

# A Comparative Analysis of PharmD Program curricula in North America and selected Arab Countries

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# History of PharmD in North America

- 1950 – University of Southern California established the nation's first Doctor of Pharmacy (PharmD) program.
- 1997, Accreditation Council for Pharmacy Education (ACPE) announced that it will only accredit the PharmD program after 2004.
- In 2000, all colleges of pharmacy in the USA switched to a PharmD program.
- In 2007, the Université de Montréal was the first Canadian university to offer the Pharm.D. program.
- The University of Toronto replaced their entry-level BPharm curriculum with an entry-to-practice Pharm.D. curriculum in 2011.
- In 2018, The Canadian Council for Accreditation of Pharmacy Programs (CCAPP) made a decision to no longer accredit Bachelor of Science in Pharmacy programs after 2020

# The PharmD program in the Arab Countries

- In **Saudi Arabia**, PharmD program started in 2001 at King Abdulaziz University, then in 2005 at Ibn-Sina National College, then 2006 at King Faisal University, then 2007 at Qassim University. In 2008, King Saud University College of Pharmacy at Riyadh
- In **Jordan**, only Jordan University and Jordan University of Science and Technology offer PharmD program.
- Libyan International University is the only university that offer PharmD program in **Libya**.
- In **Egypt**, several universities offer PharmD program such as Cairo University, Tanta University, Assiut University, Alexandria University...etc.

# Methods

- This study involves a sample collection of the most recent curricula, course descriptions, and student handbooks of all the PharmD programs on the university's websites.
- The courses were classified into 3 clusters:
  - 1) Pharmaceutics and Pharmaceutical Chemistry,
  - 2) Biological Sciences,
  - 3) Pharmacy Practice, Pharmaceutical Care, and Clinical Pharmacy.

# Curriculum clusters

Biological Sciences cluster	Pharmaceutics/ Pharmaceutical Chemistry clusters	Pharmacy Practice/ Pharmaceutical Care/ Clinical Pharmacy clusters
Psychology Cell Biology Anatomy Histology Physiology & Pathophysiology General Microbiology & Immunology Pharmaceutical Microbiology Biochemistry.....etc.	General chemistry Organic chemistry Physicochemical principle of pharmacy Pharmaceutical organic chemistry Pharmaceutical analysis Medicinal Chemistry Pharmaceutics II Physical Pharmacy Pharmacokinetics Pharmaceutical calculation and compounding.....etc.	Hospital Pharmacy Community Pharmacy Practice Drug Information Clinical Pharmacy Pharmacotherapy Medication Therapy Management Applied Clinical Pharmacology The Patient Care Experience Direct Patient Care.....etc.

# Canada

**University of Toronto  
The University of British Columbia  
University of Alberta**

**2 years of pre-pharmacy coursework + 4 years PharmD program**

# University of Toronto

Our Doctor of Pharmacy (PharmD) program gives students the critical knowledge, skills, and attitudes to be **versatile pharmacy and medication management experts**

# Year 1 courses

Students in Year 1 of the PharmD program have to complete several foundational courses that will prepare them to become medication therapy experts.

- Pharmacotherapy 1: Foundations and General Medicine
- Medication Therapy Management 1
- Health Systems
- Pharmacy Informatics
- Social and Behavioral Health
- Pharmaceutical Calculations
- Molecular Pharmacology
- Metabolic Biochemistry and Immunology
- Pathobiology and Pathology
- Pharmaceutics
- Pharmacokinetics
- Fundamentals of Pharmacology
- Early Practice Experience

At the end of their course work, students will undertake **160 hours** of experiential education in a patient care setting during the summer.



# Year 2 courses

- Additional foundational courses as well as several courses related to patient care practice
- At the end of their course work, students will undertake **160 hours** of experiential education in a patient care setting during the summer.

