



PROGRAM SPECIFICATION
BACHELOR OF PHARMACY (Bylaw 2014)

FACULTY OF PHARMACY
FUTURE UNIVERSITY
2022-2023

Program Specifications (Bylaw 2014 -Academic Year 2022/2023)

A. Basic Information

- 1. Award / degree:** Bachelor of Pharmacy
- 2. Program Type:** Single
- 3. Departments Delivering the Program**
 - 3/a-Faculty Departments**
 - Department of Pharmaceutical Chemistry
 - Department of Pharmaceutics and Pharmaceutical Technology
 - Department of Pharmacology, Toxicology and Biochemistry
 - Department of Pharmacognosy and Medicinal Plants
 - Department of Microbiology and Immunology
 - Department of Pharmacy Practice and Clinical Pharmacy
 - 3/b-Other Faculties and/or departments participating in delivering the program:**
 - Department of University Requirements and Training Center Future University in Egypt.
 - Departments of Faculty of Medicine, Governmental Universities
- 4. Coordinator:**
 - Prof. Dr. Amal Emad – Vice Dean for Education and Students Affairs
- 5. Internal Evaluator:**
 - Prof. Dr. Heba Darwish
- 6. External Evaluator (s):**
 - Prof. Dr. Salwa El-Meligie
- 7. Last date of program specifications approval by faculty council:**
 - September 2022

8. Date of program 9/2014
approval:

B. Professional Information

1. Program Aims towards graduate attributes:

- 1/1. Provide services and medical information to patients and communities about usage of medications and medical devices to participate in optimizing therapeutic outcomes and minimizing illness incidence. **(NARS 1)**
- 1/2. Perform responsibilities and authorities following legal and professional ethics. **(NARS 2)**
- 1/3. Respect ethical code of profession, patients as well as relevant laws and legislations. **(NARS 2)**
- 1/4. Prepare and formulate pharmaceutical products from different sources. **(NARS 3)**
- 1/5. Apply different systems of dispensing, storage and distribution of medications. **(NARS 3)**
- 1/6. Handle chemical substances and pharmaceutical products safely and effectively. **(NARS 4)**
- 1/7. Use different quality management techniques and guidelines to assure the quality of raw materials, procedures and pharmaceutical products. **(NARS 4)**
- 1/8. Provide integrated evidence-based information to assess appropriateness, effectiveness and safety of medications. **(NARS 5)**
- 1/9. Apply effectively proper research methodologies and contribute in planning and conducting different types of researches. **(NARS 6)**
- 1/10. Work in various pharmacy aspects including multi-disciplinary healthcare systems and pharmaceutical industries and actively share in professional decision-making. **(NARS 7)**
- 1/11. Improve therapeutic outcomes and health care services through effective participation with interprofessional health care teams. **(NARS 7)**
- 1/12. Develop personal soft skills as effective communication, critical thinking, problem solving, and time management. **(NARS 8)**

1/13. Acquire presentation, computation, marketing, business administration, leadership and entrepreneurial skills. **(NARS 8)**

1/14. Upgrade his/her professional and scientific information by self and continuous learning and demonstrate capabilities of performance appraisal and self-assessment. **(NARS 9)**

2. Learning Outcomes (LOs) of Program Specification:

Domain 1: fundamental knowledge

Competency 1-1- Integrate knowledge from basic and applied pharmaceutical and clinical sciences to standardize materials, formulate and manufacture products, and deliver population and patient-centered care.

1-1-1 Demonstrate understanding of knowledge of pharmaceutical, biomedical, social, behavioral, administrative, and clinical sciences.

1-1-2 Utilize the proper pharmaceutical and medical terms, abbreviations, and symbols in pharmacy practice.

1-1-3 Integrate knowledge from fundamental sciences to handle, identify, extract, design, prepare, analyze, and assure quality of synthetic/natural pharmaceutical materials/products.

1-1-4 Articulate knowledge from fundamental sciences to explain drugs' actions and evaluate their appropriateness, effectiveness, and safety in individuals and populations.

1-1-5 Retrieve information from fundamental sciences to solve therapeutic problems.

1-1-6 Utilize scientific literature and collect and interpret information to enhance professional decision.

1-1-7 Identify and critically analyze newly emerging issues influencing pharmaceutical industry and patient health care.

Domain 2: professional and ethical practice

Competency 2-1- Work collaboratively as a member of an inter-professional health care team to improve the quality of life of individuals and communities, and respect patients' rights

2-1-1 Perform responsibilities and authorities in compliance with the legal and professional structure and role of all members of the health care professional team.

2-1-2 Adopt ethics of health care and pharmacy profession respecting patients' rights and valuing people diversity.

2-1-3 Recognize own personal and professional limitations and accept the conditions of referral to or guidance from other members of the health care team.

Competency 2-2- Standardize pharmaceutical materials, formulate and manufacture pharmaceutical products, and participate in systems for dispensing, storage, and distribution of medicines

2-2-1 Isolate, design, identify, synthesize, purify, analyze, and standardize synthetic/natural pharmaceutical materials.

2-2-2 Apply the basic requirements of quality management system in developing, manufacturing, analyzing, storing, and distributing pharmaceutical materials/products considering various incompatibilities.

2-2-3 Recognize the principles of various tools and instruments and select the proper techniques for synthesis and analysis of different materials and production of pharmaceuticals.

2-2-4 Adopt the principles of pharmaceutical calculations, biostatistical analysis, bioinformatics, pharmacokinetics, and biopharmaceutics and their applications in new drug delivery systems, dose modification, bioequivalence studies, and pharmacy practice.

Competency 2-3- Handle and dispose biologicals and synthetic/natural pharmaceutical materials/products effectively and safely with respect to relevant laws and legislations

2-3-1 Handle, identify, and dispose biologicals, synthetic/natural materials, biotechnology-based and radio-labeled products, and other materials/products used in pharmaceutical field.

2-3-2 Recognize and adopt ethical, legal, and safety guidelines for handling and disposal of biologicals, and pharmaceutical materials/products.

Competency 2-4 Actively share professional decisions and proper actions to save patient's life in emergency situations including poisoning with various xenobiotics, and effectively work in forensic fields.

- 2-4-1 Ensure safe handling/use of poisons to avoid their harm to individuals and communities.
- 2-4-2 Demonstrate understanding of the first aid measures needed to save patient's life.
- 2-4-3 Take actions to solve any identified medicine-related and pharmaceutical care problems.
- 2-4-4 Assess toxicity profiles of different xenobiotics and detect poisons in biological specimens.

Competency 2-5- Contribute in pharmaceutical research studies and clinical trials needed to authorize medicinal products

- 2-5-1 Fulfill the requirements of the regulatory framework to authorize a medicinal product including quality, safety, and efficacy requirements.
- 2-5-2 Retrieve, interpret, and critically evaluate evidence-based information needed in pharmacy profession.
- 2-5-3 Contribute in planning and conducting research studies using appropriate methodologies.

