dosage Forms I, Lab 1
  - **PHV320** Physical Assessment 2
  - **PHV322** Professional Communication 1
  - **PHV333** Pharmacy Management 3
  - **—** Professional Elective 2

**Spring Semester (15 credits)**

- **PHV313** Medicinal Chemistry II 3
  - **PHV316** Dosage Forms II 3
  - **PHV317** Dosage Forms II, Lab 1
  - **PHV330** Pharmacology I 4
  - **PHV325** Pharmacy Practice & Ethics 2
  - **PHV340** Pharmacotherapeutics I 2

**Summer Semester (6 credits)**

- **PHV398** Pharmacy Practice Management I 3
  - **PHV399** Pharmacy Practice Management II 2
  - **PHV397** Introduction to Professional Pharmacy Practice Experience 1

* Students are expected to complete PHA 397, 398, 399 over summer P1 and summer P2.
The School of Pharmacy

Professional Year II

*Fall Semester (18 credits)*

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>PHA441</td>
<td>Pharmacotherapeutics II</td>
<td>3</td>
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<tr>
<td>PHA442</td>
<td>Pharmacotherapeutics III</td>
<td>3</td>
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<tr>
<td>PHA430</td>
<td>Pharmacology II</td>
<td>4</td>
</tr>
<tr>
<td>PHA422</td>
<td>Pharmacokinetics &amp; Biopharmaceutics</td>
<td>4</td>
</tr>
<tr>
<td>PHA421</td>
<td>Drug Information &amp; Literature Evaluation</td>
<td>2</td>
</tr>
<tr>
<td>PHA--</td>
<td>Professional Elective</td>
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</table>

*Spring Semester (17 credits)*

<table>
<thead>
<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>PHA443</td>
<td>Pharmacotherapeutics IV</td>
<td>3</td>
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<tr>
<td>PHA444</td>
<td>Pharmacotherapeutics V</td>
<td>3</td>
</tr>
<tr>
<td>PHA445</td>
<td>Pharmacotherapeutics VI</td>
<td>3</td>
</tr>
<tr>
<td>PHA449</td>
<td>Dispensing and Pharmaceutical Care</td>
<td>3</td>
</tr>
<tr>
<td>PHA452</td>
<td>Toxicology</td>
<td>3</td>
</tr>
<tr>
<td>PHA435</td>
<td>Pharmacognosy &amp; Evidence-Based Herbal Medicine</td>
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Professional Year III

*Fall Semester (19 credits)*

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<tr>
<th>Course Code</th>
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<th>Credits</th>
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<tr>
<td>PHA550</td>
<td>Introduction to Pharmacogenomics</td>
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<tr>
<td>PHA557</td>
<td>Pharmacoeconomics</td>
<td>3</td>
</tr>
<tr>
<td>PHA560</td>
<td>Clinical Nutrition &amp; Diet Therapy</td>
<td>2</td>
</tr>
<tr>
<td>PHA570</td>
<td>Professional Pharmacy Practice – Hospital/DIC Experience</td>
<td>6</td>
</tr>
<tr>
<td>PHA571</td>
<td>Professional Pharmacy Practice – Community Experience</td>
<td>6</td>
</tr>
<tr>
<td>PHA 523</td>
<td>Clinical Pharmacokinetics* or another Professional Elective</td>
<td>1</td>
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*Spring Semester (17 credits)*

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>PHA515</td>
<td>Pharmacy Seminar</td>
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<tr>
<td>PHA--</td>
<td>Professional Elective</td>
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<tr>
<td>PHA572</td>
<td>Professional Pharmacy Practice – Patient Care Experience</td>
<td>12</td>
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<tr>
<td>PHA510</td>
<td>U.S. Pharmacy Law &amp; Regulation</td>
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</tr>
<tr>
<td>PHA513</td>
<td>Lebanese Pharmacy Law &amp; Regulation</td>
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</tr>
</tbody>
</table>

A total of 6 credits of professional electives, as one-credit or two-credit courses, should be completed before graduation.

* Students interested in applying to the Pharm.D. Program should take PHA523 Clinical Pharmacokinetics (1cr.) as a professional elective.