# Year 2 courses

- Pharmacotherapy 2: Self care and Minor Ailments Prescribing
  - Pharmacotherapy 3: Endocrinology, Nephrology and Urology
  - Pharmacotherapy 4: Infectious Diseases
  - Pharmacotherapy 5: Cardiovascular Diseases
  - Medication Therapy Management 2
  - Medication Therapy Management 3
  - Research Methods for Pharmacy
  - Health Economics and Pharmacoeconomics
  - Management: Skills, Communication and Collaboration
  - Physical Assessment and Injection Techniques
  - The Science of Pharmacotherapy
  - Topics in Pharmaceutical Quality and Clinical Laboratory Medicine
  - Microbiology of Infectious Diseases
  - **Early Practice Experience 2**
- **At the end of their course work, students will undertake 160 hours of experiential education in a patient care setting during the summer.**

# Year 3

In Year 3, most courses are relate to patient care practice, including toxicology, health systems, pharmacotherapy and medication therapy management.

- Pharmacotherapy 6: Hematology, Oncology and Immunotherapies
- Pharmacotherapy 7: Neuropsychiatry
- Medication Therapy Management 4
- Pharmacy in the Modern Health Care System
- Preparation for Advanced Pharmacy Practice Experience
- Introductory Toxicology
- Global Pharmaceutical Policy
- Selected Topics in the Pharmaceutical Industry
- Molecular Mechanisms of Drug Action
- Recent Developments in Dosage Form Design
- Indigenous Issues in Health and Healing
- Antimicrobial Stewardship

# Year 4

Students in Year 4 spend the entire academic year on **Advanced Pharmacy Practice Experience (APPE) rotations (off campus)**.

These rotations take place over a **52 week period**.

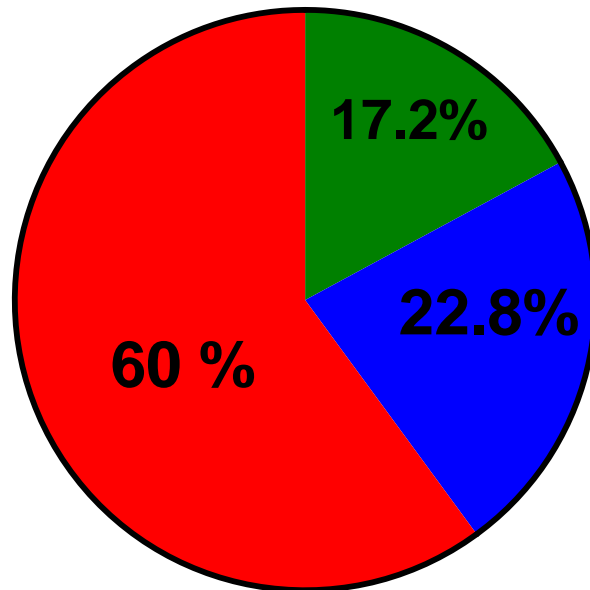
Students are required to complete the following rotations:

- APPE Institutional Required rotations
- APPE Community Required rotation
- APPE Selective (direct patient care) rotation

# University of Toronto

## Credit hours

- Biological Sciences**
- Pharmaceutics/Pharmaceutical Chemistry**
- Pharmaceutical Care/ Clinical Pharmacy**



Clusters	University of Toronto (Canada ) Prerequisites for PharmD + PharmD program
Biological Sciences cluster	30
Pharmaceutics and Pharmaceutical Chemistry cluster	40
Pharmaceutical Care, and Clinical Pharmacy cluster	105

# Training program-University of Toronto

University of Toronto	
Introductory Pharmacy Practice Experience (IPPE)	320 hours
Advanced Pharmacy Practice Experience (APPE)	52 weeks

- IPPE Four early experiential rotations (IPPE) consisting of **320 hours** of experiential education in a community pharmacy practice setting.