Competency 2-6- Perform pharmacoeconomic analysis and develop promotion, sales, marketing, and business administration skills.

- 2-6-1 Apply the principles of business administration and management to ensure rational use of financial and human resources.
- 2-6-2 Utilize the principles of drug promotion, sales, marketing, accounting, and pharmacoeconomic analysis.

Domain 3: pharmaceutical care

Competency 3-1- Apply the principles of body functions to participate in improving health care services using evidence-based data

- 3-1-1 Apply the principles of body function and basis of genomics in health and disease states to manage different diseases.
- 3-1-2 Apply the principles of public health and pharmaceutical microbiology to select and assess proper methods of infection control.
- 3-1-3 Monitor and control microbial growth and carry out laboratory tests for identification of infections/diseases.
- 3-1-4 Relate etiology, epidemiology, pathophysiology, laboratory diagnosis, and clinical features of infections/diseases and their pharmacotherapeutic approaches.

Competency 3-2- Provide counseling and education services to patients and communities about safe and rational use of medicines and medical devices

- 3-2-1 Integrate the pharmacological properties of drugs including mechanisms of action, therapeutic uses, dosage, contra-indications, adverse drug reactions and drug interactions.
- 3-2-2 Apply the principles of clinical pharmacology and pharmacovigilance for the rational use of medicines and medical devices.
- 3-2-3 Provide evidence-based information about safe use of complementary medicine including phytotherapy, aromatherapy, and nutraceuticals.
- 3-2-4 Provide information about toxic profiles of drugs and other xenobiotics including sources, identification, symptoms, and management control.
- 3-2-5 Educate and counsel patients, other health care professionals, and communities about safe and proper use of medicines including OTC preparations and medical devices.
- 3-2-6 Maintain public awareness on social health hazards of drug misuse and abuse.

Domain 4: personal practice

Competency 4-1 Express leadership, time management, critical thinking, problem solving, independent and team working, creativity and entrepreneurial skills

- 4-1-1 Demonstrate responsibility for team performance and peer evaluation of other team members, and express time management skills.
- 4-1-2 Retrieve and critically analyze information, identify and solve problems, and work autonomously and effectively in a team.
- 4-1-3 Demonstrate creativity and apply entrepreneurial skills within a simulated entrepreneurial activity.

Competency 4-2- Effectively communicate verbally, non-verbally and in writing with individuals and communities

- 4-2-1 Demonstrate effective communication skills verbally, non-verbally, and in writing with professional health care team, patients, and communities.
- 4-2-2 Contemporary technologies and media to demonstrate effective presentation skills.

Competency 4-3 Express self-awareness and be a life-long learner for continuous professional improvement

- 4-3-1 Perform self-assessment to enhance professional and personal competencies.

4-3-2 Practice independent learning needed for continuous professional development.

3. Academic Standards of Program Specification

3/1 National Academic Reference Standards (NARS 2017):

- NARS (2009) was previously adopted as a reference guiding the faculty to create its own program intended learning outcomes (ILOs), in the faculty council on 18/11/2009 and readopted for bylaw 2014 and approved by Faculty's Council No. (42) in August 2014.
- **Competency based NARS 2017** was adopted as the academic standards of program specifications by the faculty council (17-9-2018). By completion of the program, students should achieve 12 competencies that cover 4 competency domains. These domains cover all essentials for practicing pharmacy profession including both drug-oriented and patient-oriented disciplines. Several Key Elements are included in each competency, with a total of 42 key elements for all competencies. These key elements will reflect each competency in practice. The competency domains are the followings:
 - Domain 1: Fundamental Knowledge
 - Domain 2: Professional and Ethical Practice
 - Domain 3: Pharmaceutical Care
 - Domain 4: Personal Practice
- Accordingly, the program adopted the key elements of competencies of NARS 2017 as the learning outcomes (LOs) of the program. The Academic Standards and Educational Programs committee carried out a gap analysis report between competencies-based NARS 2017 Vs program learning outcome and agreed upon by the faculty council. Consequently, the following procedures were applied:
 1. Workshop for awareness of gap analysis was held.
 2. Determination of gap analysis by all departments to include curriculum needs (topics/ teaching methods).
 3. Modification of program specifications (2018/2019) and (2019/2020) according to NARS 2017 and results of gap analysis.
 4. Courses' specification modification was done accordingly.
 5. The gap analysis was adopted by departments' councils and the faculty council (17 September 2018).
- All actions filling the gap were introduced in the current program specification. The following Alignment Matrices were constructed:

- Matrix 1: NARS 2017 Graduate Attributes Versus Program Aims
- Matrix 2 (a): Program Learning Outcomes Versus Courses (By departments)
- Matrix 2 (b): Program Learning Outcomes Versus Courses (By levels)
- Updating teaching and learning methods and their assessment methods, according to Competency-Based NARS 2017 was added to program specification. Workshops were carried out to train and increase the awareness of staff members about Competency-Based NARS 2017 and the updated teaching and learning strategy and assessment methods.

3/2. **Benchmarks:** Not applicable.

4. Program structure:

- **Duration of the Bachelor of Pharmacy program:** five years (ten semesters) of full-time study. The program is structured into two semesters each year, each term made up of 15 weeks.
- **Number of Credit Hours: Theoretical: 137 Practical: 45 Total: 182**

Courses	Credit hours
University Requirements	12
Elective Faculty Requirements	8
Compulsory Faculty Requirements	162
Total	182

Table (1): Number of studying hours per week in each semester of program

Year	Semester	Lectures		Laboratory / Practical/week		Total Hours	
		Credit hours/week	Contact hours/week	Credit hours/week	Contact hours/week	Credit hours	Contact hours
1 st	1 st	13	13	4	8	17	21
	2 nd	15	15	4	8	19	23
2 nd	1 st	13	13	5	10	18	23
	2 nd	15	15	4	8	19	23
3 rd	1 st	13	13	5	10	18	23
	2 nd	13	13	5	10	18	23
4 th	1 st	14	14	5	10	19	24
	2 nd	14	14	5	10	19	24
5 th	1 st	15	15	4	8	19	23
	2 nd	12	12	4	8	16	20
Total		137	137	45	90	182	227