Professional Year IV

Pharm.D. Candidates Only

The fourth professional year of the Doctor of Pharmacy Program consists of seven four-week advanced practice experiences. The fourth professional year consists of four required experiences, one from each below:

1. Community
2. Hospital / Health System Pharmacy
3. Ambulatory Care/ Critical Care area (cardiology or medical intensive care) [and three elective experiences]
4. Internal Medicine

Internal Medicine

*Advanced Pharmacy Practice (21 credits)*

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>PHA 660</td>
<td>Required Advanced Pharmacy Practice in Internal Medicine/</td>
<td>3</td>
</tr>
<tr>
<td>PHA 661</td>
<td>Required Advanced Pharmacy Practice in Ambulatory Care</td>
<td>3</td>
</tr>
<tr>
<td>PHA 662</td>
<td>Required Advanced Pharmacy Practice in Institutional (hospital / health system pharmacy)</td>
<td>3</td>
</tr>
<tr>
<td>PHA 663</td>
<td>Required Advanced Community Pharmacy Practice</td>
<td>3</td>
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<tr>
<td>PHA 650</td>
<td>Elective Advanced Pharmacy Practice Experience (Topic I)</td>
<td>3</td>
</tr>
<tr>
<td>PHA 650</td>
<td>Elective Advanced Pharmacy Practice Experience (Topic II)</td>
<td>3</td>
</tr>
<tr>
<td>PHA 650</td>
<td>Elective Advanced Pharmacy Practice Experience (Topic III)</td>
<td>3</td>
</tr>
</tbody>
</table>

A Pharmacy Project course (3 credits) may replace 1 elective Advanced Pharmacy Practice Experience

Students have to choose 3 different topics from the following:

- Pharmacokinetics
- Emergency Medicine
- Ambulatory Care
- Psychiatry
- Dermatology
- Nephrology
- Adult Oncology
- Infectious Diseases
- Neonatal Intensive care
- OB/GYN
- Gastroenterology
- CCU
- Pediatrics
- Medical Intensive Care
- Endocrinology
- Pharmaceutical Industry
- Neurology
- Family Medicine
- Pediatric Oncology
- Teaching
- Pharmaceutical Company
- Pediatrics

RULES AND REGULATIONS

I-BACHELOR OF SCIENCE (B.S.) IN PHARMACY

ADMISSION

Students seeking admission into the pre-professional phase of the program should contact the Office of Admissions, in order to complete the application process.
Students admitted to LAU after completion of their secondary education, as well as students who hold a B.S. or a B.A. degree and who did not complete all the requirements in the first two academic years, are eligible to enroll in the pre-professional program.

After the completion of the pre-professional courses, students must complete an application form for admission into the professional phase of the program. The application forms are obtained from the Office of the Assistant Dean for students affairs of the School of Pharmacy, and must be submitted with all the required documents (i.e. recommendations and transcripts), before May 31st of every academic year.

Admission into the professional phase of the program takes place only in the fall semester, and will be decided upon by the School Admissions Committee, with the approval of the dean. The committee automatically rejects incomplete applications or if received after the above-mentioned deadline. Following the completion of the application process, an individual interview will be conducted with each applicant. Applicants will be evaluated based on different criteria such as GPA, interview, faculty evaluation, writing skills, recommendation letters, number of repeats, warning letters and others.

To be admitted into the professional phase of the program, students must complete all of the pre-professional courses, with a minimum cumulative Grade Point Average (GPA) of 2.5, and pass all the major courses, with a minimum grade of C, and an overall GPA of at least 2.5. Major courses include all the PHA courses, as well as CHM201, CHM311, CHM312, CHM313, CHM314 and BIO201.

In addition, to be eligible to apply to the professional program, students normally are allowed a maximum of three repeats of the same course or different courses, and should not have received any academic or disciplinary warning. Two warnings during the academic years will lead to dismissal from the School / not eligible to apply to the professional program. Furthermore, a student may, with approval of the School Academic Council chaired by the Dean, carry one grade of D, D+ or C in one course in the pre-pharmacy program to the professional program provided student was not able to repeat course before fall of admission. Such grade must be removed in fall, spring or summer semesters of the following year. Failure to do so will prevent student from being promoted to the next higher year. Please be aware that courses in the professional program are offered sequentially as stated in the curriculum and on a yearly basis according to student standing.

Admission into the professional phase of the program is competitive. Meeting the minimum requirements does not guarantee acceptance.

A minimum grade of C or its equivalent in pre-pharmacy courses must be earned by students transferring from an institution other than LAU. Furthermore, transfer of professional pharmacy courses will be conducted according to ACPE guidelines; only professional pharmacy courses from the Accreditation Council for Pharmacy Education (ACPE) accredited programs are transferable. Major courses transferred will be included in calculating the GPA for admission.