# University of Toronto

- **Preceptors play a major role in Advanced Pharmacy Practice Experience.**  
preceptors **should:**
  - 1- Possess a Pharmacy degree and maintain the appropriate licensure to provide patient care and practice in good standing
  - 2- Have a minimum of two years of experience in their profession.
- **After completing Advanced Pharmacy Practice Experience (APPE), students must write two exams (Qualifying Examination Part 1 (MCQ) and Qualifying Examination Part 2 (OSCE) before they become Licensed Pharmacist.**

**OSCE:** Objective Structured Clinical Examination

# PharmD program in the USA

**The university of North Carolina  
The University of New Mexico  
The University of Oklahoma  
Saint Joseph's University's**

- 2 years of pre-pharmacy coursework + 4years PharmD program
- Pre-Professional Phase (Years 1-2) + professional Phase (Years 3-6)



# University of North Carolina

**The Doctor of Pharmacy** is a professional degree similar to the doctor of medicine (M.D.) for physicians or a doctor of dental surgery (DDS) for dentists. It is a four year program that prepares students to become future health care leaders.

2 years of pre-pharmacy coursework + 4 years PharmD program

# PharmD Curriculum of University of North Carolina

## **Year One:** Foundations of Pharmacy

- Introduces you to the foundational pharmaceutical sciences, which are the building blocks of pharmacy
  - Gives you the solid foundation you'll need to start working with patients and health-care professionals

## **Years Two and Three:** Immersion in Patient Care and Engagement in Clinical Decision Making

- The training program begins the summer after the first year.

## **Year Four:** Advanced and Elective Pharmacy Practice Experiences

- Numerous advanced patient care rotations

# PharmD Curriculum of University of North Carolina

## Year 1

- On Becoming a Pharmacist
- Pathophysiology of Human Disease
- Molecular Foundations of Drug Action
- Evidence Based Practice
- Pharmaceutical Calculations
- Immunization/Med Administration training
- Pharmacotherapy: Foundations
- Pharmaceutics & Drug Delivery Systems I
- Pharmaceutical Compounding I: Nonsterile
- Foundations of Clinical Pharmacology
- Foundations of Pharmacokinetics
- Pharmaceutics & Drug Delivery Systems II
- Pharmaceutical Compounding II: Sterile
- Foundations of Patient Care
- Self-Care & Non-Prescription Medications

## Year 2

- Patient Care Lab
- The US Healthcare System
- **Applied Clinical Pharmacology**
- The Patient Care Experience
- **Pharmacotherapy: Applied (Organ systems covered:**
  - immune, cardiovascular,**
  - respiratory, gastrointestinal,**
  - neurologic, endocrine and**
  - infectious disease)**
- Business of Healthcare: Focus on the Pharmacy Enterprise
- Pharmacotherapy: Integrated-I
- Leadership and Professional Development I
- **Immersion Experience: Community**
- **Immersion Experience: Direct Patient**

# PharmD Curriculum of University of North Carolina

## Year 3

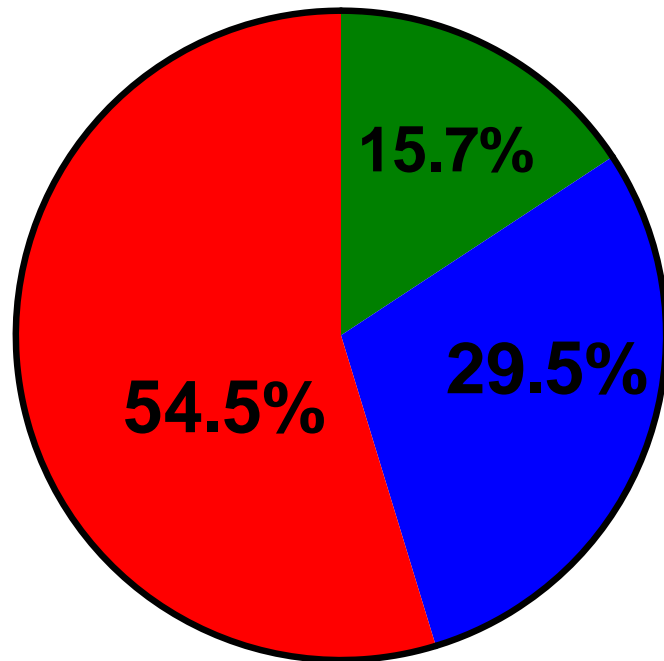
- Pharmacotherapy: Integrated II
- Leadership and Professional Development II
- Immersion Experience 3: Direct Patient Care
- The Patient Care Experience II
- Pharmacy Law: Regulation of Pharmacy Practice
- Integrated Pharmacotherapy III