- **Program Courses by levels:**

A. Study Plan:

First Level/ First Semester

Code	Prerequisite	Course	Credit Hours/Week			Marks			
			Lect.	Pract.	Total	Written	Pract.	Class Work	Oral
PHC 111	-	Pharmaceutical Analytical Chemistry-I	2	1	3	50	30	10	10
PHC 114	-	Pharmaceutical Organic Chemistry-I	2	1	3	50	30	10	10
PHT 111	-	Orientation and History of Pharmacy	2	0	2	70	-	30	-
PHL 111	-	Anatomy and Histology	1	1	2	60	30	10	-
PHT 110	-	Mathematics	2	0	2	70	-	30	-
ENG KET	- Placement into ENG KET	English KET	2	0	2	70	-	30	-
PHG 111	-	Pharmacognosy-I	2	1	3	50	30	10	10
Total Credit Hours			17						

First Level / Second Semester

Code	Prerequisite	Course	Credit Hours/Week			Marks			
			Lect.	Pract.	Total	Written	Pract.	Class Work	Oral
PHG 122	-	Pharmacognosy-II	2	1	3	50	30	10	10
PHC 122		Pharmaceutical Analytical Chemistry-II	3	1	4	50	30	10	10
PHC 125	PHC 114	Pharmaceutical Organic Chemistry-II	3	1	4	50	30	10	10
PHL 122	-	Medical Terminology	1	0	1	70	-	30	-
PHL 123	-	Physiology	3	0	3	70	-	30	-
.....	-	University Elective	2	0	2	70	-	30	-
CSC 101	-	Introduction to Computer	1	1	2	60	30	10	-
Total Credit Hours			19						

Second Level / Third Semester

Code	Prerequisite	Course	Credit Hours/Week			Marks			
			Lect.	Pract.	Total	Written	Pract.	Class Work	Oral
PHC 216	PHC 125	Structural Elucidation of Organic Compounds	2	1	3	50	30	10	10
PHC 213	PHC 122	Instrumental Analysis	3	1	4	50	30	10	10
PHT 212	PHT 111	Physical pharmacy	2	1	3	50	30	10	10
PMI 211	PHL 122	Parasitology	1	1	2	50	30	10	10
PBC 211	PHL 123	Biochemistry-I	2	1	3	50	30	10	10
PHL 214	PHL 122	Pharmaceutical Biostatistics	1	0	1	70	-	30	-
.....	-	University Elective	2	0	2	70	-	30	-
Total Credit Hours			18						

Second Level/ Fourth Semester

Code	Prerequisite	Course	Credit Hours/Week			Marks			
			Lect.	Pract.	Total	Written	Pract.	Class Work	Oral
PHG 223	PHG 111 PHG 122	Phytochemistry-I	2	1	3	50	30	10	10
PBC 222	PBC 211	Biochemistry-II	3	1	4	50	30	10	10
PHT 223	PHT 111	Pharmaceutics-I	3	1	4	50	30	10	10
PHP 221	PHL 123	Pathology & Pathophysiology	3	1	4	50	30	10	10
PSC110	-	Human Rights	2	0	2	70	-	30	-
ENG PET	ENG KET ENG KET-A	English PET	2	0	2	70	-	30	-
Total Credit Hours			19						

Third Level/ Fifth Semester

Code	Prerequisite	Course	Credit Hours/Week			Marks			
			Lect.	Pract.	Total	Written	Pract.	Class Work	Oral
PHC 317	PHC 216	Medicinal Chemistry-I	3	1	4	50	30	10	10
PHT 314	PHT 111	Pharmaceutics-II	3	1	4	50	30	10	10
PHL 315	PHL 123	Pharmacology-I	2	1	3	50	30	10	10
PHG 314	PHG 111 PHG 122	Phytochemistry-II	2	1	3	50	30	10	10
PMI 312	PBC 211	Basic and Pharmaceutical Microbiology	3	1	4	50	30	10	10
Total Credit Hours			18						

Third Level/ Sixth Semester

Code	Prerequisite	Course	Credit Hours/Week			Marks			
			Lect.	Pract.	Total	Written	Pract.	Class Work	Oral
PHC 328	PHC 216	Medicinal Chemistry-II	3	1	4	50	30	10	10
PHT 325	PHT110, PHT212	Pharmaceutics-III	2	1	3	50	30	10	10
PHL 326	PHL 315	Pharmacology-II	3	1	4	50	30	10	10
PBC 323	PBC 222	Clinical Biochemistry	3	1	4	50	30	10	10
PHP 322	PHT 223	Pharmacy Practice-I	2	1	3	50	30	10	10
Total Credit Hours			18						

- **Summer training**

Fourth Level/ Seventh Semester

Code	Prerequisite	Course	Credit Hours/Week			Marks			
			Lect.	Pract.	Total	Written	Pract.	Class Work	Oral
PHG 425	PHG 223 PHG 314	Quality Control of Natural Products*	2	1	3	50	30	10	10
PHL 417	PHL 123	Pharmacology-III	2	1	3	50	30	10	10
PHP 413	PHL 315	Drug Marketing	2	0	2	70	-	50	-
PHP 414	PHL 315	Pharmacoeconomics	1	0	1	70	-	50	-
PMI 413	PMI 312	Basic and Applied Immunology	2	1	3	50	30	10	10
PBC 414	PBC 222	Molecular Biology	1	1	2	60	30	10	-
PHP 415	PHL 315	Community Pharmacy	2	1	3	50	30	10	10
-	-	Faculty Elective	2	0	2	70	-	30	-
Total			19						

*Quality Control of Natural Products was offered in seventh semester instead of Biopharmaceutics and Pharmacokinetics which was offered in eighth semester based on comments of reviewers and approval of faculty council.

Fourth Level/ Eighth Semester

Code	Prerequisite	Course	Credit Hours/Week			Marks			
			Lect.	Pract.	Total	Written	Pract.	Class Work	Oral
PHC 429	PHC 317	Drug Design and Drug Development	1	1	2	50	30	10	10
PHT 416	PHT 325	Biopharmaceutics & Pharmacokinetics*	2	1	3	50	30	10	10
PMI 424	PMI 413	Clinical Microbiology	3	1	4	50	30	10	10
PHP 426	PHL 326	Pharmacotherapeutics-I	3	1	4	50	30	10	10
PHL 518	PHL 326	Toxicology	3	1	4	50	30	10	10
-	-	Faculty Electives	2	0	2	70	-	30	-
Total						19			

- **Summer training**

*Toxicology was offered in eighth semester instead of Pharmacy Practice-II which was offered in ninth semester based on comments of reviewers and approval of faculty council

Fifth Level/ ninth semester

Code	Prerequisite	Course	Credit Hours/Week			Marks			
			Lect.	Pract.	Total	Written	Pract.	Class Work	Oral
PHT 517	PHT 314	Industrial Pharmacy	3	1	4	50	30	10	10
PHT 518	PHT 416	Novel Drug Delivery Systems	2	0	2	70	-	30	-
PHP 427	PHP 221, PHT 416	Pharmacy Practice-II*	3	1	4	50	30	10	10
PHP 518	PHL 417	Pharmacotherapeutics-II	3	1	4	50	30	10	10
PHP 519	PHP 426	Professional Pharmacy Skills & Drug Information	2	1	3	50	30	10	10
-	-	Faculty Electives	2	0	2	70	-	30	-
Total			19						