Applicants holding a B.A. or a B.S. degree from the following Universities are exempted from taking the Liberal Arts Core (LAC) courses:

- AUB
- Balamand
- NDU
- Haigazian

Students admitted into the professional program after July 1, 2007 will be subject to the requirement stated in the ACPE Standard 14, Guideline 14.5, namely: “The required Advanced Pharmacy Practice Experience, in all program pathways, must be conducted in the United States, or its territories, or possessions.”*1

The School of Pharmacy of the Lebanese American University is an equal opportunity institution and will not use the race, sex, religion or national origin of an applicant as criterion for admission into the program.

ACADEMIC PROBATION & DISMISSAL FROM THE PROFESSIONAL PROGRAM

A student failing to score at least a C in any of the PHA courses, after registering for the course three times, including withdrawals, will be dismissed from the School of Pharmacy.

Students will be placed on Academic Probation (GPA below 2.0) only once. If a student fails to achieve a good academic standing (GPA of 2.0 or above) after one semester of probation (excluding summer), he/she will be suspended from the School of Pharmacy for one year. If a student fails to improve his/her GPA (2.0 or above) during the first semester (excluding summer), after serving his/her suspension, he/she will be dismissed from the school. A student
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suspended for one year may be considered for readmission, after the school’s approval, and will be advised to repeat courses in which he/she received an F, D, D+ or C-, and may not carry more than 13 credits in a semester.

1* This applies only for students who seek the Pharm.D. degree.

PROMOTION TO A HIGHER YEAR

To be promoted to a higher year in the professional program, a student must complete all courses of each year with grade of C or better before being allowed to enroll in any course in the higher year. All courses will be followed sequentially as stated in the curriculum. However, a student must have prior approval of the School Academic Council chaired by the Dean to be allowed to carry one grade of D, D+ or C- to a higher year. Such deficient grade must be removed within the following two semesters or summer of the higher year. Failure to remove this deficiency on time will result in denying promotion to the next higher year. A grade “F” will stop the student from being promoted to a higher year. Students must successfully complete all didactic courses of the program before they are allowed to enroll in any Pharmacy Practice Experiences (rotations).

In the first professional year, P1, students will not be able to register for PHA 397, 398 and 399 if they have not completed all P1 courses or if they have more than 2 courses with a grade below C. A grade “F” will stop the student from taking PPM or being promoted to P2.

GRADUATION REQUIREMENTS

To earn a Bachelor of Science in Pharmacy, a student must have a minimum overall GPA of 2.00 in all PHA courses taken at LAU, and have a minimum grade of C in all PHA courses.

II-DOCTOR OF PHARMACY (PHARM.D.)

ADMISSION

Admission into the Pharm.D. Program takes place only in the fall semester. Applications should be obtained from the School of Pharmacy. All applicants must submit a completed application form to the School of Pharmacy no later than January 31 of the year of expected admission.

Admission into the Pharm.D. Program is a competitive process. The School Admissions Committee will evaluate applicants based on GPA, interview, number of courses repeated in the professional program, recommendation letters, faculty evaluation, warning letters and others. Two warnings during the academic years will lead to dismissal from the School or will not be eligible to apply to the Pharm.D program.

Only students who earned a B.S. in Pharmacy degree from LAU or an ACPE accredited university are eligible to apply. Furthermore, students who received the B.S. in Pharmacy degree two years prior to the year of expected admission are eligible to apply. Graduates from non-ACPE-accredited universities must start from pre-pharmacy or the first professional year (P1).

GRADUATING REQUIREMENTS

To graduate with a Pharm.D. degree, a student must have a minimum GPA of 2.00 and grades of C in all required courses.

PHARMACEUTICAL SCIENCES DEPARTMENT

PHA202 Medical Anatomy and Physiology [4 cr.]

This course covers the anatomy and physiology of the human body, with emphasis on the central nervous system, the autonomic nervous system, the cardiovascular and renal systems, and the immune, endocrine, gastrointestinal and respiratory systems. A thorough understanding of receptors, their affinity to drugs and hormones, as well as targets for therapeutic interventions, will be emphasized. Congenital malformations and their physiological impacts will also be discussed.

Prerequisite: BIO201.
Corequisite: Pre-Professional Year I status.

PHA204 Computer Application to Pharmacy [2 cr.]

This course covers the use of computers for solving professional, educational and business problems. The course also covers the utility of computer technology, online information resources, hardware peripherals, CD-ROM databases, programs, and multimedia computing systems, which pharmacists can use in their practice.

Corequisite: Pre-Professional Year I status.

PHA205 Statistics for Health Profession Majors [3 cr.]