## Year 4

**Year Four: Advanced and Elective Pharmacy Practice Experiences**

# PharmD Curriculum of University of North Carolina

- Biological Sciences**
- Pharmaceutics/Pharmaceutical Chemistry**
- Pharmaceutical Care/ Clinical Pharmacy**



## Credit hours

Clusters	University of North Carolina (USA) Prerequisites for PharmD + PharmD program
Biological Sciences cluster	28.5
Pharmaceutics and Pharmaceutical Chemistry cluster	53.5
Pharmaceutical Care, and Clinical Pharmacy cluster	99
<b>Total Credit hours</b>	<b>181</b>

# Training program- University of North Carolina

University of North Carolina	
Introductory Pharmacy Practice Experience (IPPE)	760 hours
Advanced Pharmacy Practice Experience (APPE)	36 weeks

- students are required to pass NAPLEX (National Association of Boards of Pharmacy) Exam and includes questions related to medications to be licensed to practice pharmacy in the United States.

# **Egypt**

**Cairo University**

**Tanta University**

**Assiut University**

**Alexandria University**

# Cairo university

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## أهداف البرنامج

- تخرج صيدلي متميز مؤهل للعمل بالصيدليات العامة والخاصة ومصانع وشركات الأدوية ومعامل الرقابة الدوائية وتحليل الأغذية والعمل في مجال الاعلام والتسويق الدوائي والبحوث والجامعات.

The program curriculum is designed based on **five academic years** and an **advanced training year (Residency)**. **Total years: 6**



# PharmD Curriculum- Cairo university

## Year 1

- Information Technology
  - Human Rights & Fighting Corruption
  - Pharmaceutical Analytical Chemistry I
  - Pharmaceutical Organic Chemistry I
  - Medicinal Plants
  - Pharmacy Orientation
  - Mathematics
  - Psychology
- 

- Cell Biology
- Anatomy
- Histology
- Pharmaceutical Analytical Chemistry II
- Pharmaceutical Organic Chemistry II
- Pharmacognosy I

## Year 2

- Pharmaceutical Analytical Chemistry III
  - Pharmaceutical Organic Chemistry III
  - Pharmacognosy II
  - Pharmaceutics I
- 
- Pathophysiology
  - Communication Skills
  - Biochemistry I
  - Instrumental Analysis
  - Pharmaceutical Organic Chemistry IV
  - General Microbiology & Immunology
  - Pharmaceutics II

# PharmD Curriculum- Cairo university

## Year 3

- Drug Design
- Phytochemistry I
- Pharmaceutical Microbiology
- Pharmacology I
- ~~• Pharmaceutics III~~
- Medicinal Chemistry I
- Phytochemistry II
- Parasitology
- Pharmacology II
- Biopharmaceutics & Pharmacokinetics
- Pharmaceutics IV

## Year 4

- Applied & Forensic Pharmacognosy
- Medical Microbiology
- Pharmacology III
- ~~• Pharmaceutical Technology I~~
- Pharmaceutical Legislations & Regulatory Affairs
- Clinical Biochemistry
- Clinical Pharmacokinetics
- Hospital Pharmacy
- Community Pharmacy Practice
- Drug Information
- Pharmaceutical Technology II