Fifth Level/ tenth semester

Code	Prerequisite	Course	Credit Hours/Week			Marks			
			Lect.	Pract.	Total	Written	Pract.	Class Work	Oral
PHT 529	PHC213, PHT223,	Quality Control and Quality Assurance	3	1	4	50	30	10	10
PHG 526	PHL 417	Phytotherapy	1	0	1	70	-	30	-
PMI 525	PMI 312	Pharmaceutical Biotechnology	1	1	2	50	30	10	10
PHP 520	PHP 426	Clinical Pharmacy	2	1	3	50	30	10	10
PHP 521	PHP 426	Pharmacoepidemiology, Pharmacovigilance and public Health	3	1	4	50	30	10	10
-	-	Faculty Electives	2	0	2	70	-	30	-
Total Credit Hours			16						

- **Summer training**

B. University Requirements (12 credit hours):

a. Compulsory University Courses: Compulsory University requirements (8 credit hours) and they include 2 English courses (4 credit hours) in addition to the courses of Introduction to Computer and Human Rights

Credit hours/week	Course Name	Prerequisites	Course code
2	English KET	ENG EL pass placement into ENG KET	ENG KET
2	English KET Advanced	Placement into ENG KET-A	ENG KET A
2	English PET	ENG KET pass or ENG KET-A pass	ENG PET
2	English PET Advanced	ENG KET-A with a B+ grade pass or better	ENG PET A
2	Introduction to Computer	-	CSC 101
2	Human Rights	-	PSC110

b. Elective University Courses: 4 credit hours (2 courses of the following):

Credit hours/week	Course name	Prerequisites	Course code
2	Psychology	-	PSY 101
2	Sociology	-	SOC 101
2	Scientific Thinking	-	SCT 101
2	Environmental Sciences	-	ENV 101

C. Faculty Requirements

a. Compulsory Faculty Courses (162 credit hours)

Department	Credit Hours
Pharmaceutical Chemistry	31
Pharmaceutics & Pharmaceutical Technology	31
Pharmacology, Toxicology & Biochemistry	34
Pharmacognosy & Medicinal Plants	16
Microbiology & Immunology	15
Pharmacy Practice & Clinical Pharmacy	34
Total	162

b. Elective Faculty Courses (4 X 2)

Serial no.	Course Title	Course Code	Prerequisites	Credit hours/week
1	Analysis of Food and Cosmetics	PHC 601	PHC 213	2
2	Chemistry of Medicinal Heterocycles	PHC 602	PHC 216	2
3	Skin Care and Cosmetology	PHT 603	PHT 314	2
4	Radiopharmaceuticals	PHT 604	PHT 325	2
5	Drug Evaluation and Bioassay	PHL 605	PHL 326	2
6	Substance Abuse	PHL 606	PHL 518	2
7	Clinical Toxicology	PHL 607	PHL 518	2
8	Clinical nutrition	PBC 608	PBC 222	2
9	Marine Natural Products	PHG 609	PHG 314	2
10	Forensic Pharmacognosy	PHG 610	PHG 314	2
11	Infection and Immunity	PMI 611	PMI 312	2
12	Advanced Biotechnology	PMI 612	PMI 312	2
13	Medical Devices	PHP 613	PHP 426	2

14	Clinical Trials	PHP 614	PHP 426	2
15	Evidenced Based Medicine	PHP 615	PHP 426	2
16	First Aid	PHP 616	PHP 221	2
17	Pharmacy Graduation Project	PGP 617	--	2

D- Summer Training: (graduation requirement) (300 hour)

- Students are required to complete 300 hours of Practical/Field Training for graduation (Hospital and Clinical pharmacy: 80 hrs. Community pharmacy: 80 hrs. pharmaceutical industry: 80 hrs. Miscellaneous: 60 hrs.). Students can start training after the third level and finish them before graduation. Students should follow the summer training description and the method of assessment as described and announced (attached). The student receives a (Pass/Fail) based on the approval of his academic supervisor depending on data in his logbook and the evaluation rubric at the training site at the end of the training period.

E- Graduation project

- Students are required to register the graduation project in addition to 3 faculty elective courses according to faculty council. The student must submit and pass a graduation project in one of the departments specialties determined by the supervising staff member. Graduation project includes thesis and e- portfolio. Thesis are performed in groups of at least two and at most four students. The assessment includes class work, thesis evaluation, and presentation of e-portfolio.

5. Courses Content (courses' specification are attached)

1. *University Requirements (12 Credit Hours)*

A. University Compulsory Courses [8 Credit Hours]:

English Language: 4 credit hours

Prerequisite: -

Since English is the teaching language at FPSPI, all applicants must go through an English placement exam as an enrollment condition. Based on the exam score the students' English level is classified as Elementary level (offered as extra courses which are non-credit), Key English level (KET) or (KET-A) each weigh 2 credit hours or Preliminary English level (PET) or (PET-A) each weigh 2 credit.

ENG KET: English KET (2+0)

Prerequisite: ENG EL or placement into ENG KET

A second tier English language course that focuses on all four skills through the enhancement of language production and reception. The course further builds upon the foundation of the previous course to reinforce language learning. Lexis is drawn from the reading and listening and recycled for consolidation within grammar, writing and speaking. More emphasis is given to fluency thus achieving higher levels of communicative complexity.

ENG KET-A: English KET Advanced (2+0)

Prerequisite: Placement into ENG KET-A

This course is very similar to English KET; however, it caters to the more advanced students. It is a second-tier English language course that focuses on all four skills through the enhancement of language production and reception. The course further builds upon the foundation of the previous course to reinforce language learning. Lexis is drawn from the reading and listening and recycled for consolidation within grammar, writing and speaking. More emphasis is given to fluency thus achieving higher levels of communicative complexity.

ENG PET: English PET (2+0)

Prerequisite: ENG KET or ENG KET A

A third tier English language course encompassing the lexical approach which focuses on communication by emphasizing fluency and accuracy through the development of sub-skill strategies for interaction, through speaking and writing. Topical and functional lexis provide the reference by which language is introduced and recycled within clear natural contexts. Writing is explored through a range of texts, by understanding genre-specific conventions, and developing confidence by planning and discussions and by applying both process and product approaches.

ENG PET-A: English PET Advanced (2+0)

Prerequisite: ENG KET-A

This course is very similar to English PET; however, it caters to the more advanced students. IT is a third-tier English language course encompassing the lexical approach which focuses on communication by emphasizing fluency and accuracy through the development of sub-skill strategies for interaction, through speaking and writing. Topical and functional lexis provide the reference by which language is introduced and recycled within clear natural contexts. Writing is explored through a range of texts, by understanding genre-specific conventions, and developing confidence by planning and discussions and by applying both process and product approaches. This course is very similar to English PET; however it caters to the more advanced students.