This course covers the descriptive and basic inferential statistics, and issues
surrounding the design of biomedical and biopharmaceutical investigations.

Corequisite: Pre-Professional Year I & II status.

**PHA208 Medical Biochemistry [4 cr.]**
This course covers the chemistry and metabolism of biomolecules (proteins, lipids, carbohydrates and DNA) and enzymology, and metabolic pathways to energy utilization. Particular emphasis is placed on the biochemical basis for disease, and targets for therapeutic intervention.

Prerequisites: CHM201, CHM 311, CHM312, CHM 313, and CHM314.
Corequisite: Pre-Professional Year II status.

**PHA209 Principles of Pathophysiology & Immunology [4 cr.]**
This course covers the basic principles and mechanisms of pathologies and disorders that affect the human body in general, as well as a few selected systems. It also covers the environmental, nutritional and genetic origins of pathology and immunity, in relation to internal as well as external disease processes. Diagnostic modalities, interpretation of relevant laboratory data, and an introduction to the basic pharmacology and treatment of major diseases, are also covered.

Prerequisite: PHA202.
Corequisite: Pre-Professional Year II status.

**PHA210 Systems Pathophysiology [4 cr.]**
This course is a continuation of PHA209. It covers the pathologies and disorders that affect the human body, in its various systems. It discusses disease processes, etiologies and symptoms, as well as diagnostic modalities, the interpretation of relevant laboratory data, and an introduction to the basic pharmacology and the treatment of major diseases of the various bodily systems. The course will consist of lectures, discussions, as well as case presentations.

Prerequisite: PHA209.
Corequisite: Pre-Professional Year II status.

**PHA211 Microbiological Basis of Disease [3 cr.]**
This course covers the characteristics of microorganisms, in general, and the specific characteristics of pathogenic bacteria, viruses and fungi. Topics include the different aspects of medical microbiology, identification and the control of pathogens, disease transmission, host resistance, immunity, control of infection, and development of microbiological techniques.

Prerequisite: BIO201.
Corequisite: Pre-Professional Year II status.

**PHA308 Pharmaceutical Analysis and Biotechnology [2 cr.]**
This course is an introduction to the principles and techniques used in pharmaceutical analysis, hence; extraction, spectroscopy, chromatography and dissolution procedures. Particular emphasis is placed on the recombinant DNA technology.

Prerequisites: CHM201, CHM312 and CHM314.
Corequisite: Professional Year I status.

**PHA309 Pharmaceutical Analysis and Biotechnology Lab [1 cr.]**
This course is a laboratory taken concurrently with PHA308. Techniques used to assess the quality of drug products are covered, as well as PCR and electrophoresis techniques.

Prerequisites: CHM201, CHM312 and CHM314.
Corequisite: PHA308, Professional Year I status.

**PHA312 Medicinal Chemistry I [3 cr.]**
This course covers the physicochemical properties of various drug categories, their relation to biological activity, metabolic pathways, and structure-activity, and their adverse effects.

Prerequisites: CHM312 and CHM314.
Corequisite: Professional Year I status.

**PHA313 Medicinal Chemistry II [3 cr.]**
This course is a continuation of Medicinal Chemistry I.

Prerequisite: PHA312.
Corequisite: Professional Year I status.

**PHA314 Dosage Forms I [3 cr.]**
This course covers the design, formulation, manufacturing and evaluation of pharmaceutical dosage forms, based on physical chemical principles. Drug regulatory affairs, current good manufacturing practices, in compliance with FDA guidelines and standards, pre-formulation studies, formulations of solids, liquids, and aerosols are discussed.

Corequisites: PHA315 and Professional Year I status.
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PHA315 Dosage Forms I Laboratory [1 cr.]
This is a compounding laboratory taken concurrently with PHA314. Techniques and principles used to prepare and dispense individual extemporaneous prescriptions, including calculations and dating of compounded dosage forms, are discussed.
Corequisites: PHA314 and Professional Year I status.

PHA316 Dosage Forms II [3 cr.]
This course is a continuation of PHA314. It covers the design, formulation, manufacturing and evaluation of semi-solid, complex and novel pharmaceutical dosage forms.
Prerequisite: PHA314.
Corequisites: PHA317 and Professional Year I status.

PHA317 Dosage Forms II Laboratory [1 cr.]
This is a compounding laboratory taken concurrently with PHA316.
Prerequisite: PHA315.
Corequisites: PHA316 and Professional Year I status.