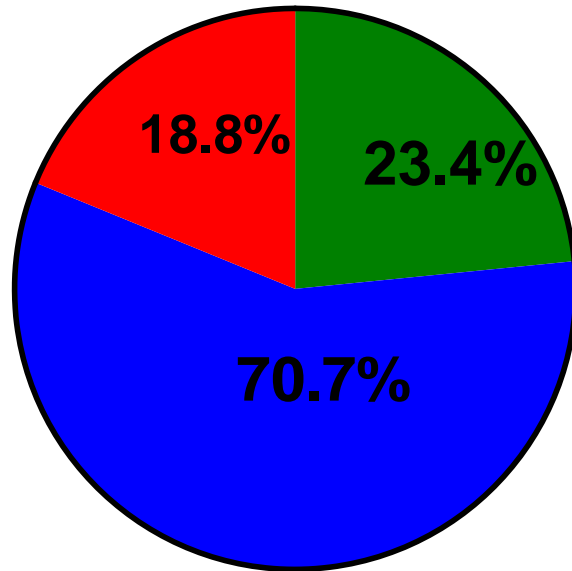
# PharmD Curriculum- Cairo university

## Year 5

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- Pharmacoepidemiology & Pharmacovigilance
  - **Good Manufacturing Practice**
  - Basic & Clinical Toxicology
  - Clinical Pharmacy I
  - Pharmacoeconomics
  - Advanced Drug Delivery Systems
  - First Aid
  - Scientific Writing
  - Professional Ethics
  - **Quality Control of Pharmaceuticals**
  - **Phytotherapy & Aromatherapy**
  - Drug Interaction
  - Clinical Pharmacy 2

# PharmD Curriculum- Cairo university

- **Biological Sciences**
- **Pharmaceutics/Pharmaceutical Chemistry**
- **Pharmaceutical Care/ Clinical Pharmacy**



## Credit hours

Clusters	Cairo University (Egypt)
Biological Sciences cluster	41
Pharmaceutics and Pharmaceutical Chemistry cluster	101
Pharmaceutical Care, and Clinical Pharmacy cluster	33
<b>Total Credit</b>	<b>175</b>

# Training program- Cairo University

Cairo University	
Introductory Pharmacy Practice Experience (IPPE)	100
Advanced Pharmacy Practice Experience (APPE)	36 weeks

# Practical Training & Field Experience

## Advanced Field Training (Residency Year):

- The sixth year of the study is devoted to advanced field training for an academic year (**9 months**) and a total of **36 weeks** in which the student trains in various **fields of pharmaceutical practices (companies and factories of human and veterinary medicines, medical supplies and equipment, cosmetics, food supplements, herbs, medicinal plants, disinfectants, pesticides, distribution companies and stores, local and international centers and bodies of pharmaceuticals monitoring and follow-up, pharmaceutical and medical research centers, bioavailability, clinical studies, information and drug marketing)**
- The student must submit and pass a **graduation project** in a specific specialization determined by the committee responsible

# Jordan

# **Jordan**

**Jordan University**

**Jordan University of Science and Technology**



# PharmD curriculum-Jordan University

- The curricular philosophy and model of Pharm D directed the curriculum to provide knowledge, skills, abilities, attitudes and values:
  1. Participate effectively in the manufacturing of safe and effective pharmaceutical products
  2. Safe and effective dispensing of pharmaceutical products
  3. Provision of patient-centered care
  
- A 6 years PharmD program

# PharmD curriculum-Jordan University

## Year 1

- General chemistry
- Calculus
- General biology
- Organic chemistry
- Physicochemical principle of pharmacy
- Biochemistry-1
- Computer skills for medical faculties
- General biology laboratory