CSC 101: Introduction to Computer (1+1)

Prerequisite: -

The course includes theoretical and practical skills. Introduction to information technology: an introduction to digital world –The internet and the World Wide Web: exploring Cyberspace –Software: tools for productivity and creativity –Hardware: CPU and storage system –Input and Output: taking charge of computing and communications –Communication, networks –Personal technology –Databases and information systems.

PSC110: Human Rights (2+0)

Prerequisite: -

This course examines the conceptual foundations of human rights, history of the field, the development of human rights framework and the multidisciplinary character of the field as an

area of study. It covers in details the Universal Declaration on Human Rights, the International Covenant on Civil and Political Rights, the International Covenant on Economic, Social and Cultural Rights and all related agreements. It also touches on the state of Human Rights in Egypt and the Arab World.

B. University Elective Courses [4 Credit are required]

PSY 101: Psychology (2+0)

Prerequisite: -

This course is designed to give students' basic understanding of psychology of human behavior. Students will be given exposure to the concepts, terminology, principles and theories that comprise an introductory course in psychology. Topics covered are to synthesize the broad range of knowledge about psychology, to emphasize research methodology, to encourage critical thinking, and to convey a multicultural approach that respects human diversity and individual differences.

SOC 101: Sociology (2+0)

Prerequisite: -

This course analyses the evolution of human communities from tribal societies to modern states. It examines problems and issues related to the relationship between humans and their environment and their ability to adapt and develop. It also deals with problems of urbanization and hyper-urbanization such as tension, conflict and violence. It also touches on the role of civic society organizations, charities as well as NGOs in creating and maintaining social equilibrium and tranquility.

SCT 101: Scientific Thinking (2+0)

Prerequisite: -

This course provides students with basic understanding of scientific thinking. Students will be given exposure to the concepts, terminology, principles and theories that comprise a course in thinking scientifically. Topics covered are to synthesize the broad range of knowledge about thinking scientifically, to emphasize research methodology, to encourage critical thinking, and to convey a scientific as well as systematic approach to think over a concept.

ENV 101: Environmental Sciences (2+0)

Prerequisite: -

Environmental Sciences course helps students develop knowledge required to critically evaluate environmental problems and issues, and provide applied solutions. The course is decidedly interdisciplinary in nature, focusing on the underlying natural processes relating to the environment, understanding and employing the scientific methods. The course includes studying natural resources, the relationship between environmental issues and society, as well as sustainable development. This course also perceives how respective official and non-official institutions deal with these issues and what sort of impact they have.

2. Faculty Compulsory and Elective Courses (170 Credit Hours)

I. DEPARTMENT OF PHARMACEUTICAL CHEMISTRY

A- Compulsory Courses

PHC 111: Pharmaceutical Analytical Chemistry-I (2+1)

Prerequisite: -

The Course deals with study of qualitative inorganic analytical chemistry, including introduction to the course and identification of different anionic groups, carbonates, sulphates, halides, cyanogens, phosphate, arsenic, and nitrate groups, in addition to different cation groups (I– IV). Emphasis is also given to gravimetric analysis.

PHC 122: Pharmaceutical Analytical Chemistry-II (3+1)

Prerequisite: -

The Course deals with studying the quantitative analysis. The course will cover different types of analytical methods including aqueous and non- aqueous titration, oxidation-reduction titration as well as precipitometric and complexometric titrations. Finally, the course deals with interpretation of the results using statistical methods of analysis and comparison between results in accuracy and precision.

PHC 213: Instrumental Analysis (3+1)

Prerequisite: PHC 122

The course deals with quantitative UV- visible spectrometry and their instrumentation. Colorimetry, emission spectroscopy including theory of fluorescence, phosphorescence, different relaxation processes, and study factors affecting fluorescence, quantitative fluorescence, instrumentation and applications will be covered. The course will also address flame spectroscopy including flame emission and atomic absorption, Electrochemistry including conductometry, potentiometry and

polarography, in addition to different methods of chromatographic separation including GC, TLC, and HPLC.

PHC 114: Pharmaceutical Organic Chemistry-I (2+1)

Prerequisite: -

The course deals with the study of the chemical structures, nomenclature, synthesis and reactions of different classes of aliphatic organic compounds. Special emphasis is given on Bioorganic chemistry for the application of simple organic reactions as oxidation, reduction and hydrolysis. The practical course is designed to expose the student to various functional group reactions and synthesis.

PHC 125: Pharmaceutical Organic Chemistry-II (3+1)

Prerequisite: PHC 114

The course aims at covering the basic knowledge of aromatic organic chemistry and it assures that students will have the skills to apply their basic chemistry knowledge. The course also aims at giving students detailed knowledge about the synthesis - in particular - the green synthesis of aromatic compounds. The course enables students to define the concepts of aromaticity of benzenoid and non benzenoid aromatic compounds, outline the mechanism of the reactions of aromatic organic compounds and describe their synthesis and chemical reactions. The course also aims at giving students detailed knowledge about the mechanism of reactions of Heterocyclic compounds and upon successful completion of this course the students can differentiate most of the heterocyclic organic compounds.

PHC 216: Structural Elucidation of Organic Compounds (2+1)

Prerequisite: PHC 125

This course includes three main concepts; Pharmaceutical Spectroscopic Determinations: course which aims to cover the basics of spectroscopy and elucidation of chemical structures. After attending the lectures and tutorials the students will be capable of independently using the different spectroscopic methods to elucidate the structures of organic compounds, he could solve the spectroscopic problems for organic compounds with the help of his instructors. The practical course is designed to expose the student to the interpretation of various spectroscopic charts and its correlation with structure. The other concept will cover a basic introduction to cheminformatics including chemdraw and molecular docking. The practical course is designed to expose the student to practice basic application of cheminformatics. The course also aims at giving students detailed knowledge about Stereo-chemical compounds. The course ensures that the students has and understand the skills to know the spatial (three-dimensional) structure of organic compounds. and basic knowledge of Stereochemistry. The course also aims at giving students detailed knowledge about the reactions of stereo-chemical compounds with biological receptors.

PHC 317: Medicinal Chemistry-I (3+1)

Prerequisite: PHC 216

The study of the chemical structures, nomenclatures, synthesis, interactions with the receptor sites, Structure Activity Relationships and the metabolic pathways of

different chemical classes of various medicinal active agents including Antibiotics, Anti-infective, anthelmintics, Antifungal drugs, Anticancer drugs, hormones and others chemotherapeutic agents,. The practical course is designed to expose the student to various synthetic and purification techniques in medicinal chemistry.