PHA320 Physical Assessment [2 cr.]
This course is an introduction to the various techniques and tools necessary to conduct physical examinations and to monitor modifications caused by common disease states and drug therapy. Practical sessions are included.
Prerequisite: PHA210.
Corequisite: Professional Year I status.

PHA322 Professional Communication [1 cr.]
This course is an analysis and application of the factors promoting or hindering successful communications between the pharmacist and the patients, as well as with health professionals.
Prerequisites: ENG202 and ENG203.
Corequisite: Professional Year I status.

PHA325 Pharmacy Practice and Ethics [2 cr.]
This course is an introduction to the practice of pharmacy in institutional and community settings. It entails the study of the development of the profession of pharmacy and the ethical principles upon which the profession rests.
Corequisite: Professional Year I status.

PHA330 Pharmacology I [4 cr.]
The course is designed to introduce students to the principles of drug use. The course emphasizes on drug–receptor relationships, pharmacodynamics, pharmacokinetics, drug–drug interactions, and the adverse effects of various categories of drugs.
Prerequisite: PHA210.
Corequisites: PHA313 and Professional Year I status.

PHA333 Pharmacy Management [3 cr.]
This course is an introduction to pharmacy management, as applied to various pharmacy practice settings. Topics will be discussed within the framework of the Lebanese law.
Corequisite: Professional Year I status.

PHA421 Drug Information and Literature Evaluation [2 cr.]
This course covers the use of reference sources to retrieve, evaluate and disseminate information in pharmacy practice. Fundamentals of research design, methodology, and analysis in practicing evidence-based pharmacy are discussed.
Prerequisites: PHA330 and PHA205.
Corequisite: Professional Year II status.

PHA422 Pharmacokinetics and Biopharmaceutics [4 cr.]
This course entails the study and application of the fundamental concepts of absorption, distribution, metabolism and the elimination of drugs. The influences of formulation, disease and diet on pharmacokinetics, as well as the principles of bioavailability and bioequivalence are discussed.
Prerequisite: PHA316.
Corequisite: Professional Year II status.

PHA430 Pharmacology II [4 cr.]
This course is a continuation of PHA330.
Prerequisites: PHA210, PHA313, PHA330 and PHA211.
Corequisite: Professional Year II status.

PHA435 Pharmacognosy and Evidence-Based Herbal Medicine [2 cr.]
This course is an introduction to the preparation and extraction of active ingredients, and the identification and classification of medicinal plants. An explanation of the pharmacology and therapeutic use of commonly prescribed
and dispensed herbal medicines, based on current scientific research, is covered.

Prerequisite: PHA313.
Corequisite: Professional Year II status.

**PHA452 Toxicology [3 cr.]**
This course covers the fundamental and mechanistic aspects of toxicology, with emphasis on the mechanisms of toxicants, pathophysiology, clinical manifestations, and on the management of toxic exposures and antidotal therapy.

Prerequisites: PHA330, PHA430 and PHA422.
Corequisite: Professional Year II status.

**PHA510 U.S. Pharmacy Law and Regulation [2 cr.]**
This course covers the federal laws that affect the regulation of drugs and the practice of pharmacy. The course helps the students realize and understand the general principles of the federal law related to drug control and to pharmacy practice.

Corequisite: Professional Year III status.

**PHA513 Lebanese Pharmacy Law and Regulation [1 cr.]**
Course description: This course discusses the regulations of pharmacy practice in Lebanon including the requirements to become a licensed pharmacist, to establish a community pharmacy, to operate a hospital pharmacy, and to receive a license for manufacturing a drug or importing any substance that falls under its category. The course covers the registration process of any substance considered a drug at the Ministry of Public Health department, including its pricing regulation and profit allowance. It also sheds the light on situations whereby a pharmacist can dispense, substitute a medication or make changes to the dosing regimen. Other topics discussed include the responsibilities and rights of pharmacy inspection/audit from the Lebanese Ministry of Public Health and any other regulatory body, and definition of felony or crime and determine its respective penalty measures. Finally, this course covers all the regulations related to establishing the Lebanese Order of Pharmacists, including its mission, goals, organization structure, executive board, committees, retirement plan, financial operations, elections, and inspection.

**PHA550 Introduction to Pharmacogenomics [1 cr.]**
This course covers the relationship of genetic individual variability to drug response.

Prerequisite: PHA430.
Corequisite: Professional Year III status.

**PHA557 Pharmacoeconomics [3 cr.]**
This course is an introduction to the role of pharmacoeconomics in the health care system, with emphasis on research outcomes. This course covers the application of pharmacoeconomic analysis in clinical practice.