## Year 2

- Pharmaceutical organic chemistry
- Pharmaceutical organic chemistry practical
- Pharmaceutical calculation and compounding
- Pharmaceutical calculation and compounding practical
- Anatomy and histology for pharmacy
- Physical pharmacy
- Pharmaceutical statistics
- Pharmaceutical analysis
- Pharmaceutical analysis practical
- Physiology for pharmacy 1
- Physiology for pharmacy 2
- Biochemistry-2

# PharmD curriculum-Jordan University

## Year 3

- Pharmacology -1
- Pharmaceutical technology-1
- Pharmaceutical technology practical-1
- Pharmacotherapy: a pathophysiologic approach
- Phytotherapy and natural products chemistry 1
- First Aid
- Pharmacology 2
- Pharmaceutical microbiology 1
- Pharmacoeconomics
- Phytotherapy and natural products chemistry 2
- pharmaceutical technology -2
- **Pharmaceutical field training (1)**

## Year 4

- **Therapeutics 1**
- Case studies in therapeutics 1
- Medicinal chemistry 1
- Biopharmaceutics
- Pharmaceutical microbiology 2
- Pharmaceutical microbiology –practical
- Pharmacology 3
- Basic nursing skills for pharmacy
- Therapeutics 2
- Case studies in therapeutics
- Pharmacokinetics
- Medicinal chemistry 2
- Case studies in pharmacokinetics
- Pharmaceutical promotion and marketing
- **Pharmaceutical field training (2)**

# Year 5 PharmD curriculum-Jordan University

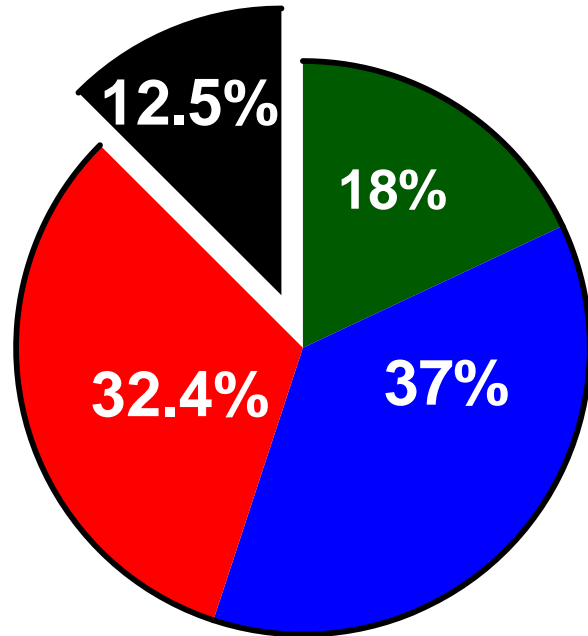
- Therapeutics 3
- Case studies in therapeutics 3
- Medicinal chemistry 3
- Clinical pharmacokinetics
- Toxicology
- Pharmaceutical care
- Pharmaceutical care-practical
- Pharmacy informatics
- **Therapeutics 4**
- Case studies in therapeutics (4)
- Pharmacy regulation and ethics
- Pharmaceutical literature evaluation
- Pharmaceutical biotechnology
- Pharmaceutical nutrition and diet therapy
- Over the counter drugs
- Intravenous Admixture and Sterile

## Year 6

- Internal medicine clerkship
- Pediatric clerkship
- Critical Care clerkship
- Advanced Community Pharmacy clerkship
- Ambulatory care clerkship
- Hospital Pharmacy clerkship

# PharmD curriculum-Jordan University

- Biological Sciences
- Pharmaceutics/Pharmaceutical Chemistry
- Pharmaceutical Care/ Clinical Pharmacy
- Courses not relevant to any of the clusters



## Credit hours

Clusters	Jordan University (Jordan)
Biological Sciences cluster	39
Pharmaceutics and Pharmaceutical Chemistry cluster	80
Pharmaceutical Care, and Clinical Pharmacy cluster	70
	189 + 27 (courses not relevant to any of the clusters)

# Training program- Jordan University

Jordan University	
Introductory Pharmacy Practice Experience (IPPE)	480
Advanced Pharmacy Practice Experience (APPE)	28 weeks

# Practical Training & Field Experience

## 1- Introductory Pharmacy Practice Experience (480 h)

- **The Pharmaceutical Field Training I.** 240 hours of didactic training program in community pharmacy setting during the summer following the **third professional year**.
- **The Pharmaceutical Field Training II.** 240 hours of didactic training program in community pharmacy setting during the summer following the **fourth professional year**.