PHC 328: Medicinal Chemistry-II (3+1)

Prerequisite: PHC 216

The study of the chemical structures, nomenclatures, synthesis, interactions with the receptor sites, Structure Activity Relationships and the metabolic pathways of different chemical classes of various medicinal active including cardiovascular, diuretics, adrenergic, cholinergic, histamine, antihistamines, local anesthetics, CNS active drugs, analgesics, narcotics, and others. The practical course is designed to expose the student to various synthetic and purification techniques in medicinal chemistry.

PHC 429: Drug Design and Drug Development (1+1)

Prerequisite: PHC 317

The course comprising the physicochemical properties of drugs in relation to biological action, drug-receptor interactions, isosterism, drug metabolism, prodrug concept, and principles of drug design and drug development through Molecular Modeling aspects. The course comprises training sessions on computer cheminformatics programs.

B- Elective Courses

PHC 601: Analysis of Food and Cosmetics (1+1)

Prerequisite: PHC 213

The objective of the course is to show the application of analytical chemistry in different fields of food and cosmetics. Students will be introduced to oils and fats concerning composition, physical and chemical examination, analysis according to the pharmacopeial monographs, FDA and pharmacopeial compliance, detection and determination of adulterants. The course will also introduced the classification of cosmetics, types and analysis of additives, preservatives and FDA approved coloring matter, general methods for analysis of volatile and non volatile materials, and their water and nitrogen contents.

PHC 602: Chemistry of Medicinal Heterocycles (2+0)

Prerequisite: PHC 216

The course deals with the modern aspects of the chemistry of medicinally important heterocycles and the correlation of the physical and chemical properties of these pharmacophores and drug activity. In addition, the course covers the chemistry of nucleosides and their functional groups transformations involving both the heterocyclic bases and the sugar tails.

II. DEPARTMENT OF PHARMACEUTICS & PHARMACEUTICAL TECHNOLOGY

A- Compulsory Courses

PHT 110: Mathematics (2+0)

Prerequisite: -

Since mathematical thinking is important for all members of modern society as a habit of mind for its use in the workplace, business and finance, it is deemed necessary to provide the student with basic mathematical knowledge. This course deals with presentation of data, differentiation, and integration with emphasis on their application in pharmacy.

PHT 111: Orientation and History of Pharmacy (2+0)

Prerequisite: -

This course is designed to help the student to understand scope of pharmacy, pharmacy careers and the role of pharmacists in different careers. The course comprises also pharmacy education and pharmaceutical national and international organizations. This course provides the student with the historical background of pharmaceutical sciences and the development of pharmacy profession in ancient Egypt and Arab countries. This course also involves introduction to dosage forms, definition and their classification and additives. The course also includes an introduction to standard prescription notation and familiarization with pharmaceutical Latin terms for weights and volumes. Incompatibilities in prescriptions, their types and methods of corrections are also included.

PHT212: Physical Pharmacy (2+1)

Prerequisite: PHT 111

This course aims to provide the student with good knowledge on some physical pharmacy principles essential for designing dosage form including state of matter and phase equilibria. It will also cover the physical phenomena related to solubility and colligative properties aiming to assets the preparation of pharmaceutical solutions and enhancing the drug solubility in different dosage forms. The course will also cover rheology, surface phenomena and surfactants to help in the production of successful pharmaceutical dispersion systems. The course emphasizing on those phenomena applicable to various topics of pharmaceutics and focusing on the theories behind those needed for dosage form design.

PHT 223: Pharmaceutics I (3+1)

Prerequisite: PHT 111

This course focuses on liquid dosage forms including aqueous and non-aqueous solutions, colloidal dispersions, suspensions and emulsions. The study includes their physiochemical properties, methods of preparation and factors affecting their stability. Pharmaceutical calculations, which are essential to ensure that the right dose and strength is given to the patient, is covered as a section of the course.

PHT 314: Pharmaceutics II (3+1)

Prerequisite: PHT 111

This course comprises study of solid, semisolid as well as molded solid dosage forms. The course provides the student with a comprehensive knowledge of different solid dosage forms including powders, granules, capsules and tablets. The

study includes their types, method of preparation and problems encountered in their manufacture. Semisolid dosage forms include ointments, creams, gels and pastes. Molded solid preparations comprising different types of suppositories are also included.

PHT325: Pharmaceutics III (2+1)

Prerequisite: PHT 110, PHT 212

This course deals with sterile dosage forms, reaction kinetics and drug stability. The course is designed to provide the student with adequate knowledge on sterile dosage forms including parenterals and ophthalmics as well as sterilization processes. It deals also with aerosols and inhalations dosage forms. The course also provides the student with an in-depth knowledge of chemical kinetics underlying the degradation of drugs and methods of determination of the order of the reaction. The course is also designed to provide the student with adequate knowledge about the degradation pathways of the drugs in different pharmaceutical dosage forms and how to predict a product shelf-life. The course also utilizes the knowledge of optimum storage conditions for finished pharmaceutical products.

PHT 416: Biopharmaceutics and Pharmacokinetics (2+1)

Prerequisite: PHT 325

This course introduces the students to the concept of biopharmaceutics and pharmacokinetics. It deals with the kinetics of drug absorption, distribution and elimination as well as the effect of physicochemical properties and formulation on the rate and extent of drug absorption. The course also deals with compartmental models, volume of distribution, multiple dosing, renal, hepatic excretions and assessment of dosage regimen.

PHT517: Industrial Pharmacy (3+1)

Prerequisite: PHT314

This course is designed to make the student able to know the planning construction, validation and maintenance of modern pharmaceutical facilities. The student should be able to know the environmental considerations layout of industrial firms, material for plant construction, packaging materials, ISO and manufacturing of active pharmaceutical ingredients. In addition, the student will be aware about safety measurements in factories. Beside this, the student will learn all the basic knowledge in the area of industrial unit operations (particle size reduction and particle size enlargement, powder and liquid mixing, heat transfer, evaporation, extraction, drying, etc....).

PHT518: Novel Drug Delivery Systems (2+0)

Prerequisite: PHT 416

This course is concentrated with developing fundamentals required for designing novel drug delivery systems (e.g. nano systems & gene delivery ...). The course is designed to let the student gain the essential information for the advancement of targeted drug delivery ranging from small molecules to proteins to genes. The basic principles of pharmaceutical science concentrating the modified release dosage

forms (e.g. controlled release, bioadhesive, floating, microencapsulation and others) will also be included.