Prerequisites: PHA333 and PHA421.
Corequisite: Professional Year III status.

**PHA560 Clinical Nutrition & Diet Therapy [2 cr.]**
This course covers the principles of nutrition, with emphasis on the nutritional aspects of carbohydrates, lipids, proteins, vitamins, electrolytes and trace elements. Total parenteral nutrition, enteral nutrition, nutrition for growth and development, and nutrition care of selected disease states will be covered.

Prerequisites: PHA340, PHA441, PHA442, PHA443, PHA444 and PHA445.
Corequisite: Professional Year III status.

**PROFESSIONAL PHARMACY ELECTIVES**
*Note: Electives may not be offered on a regular basis.*

**PHA400 Medical Terminology [1 cr.]**
This course covers the study of how to build medical terms from Greek and Latin prefixes, suffixes, word roots, and combining forms.

**PHA401 History of Pharmacy [1 cr.]**
This course covers the evolution and the development of the history of pharmacy, from ancient civilization to modern times.

**PHA402 Cosmetics [2 cr.]**
This course entails a study of the manufacture and the use of cosmetic preparation, intended to be applied to the human body, for cleansing, beautifying or altering appearance.

**PHA404 Vaccines and Other Biologicals [2 cr.]**
This course entails a study of the preparation, storage and use of vaccines and biologicals such as toxins, toxoids, serums and antigens.
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**PHA405 Pharmaceutical Parenterals [2 cr.]**
This course covers pharmaceutical parenterals, and pre-formulation and formulation of parenteral products. Methods used in the manufacturing, preparation, handling, quality control, and dispensing of sterile dosage forms, including aseptic preparation of parenteral and enteral nutrition products, chemotherapeutic agents, biological and specialty solutions, are covered.

**PHA523 Clinical Pharmacokinetics [1 cr.]**
This course covers the application of pharmacokinetics principles for the rational design and monitoring of individualized dosage regimen for commonly used and low-therapeutic-index drugs.

Prerequisite: PHA 422.
Corequisite: Professional Year III status.

**PHARMACY PRACTICE DEPARTMENT**

**PHA398 Pharmacy Practice Management I [3 cr.]**
This course covers the aspects of practical experiences in selected pharmacy management settings, under the supervision of pharmacists and clinical faculty coordinators. Community pharmacy management approaches and styles, organizational principles, personnel, purchasing and inventory control, pricing, professional fees, community pharmacy services, and the Lebanese law are covered.

Prerequisites: PHA210, PHA313, PHA316, PHA322, PHA333, PHA320, PHA 330, PHA 340 and Professional Year I status.

**PHA399 Pharmacy Practice Management II [2 cr.]**
This course is a continuation of PHA398. It covers the aspects of practical experiences in selected hospital pharmacy management environments, under the supervision of pharmacists and clinical faculty coordinators. It also covers the management approaches and services provided in hospital pharmacies, in accordance with the Lebanese law.

Prerequisites: PHA210, PHA313, PHA316, PHA322, PHA333, PHA320, PHA 330, PHA 340 and Professional Year I status.

**PHA397 Introduction to Professional Pharmacy Practice Experience [1 cr.]**
This course is an introduction to the practice of pharmaceutical care, through a structured early learning experience in a clinical setting, and under the supervision of a clinical faculty member.

Prerequisites: PHA210, PHA313, PHA316, PHA320, PHA322, PHA333, PHA 330, PHA 340 and Professional Year I status.

**PHA340 Pharmacotherapeutics I [2 cr.]**
This is the first in a series of six courses addressing the pharmacotherapeutic principles and functional consequences of the disease state. Discussion will focus on the therapeutic problem solving and the evaluation of drugs commonly used in clinical practice. Individualization of pharmacotherapy, selection of appropriate drug regimen, with its efficacy and toxicity monitoring parameters, and the assessment of various drug interactions, and their adverse reactions, are covered. Disease prevention, patient counseling, and pharmacoeconomics issues will be an integral part of each disease state management. Pharmacotherapeutics of psychiatric diseases will be discussed.

Prerequisites: PHA210, PHA313, PHA316, PHA320, PHA397, PHA398 and PHA399.
Corequisites: PHA430 and Professional Year II status.

**PHA441 Pharmacotherapeutics II [3 cr.]**
This course focuses on endocrinologic and oto/ophthalmologic diseases, and women’s health.

Prerequisites: PHA210, PHA313, PHA316, PHA320, PHA397, PHA398 and PHA399.
Corequisites: PHA430 and Professional Year II status.