## 2- Advanced Pharmacy Practice Experience (1000 hours)

- The training covers:
- Internal medicine (14 weeks)
- Pediatrics (4 weeks)
- Surgery (2 weeks)
- Ambulatory care (3 weeks)
- Obstetrics and gynecology (2 weeks)
- Psychiatric and geriatrics (2 weeks)
- Clinical pharmacokinetics (2 weeks).

## **Saudi Arabia**

**Qassim University**

**King Khalid University**

**Umm Al-Qura University**

**King Faisal University**

**Imam Abdulrahman Bin Faisal University**



# PharmD Program-Qassim University

To provide an advanced and accredited pharmacy education that produces professionally qualified clinical pharmacists capable of conducting cutting-edge healthcare and applied research

# PharmD Program-Qassim University

## Year 1

- Arabic Language Skills
- Medical Terminology
- Mathematics for Pharmacy
- Human Biology
- Organic Chemistry
- Human Anatomy and Histology
- Introduction to Pharmacy Profession
- Introduction to Islamic Culture
- Biostatistics
- Pharmaceutical Organic Chemistry
- Pharmaceutical Microbiology
- Pharmaceutical Analytical Chemistry

## Year 2

- Biochemistry-I
- Physiology-I
- Pharmaceutics-I
- Pharmacognosy ,
- Computer for Health Sciences
- Pharmacy Practice
- General Immunology
- Biochemistry-II
- Physiology-II
- Medicinal Chemistry
- Pharmacology-I
- Molecular Pharmacology
- Pharmaceutics-II

# PharmD Program-Qassim University

## Year 4

### Year 3

- Medicinal Chemistry-II
- Pathophysiology-I
- Pharmacology-II
- Chemotherapy
- Natural Products Chemistry
- Islam & Constr. Of Society
- Pharmacopeial Analysis
- Medicinal Chemistry-III
- Pathophysiology-II
- Pharmaceutics-III
- Pharmacology-III
- Scientific Writing & Seminar-I

- **Pharmacotherapy-I**
- Pharmacology-IV
- Toxicology
- Pharmaceutical Biotechnology
- Basic Pharmacokinetics
- Dispensing of Medication
- Radiopharmacy
- Pharmacogenomics
- Biopharmaceutics
- Clinical Communication Skills
- Ethics in Pharmacy
- Pharmacotherapy-II
- Drug and Poison Information Services & Literature Evaluation
- Over the Counter Drugs
- Patient Assessment & First Aid