PHT529: Quality Control and Quality Assurance (3+1)

Prerequisite: PHC 213, PHT 223, PHT 314, PHT 325

This course is designed to let the student have the necessary knowledge about quality control tests of solid dosage forms (tablet, capsules, effervescent granules and suppositories), semisolid dosage forms (ointments, creams and gels), liquid dosage forms (solutions, suspensions and emulsions) and sterile dosage forms (parenteral, ophthalmic and aerosols). Students will be also aware of the inter-relationship between quality control, quality assurance and good manufacturing practice as well as the concept of process validation (prospective, retrospective, concurrent and revalidation). In addition, the course will cover subjects related to good laboratory and analytical practice, including validation parameters for analytical methods, establishment of analytical methods documentation. etc. It will also cover the development of stability indicating assay as well as the sampling methods and procedures.

B. Elective Courses:

PHT 603: Skin Care and Cosmetology (1+1)

Prerequisite: PHT 314.

The course comprises the study of the function and behavior of skin hair and nails; their response to environmental, physiological and aging factors; cosmetic regulations pertaining to cosmetic product safety. Formulation of skin bleaches, sunscreens, antiperspirants, deodorants, anti-acne, masks, scrubs, cleansing products, shaving preparations, color cosmetics, nail polishes, shampoos and hair setting products (hair colorants, permanent waving and hair straightening) as well as depilatories are included in this course. The course also deals with dermatological reactions of the skin, hair and nails to cosmetic raw materials and formulations, functions, properties, stability, and possible side effects of the active and inactive cosmetic ingredients and formulations.

PHT 604: Radiopharmaceuticals (2+0)

Prerequisite: PHT 325.

The course aims to give students a background of the basic principles of radiopharmacy necessary for the pharmacist to take responsibility in handling and using radiopharmaceuticals efficiently and safely in different clinical applications. This course is designed to let the student understand the clinical applications of radiopharmaceuticals and gain ability to conduct basic radiation dosimetry calculations and dose estimates.

**III. DEPARTMENT OF PHARMACOLOGY, TOXICOLOGY AND
BIOCHEMISTRY**

A- Compulsory Courses

PHL 111: Anatomy and Histology (1+1)

Prerequisite: -

The anatomy course will cover all aspects of visceral anatomy including, introduction to brain and cranial cavity, spinal cord, nerves, vertebral column and back, thoracic & abdominal walls, pelvis & perineum, cardiovascular system, respiratory system, digestive system, urinary system, male pelvis, female pelvis, internal genitalia, breast, and endocrine glands. Histology course aims to enable students to know theoretically and practically the normal histological architecture of organs of various body systems, to correlate between the histological structure & functions of various tissues & organs. The practical part of the course implies macroscopic studying of organ specimens as well as microscopic examination of many tissue sections from various body organs.

PHL 122: Medical Terminology (1+0)

Prerequisite: -

The current course enables students to learn and recognize word roots, prefixes, and suffixes used in medical language today. Students will be also able to learn how to combine words to create meaningful medical conditions as well as comprehend their definition and know the correct spelling. In this course, medical terms related to all major body systems, including muscular system, skeletal system, respiratory system, circulatory system, digestive system, reproductive system, and urinary system will be discussed.

PHL 123: Physiology (3+0)

Prerequisite: -

The current course enables students to know about and recognize the normal structure and function of the body and major systems, to acquire an appropriate functional background of cells, tissues, organs & systems. It also provides information on the integration of physiological functions, which characterize the performance of the human body as a whole in health. Herein, the physiology of the autonomic nervous system and its integration with higher centers, the physiological functions of cardiac muscles and blood with special emphasis on their homeostatic regulation of blood pressure will be further discussed. The renal physiology with regard to control on electrolytes and pH, respiratory function of the pulmonary system, endocrine functions as well as the physiological aspects of neurochemistry in regulating neuronal functions of the central nervous system will also be addressed.

PHL 214: Pharmaceutical Biostatistics (1+0)

Prerequisite: PHL 122

This course represents an introduction to the field of biostatistics and provides a survey of data and data types. Specific topics include tools for describing central tendency and variability in data; scatter of data, methods for performing inference on population means and proportions via sample data; statistical hypothesis testing and its application to group comparisons; issues of power and sample size in study designs; and random sample and other study types. Hence, students will be able to perform a two-sample t-test and interpret the results; calculate a 95% confidence interval for the difference in population means, select an appropriate test for comparing two populations on a continuous measure, when the two-sample t-test is not appropriate,

understand and interpret results from Analysis of Variance (ANOVA), a technique used to compare means amongst more than two independent populations.

PHL 315: Pharmacology-I (2+1)

Prerequisite: PHL 123

This course is the mainstay of all related forthcoming courses including pharmacology II, clinical pharmacology, clinical pharmacy, basic and clinical toxicology and drug abuse. The course offers knowledge about types of drugs, different routes of administration, pharmacokinetics; absorption, distribution, metabolism, elimination and pharmacodynamics; drug effects, receptor families, agonists and antagonists, drug interactions, contraindications and side effects. It also provides information about the pharmacology of autocooids.

PHL 326: Pharmacology II (3+1)

Prerequisite: PHL 315

The course provides knowledge on drugs acting on cardiovascular system including anti-hypertensives, drugs used in coronary artery diseases such as angina and myocardial infarction, drug interventions in heart failure as well as anti-arrhythmic agents. Lipid-lowering agents and drugs acting on the blood system will also be studied. Centrally acting drugs will also be discussed in this syllabus such as anti-depressants, anti-psychotics, anti-nociceptives, anti-parkinsonian, anti-epileptics, and sedative hypnotics. Non-steroidal anti-inflammatory drugs will also be taught.

PHL 417: Pharmacology III (2+1)

Prerequisite: PHL 123

The course entitles good knowledge of a plethora of chemotherapeutic agents such as antibiotics, anti-viral, anti-fungal, anti-TB drugs, beside various cancer chemotherapeutic drug modalities. Pharmacology of the endocrine system will be presented and various hormones and anti-hormones will be addressed.

PHL 518: Toxicology (3+1)

Prerequisite: PHL 326

The course syllabus encompasses history of toxicology, general knowledge of toxicology terms and measures, different toxic episodes; accidental, suicidal, homicidal and non-accidental poisoning, different ways of intoxication and mechanisms whereby poisons exert their effects and how to manage their toxicities. The course also compiles good information on different effect of toxic chemicals, gases, corrosives, metal poisoning, hydrocarbons, alcohols, asphyxiants and pesticides. Many other sub-disciplines will be provided such as plant and animal poisons, food toxicology, environmental toxicology with its multifacets of air, water and soil pollution. The course will also be extended beyond the conventional subjects to study important knowledge about teratogenicity, teratogenic agents and different types of congenital mal formations

PBC 211: Biochemistry-I (2+1)

Prerequisite: PHL 123

This course introduces the concepts of cellular biology including the outlines, functions of cell components, different transport mechanisms through the plasma membrane as well as the basic concepts and fundamentals of biochemistry. The course covers the physical and chemical properties of different biomolecules; carbohydrates, lipids, proteins, and nucleic acids and their functions, enzyme mechanisms and controlling enzyme activity, biochemistry of hemoglobin and the basic principles of molecular biology. The laboratory application to study the physical and chemical properties of different biochemical molecules and the enzyme activity are included.