**PHA442 Pharmacotherapeutics III [3 cr.]**
This course focuses on the pulmonary, gastrointestinal, arthritic and nephrologic diseases.

Prerequisites: PHA210, PHA313, PHA316, PHA320, PHA397, PHA398 and PHA399.
Corequisites: PHA430 and Professional Year II status.

**PHA443 Pharmacotherapeutics IV [3 cr.]**
This course focuses on the cardiovascular and dermatologic diseases.

Prerequisites: PHA210, PHA313, PHA316, PHA320, PHA397, PHA398, and PHA399.
Corequisite: PHA430 and Professional Year II status.

**PHA444 Pharmacotherapeutics V [3 cr.]**
This course focuses on infectious diseases.
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Prerequisites: PHA210, PHA211, PHA313, PHA316, PHA320, PHA397, PHA398, PHA399 and PHA430.
Corequisite: Professional Year II status.

PHA445 Pharmacotherapeutics VI [3 cr.]
This course focuses on the hematological/oncologic, neurologic, genitourinary, and reproductive system diseases.
Prerequisites: PHA210, PHA313, PHA316, PHA320, PHA397, PHA398, PHA399 and PHA430.
Corequisite: Professional Year II status.

PHA449 Dispensing and Pharmaceutical Care [3 cr.]
This course covers the techniques and skills required to safely and accurately dispense prescription and non-prescription drug products to patients. Emphasis will be on computerized patient record keeping, interpreting and evaluating prescriptions, as well as tips for patient counseling.
Prerequisites: PHA322, PHA340, PHA430, PHA441 and PHA442.
Corequisites: PHA443, PHA444, PHA445, PHA452 and Professional Year II status.

PHA515 Pharmacy Seminar [1 cr.]
This course entails discussions of current literature as well as issues concerning the pharmacy profession.
Prerequisites: PHA340, PHA421, PHA422, PHA441, PHA442, PHA443, PHA444 and PHA445.
Corequisite: Professional Year III status.

PHA570 Professional Pharmacy Practice – Hospital/DIC Experience [6 cr.]
This course covers pharmacy practice in a hospital setting and at a drug information center. It covers the principles of hospital pharmacy management rules and regulations, drug distribution systems, patient-oriented pharmacy services, as well as the principles of evidenced-based medicine and the systemic approach in answering drug information questions and analyzing the literature.
Prerequisite: Passing all the PHA courses from the pre-professional years.
Corequisite: Professional Year III status.

PHA571 Professional Pharmacy Practice – Community Experience [6 cr.]
This course covers the pharmacy practice in a community setting. It deals with the principles of community pharmacy management rules and regulations, drug distribution systems, and patient-oriented pharmacy services which include dispensing medications, communicating with patients and health professionals, providing proper information, and monitoring the patient profiles for drug interactions, medication noncompliance, and inappropriate drug therapy.
Prerequisite: Passing all the PHA courses from the pre-professional years.
Corequisite: Professional Year III status.

PHA572 Professional Pharmacy Practice – In-patient Care Experience [12 cr.]
This course covers the use of therapeutic problem-solving skills, and the knowledge of the appropriate use of medications in patient care environments, which include patient monitoring, therapeutic consultation, and in-service presentation and communication with health care professionals and patients.
Prerequisite: Passing all the PHA courses from the pre-professional years.
Corequisite: Professional Year III status.

REQUIRED/ELECTIVE: ADVANCED PHARMACY PRACTICE EXPERIENCE DESCRIPTIONS
Numerous and various experiences are available for the Doctor of Pharmacy advanced practice rotations, including: institutional health care systems, community pharmacies, pharmaceutical industry, and clinical and pharmaceutical sciences’ research opportunities. The experience is supervised by skilled preceptors. Yearly, the chair of the Pharmacy Practice will prepare a list of the currently available experiences.

Experience Selection
Students will be matched with the rotation sites, based on the students’ choice and availability. In July, students are asked to rank, in order of preference, the elective rotations they would like to do. Selection of sites is checked upon by Chair of PP, Director of Experiential Education

Experience Scheduling
The chair of the Pharmacy Practice and the site coordinators schedule all experiences. Students are asked not to contact individual preceptors to schedule or reschedule the experience elective. Students desiring to modify their schedule need to approach the chair of the Pharmacy Practice, with a valid
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excuse, by the third and the fourth week of September, before the start of the first experience.