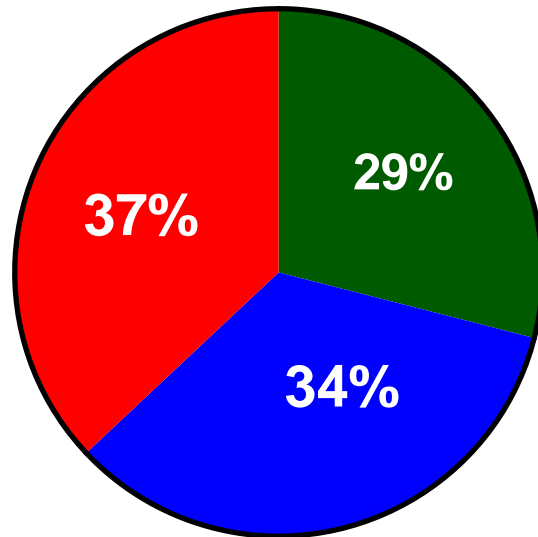
# PharmD Program-Qassim University

## Year 5

- Pharmacotherapy-III
- Pharmacoeconomics & Epidemiology
- Pharmacy Management
- Evidence Based Pharmacy
- Psychology and Health
- Applied Pharmacokinetics
- The Islamic Economic System
- Clinical Nutrition &IV. Adm.
- Pharmacy Law
- Scientific Writing &Seminar-II
- Fundamentals of the Islamic Political System
- Drug of Abuse
- Pharmacotherapy-IV
- Graduation Project

# PharmD Program-Qassim University

- Biological Sciences
- Pharmaceutics/Pharmaceutical Chemistry
- Pharmaceutical Care/ Clinical Pharmacy



## Credit hours

Clusters	Qassim University (Saudi Arabia)
Biological Sciences cluster	53
Pharmaceutics and Pharmaceutical Chemistry cluster	62
Pharmaceutical Care, and Clinical Pharmacy cluster	67
Total Credit hours	182

# Training program- Qassim University

Qassim University (Saudi Arabia)	
Introductory Pharmacy Practice Experience (IPPE)	150
Advanced Pharmacy Practice Experience (APPE)	50 weeks

## **Advanced Pharmacy Practice Experiences (APPEs)**

APPEs includes 10 clinical rotations. These include 7 core rotations and 3 elective rotations. The students need to choose 3 rotations out of 18 elective rotations. The duration of each rotation is of 5 weeks, 8 hours/day and 40 hours/week.

- 1- Pharmacy Practice I(Inpatient/Outpatient)
- 2- Clinical Nutrition and IV Admixture
- 3- Cardiology
- 4- Internal Medicine
- 5- Critical Care Unit
- 6- Pediatrics(Neonates, Infants or Children)
- 7- Infectious Diseases

Clusters	University of Toronto (Canada ) Prerequisites for PharmD + PharmD program	University of North Carolina (USA) Prerequisites for PharmD + PharmD program	Cairo University (Egypt)	Jordan University (Jordan)	Qassim University (Saudi Arabia)
Biological Sciences cluster	30	28.5	41	39	53
Pharmaceutics and Pharmaceutical Chemistry cluster	40	53.5	101	80	62
Pharmaceutical Care, and Clinical Pharmacy cluster	105	99	33	70	67
<b>Total Credit Hours</b>	175	181	175	189 + 27 (courses not relevant to any of the clusters) Total: <b>216</b>	182

# Training program of all Universities

	University of Toronto	University of North Carolina	Cairo University	Jordan University	Qassim University (Saudi Arabia)
Introductory Pharmacy Practice Experience (IPPE)	320 hours	760 hours	100	480	150
Advanced Pharmacy Practice Experience (APPE)	52 weeks	36 weeks	36 weeks	28 weeks	50 weeks



# Summary

- All pharmacy school programs in the USA and Canada have transitioned to the PharmD program
- In the Arab countries, many pharmacy schools still following the traditional Bachelor of Pharmacy program.
- In the USA and Canada, courses related to pharmaceutical care are offered to students from the first year of the program. While in the Arab countries these courses are taught at the end of the program.
- The Pharmacy curricula in the United States and Canada are very similar. They have many clinical pharmacy subjects, such as pharmacotherapy, pharmaceutical care, and medication management courses.
- A significant variation in the credit hours distribution among the three clusters between North America and the Arab countries (**Pharmaceutical Care, and Clinical Pharmacy cluster**).
- The curricula still require improvements towards implementing more pharmaceutical care and patient-centered care approaches and reducing some courses related to pharmaceutical/biological sciences.

**Thank you for attending**



**كلية الصيدلة**  
**Faculty of Pharmacy**



**الجمعية العلمية لكليات  
الصيدلة في الوطن العربي**



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