REQUIRED ADVANCED PHARMACY PRACTICE EXPERIENCES

PHA670–PHA673 (12 cr)
The required experiences are designed to allow the student to develop a strong understanding of specific areas of internal medicine, pediatrics, intensive care, and community principles. The goals that students should achieve during this module are to further understand the pathophysiology and treatment of various diseases commonly encountered, and to develop strong and advanced skills in the design and monitoring of rational pharmacotherapy regimens, and how they can utilize available data to maximize pharmaceutical care. The students will also work with both the medical and pharmacy services, and will provide pharmaceutical care to the patients. The students will gain the relevant knowledge, learning valuable information for their future practice. Students will also gain strong skills in professional and educational communications, all under the mentoring of the clinical pharmacy experienced preceptors.

Prerequisites: Bachelor of Science in Pharmacy and Professional Year IV status.

PHA650 Elective Advanced Pharmacy Practice

The elective experience is designed to allow the student to develop a stronger understanding of a specialty area.

For direct patient care experiences, the goals that students should achieve during this elective experience are generally to further understand the pathophysiology and treatment of various diseases in that specialty, and to develop strong and advanced skills in the design and monitoring of rational pharmacotherapy regimens, and how they can utilize the available data to maximize pharmaceutical care. Students will work closely with the chief of department or the chief resident, and under the close mentoring from a clinical pharmacy faculty member. Furthermore, the students will provide pharmaceutical care to the patients and will gain the relevant knowledge, learning valuable information for their future practice.

For non-direct patient care experiences, the goals that the students should achieve are dependent on the elected experience. In general, all experiences are designed to allow students to gain further knowledge, and to develop the required skills and information for their future practice. Students are required to choose three topics, based on availability.

Prerequisite: Bachelor of Science in Pharmacy/Professional Year IV status.

PHA689 Pharmacy Project

This course will be offered as an elective to all Pharm.D. students who wish to engage in research. At the beginning of the academic year, a list of potential research projects will be generated by the School of Pharmacy from which students can choose. The scope of the project can be either in pharmaceutical sciences or clinical pharmacy.

The interested students will commit to the project at the beginning of the fall semester and will dedicate a month during the spring semester for the completion of the work. The project must be completed and submitted at the end of the spring semester.

SUPPORTING FACILITIES

PHARMACY LABS

The Pharmacy Research Lab is designed to allow Faculty, and Pharm.D candidates to conduct their research projects. Instruments in the lab include HPLC systems, which are equipped with a variety of detectors (absorbance, PDA, electrochemical, fluorescence, conductivity, and refractive index), enabling their use for a variety of applications. In addition, the Lab is also equipped with a freeze dryer, incubators, and a centrifuge apparatus.

The Pharmaceutical Analysis Lab is designed to familiarize pharmacy students with the different techniques used in pharmaceutical analysis. These techniques include those used in pharmaceutical industry such as spectroscopic, chromatographic, enzymatic and biotechnology methods. For this purpose, the Lab is equipped with an HPLC, a GC, a dissolution apparatus, an FT-IR spectrophotometer, an ELISA, an electrophoresis, a microplate reader, and a PCR.

The NMR and GC-MS Lab is mainly used by Faculty, and contains a 300 MHz NMR spectrometer, suitable to run different 1D
and 2D NMR (homo and heteronuclear) experiments. There are two GC-MS system, one of which is equipped with a purge and trap system. The GC-MS systems are used to separate and identify volatile compounds in plants and biological fluids.

In the Compounding Laboratory, students learn the fundamental techniques used for the extemporaneous preparation of dosage forms, as part of the requirements of Dosage Forms I and Dosage Forms II courses. The Laboratory deals with the formulation, preparation, handling, and evaluation of pharmaceutical products.

The Lab includes the preparation of drug products using traditional approaches (mortar and pestle, spatula and slab), as well as modern technology. Basic equipment includes the water bath, hot plate, magnetic stirrer, oven, electronic balance, and vortex. More sophisticated equipment such as the optical microscope, sieve shaker, planetary mixer, homogenizer, fluidized-bed dryer, tablet press, hardness tester (also measures the thickness and diameter of the tablet), friabilator, and disintegration apparatus, are also available.

The Pharmacy Dispensing Laboratory supports course instruction on the proper techniques and skills required to safely, and accurately, distribute drug products to patients. Emphasis is on computerized patient record keeping, patient counselling, finding errors and omissions in prescriptions, and communication with other health care providers and patients. Thus, the Dispensing Laboratory is designed to mimic a community pharmacy. It includes shelved medications, storage cabinets, counselling area desks, auxiliary medication labels, personal computers, a printer, a bar code reader, and pharmacy textbooks.