PBC 222: Biochemistry-II (3+1)

Prerequisite: PBC 211

The course covers the macromolecular metabolic pathways, interconversions and integration of carbohydrates (glucose oxidation, citric acid cycle, gluconeogenesis, glycogen metabolism, and hexose monophosphate shunt, and fructose and galactose metabolisms), lipids (fatty acid metabolism), proteins and nucleic acid (amino acid metabolism, disposal of nitrogen; urea cycle) in well-fed and fasted states. The laboratory biochemical measurements of different enzymes involved in different metabolic pathways enable the students to analyze and interpret the different biochemical data and their clinical significances are covered.

PBC 323: Clinical Biochemistry (3+1)

Prerequisite: PBC 222

The course emphasizes the clinical aspects and applications of biochemistry through identifying the clinical disorders posed by genetic/hereditary diseases and/or related to metabolism, and production of carbohydrates, lipids, proteins, hormones and nucleic acids and providing precise diagnostic means and markers for specific disease situations. The course enables the students to analyze and interpret the different biochemical data and their clinical correlations with respect to the pathophysiological relevances.

PBC 414: Molecular Biology (1+1)

Prerequisite: PBC 222

The course demonstrates an understanding of genome organization in prokaryotes and eukaryotes, outlines the recent advances in approaching gene discovery through, explaining gene expression, regulation and molecular biology techniques. In addition to, cancer development, progression mechanisms (carcinogenesis & apoptosis) and different models of cell division/cell cycle control are illustrated. The course emphasizes new approaches using molecular biology to undertake gene manipulation in diagnosing and controlling different diseases.

B- Elective Courses

PHL605: Drug Evaluation and Bioassay (2+0)

Prerequisite: PHL 326

This course provides knowledge of the basics of biostatistics, different types of data distribution, various tests for validity, scatter of data as well as significance. Students will also study the general principles of drug screening from simple one to more

sophisticated programmed screening. These screening tests are crucial for drug evaluation and discovery. The course offers knowledge about an array of experimental models both in vitro and in vivo which are required for the evaluation of a plethora of drug classes such as adrenergic agonists and antagonists, cholinomimetics and parasympatholytics, anti-hypertensives, cardiotonics, anti-arrhythmias, anti-epileptics, anti-histaminics as well as differential screening of some drug mixtures. The course presents also good knowledge of the biological standardization of a myriad of drugs.

PHL606: Substance Abuse (2+0)

Prerequisite: PHL 518

The course enables the students to learn the neurochemical basis of drug dependence and how it affects the soft and hard use of many abused substances. The psychoactive effects of CNS depressant drugs such as opioids, sedative hypnotics (barbiturates, Benzodiazepines), alcohol, Cannabinoids as well as psychostimulant drugs such as caffeine, cocaine and amphetamines are discussed in details in the current course. Besides, inhalants, hallucinogens and designer drugs are also an integral part of the curriculum. Recent trends in the management of dependence associated with the aforementioned drug classes are also provided.

PHL607: Clinical Toxicology (2+0)

Prerequisite: PHL 518

This course offers exciting, unique program specially designed to provide an extensive, compact review of "need to know" toxicology management and must-learn subjects that give an idea about different ways of poison control; emesis, gastric lavage, charcoal, whole bowel irrigation, hemodialysis, and hemoperfusion. It offers detailed information on the emergency supportive measures provided in poison centers. Many toxicity cases will be covered such as those from occupational hazards, fire smoke, as well as overdose toxicity from household medicinal cabinet.

PBC 608: Clinical Nutrition (2+0)

Prerequisite: PBC 222

The course introduces students to basic concepts of clinical nutrition including; detailed information about micro and macronutrients, types of healthy and unhealthy food, drug-nutrient interactions and essential medical nutrition in particular disease conditions, e.g. cancer; diabetes; obesity, fatty liver etc.

IV. DEPARTMENT OF PHARMACOGNOSY AND MEDICINAL PLANTS

A- Compulsory courses

PHG 111: Pharmacognosy-I (2+1)

Prerequisite: -

This course will help pharmacy students to develop skills and knowledge concerning handling and authentication of medicinal plants either in entire or powdered forms. The course includes methods for detection and identification of natural drugs, especially leaves, flowers, seeds, barks and woods both macro- and micro-

morphologically. It gives the students the required knowledge about the chemical constituents and how to detect them chemically. It also includes methods for selection of genuine natural drugs and differentiation between pharmacopoeial grade, varieties and adulterants. It describes different herbal drugs and their treatment before marketing.

PHG 122: Pharmacognosy-II (2+1)

Prerequisite: -

The course provides pharmacy students with different pharmacognostical means in identification of natural drugs, especially fruits, subterranean, and herbs morphologically and histologically. Additionally, the students will be introduced to the field of chemical natural products dealing with some examples of the marketed unorganized drugs. The course describes methods for detection and identification of them physically and chemically. By the end of this course, the student will be able to recognize and summarize the main characteristic differences between drugs obtained from different organs.

PHG 223: Phytochemistry-I (2+1)

Prerequisite: PHG 111 + PHG 122

This course will help students to develop both the knowledge and skills that enable them to understand, describe and deal with the chemistry of volatile oils, and carbohydrates of both plant and animal origin. The course also offers the primary and advanced methods of chromatography that are currently used for isolation, as well as, qualitative and quantitative determination of biologically active compounds. The course will enable the students to analyze different classes of secondary metabolites using different chromatographic techniques.

PHG 314: Phytochemistry-II (2+1)

Prerequisite: PHG 111 + PHG 122

This course provides the students with both the knowledge and skills that enable them to understand describe and deal with the chemistry of alkaloids, glycosides, bitter principles and tannins of plant or animal origin and the related techniques and chemical methods used to prepare, isolate and analyze the biologically active compounds with brief description of their medicinal uses.

PHG 425: Quality Control of Natural Products (2+1)

Prerequisite: PHG 223, PHG 314

This course deals with identifying quality control procedures required for the assurance of the herbal preparations and valuable extracts. It gives knowledge about different pharmacopoeial quality control values. It will enable the students to analyze different herbal drugs and preparation using advanced chromatographic techniques as HPLC, GC, UPLC ...etc. By the end of this course, the students will be able to evaluate and standardize different herbal preparations and natural products.

PHG 525: Phytotherapy (1+0)

Prerequisite: PHL 417

This course includes the use of herbal remedies for the treatment of different types of diseases. By the end of the course, the student should be able to prescribe herbal remedies for most of diagnosed diseases and comprehend the mechanism of action of most of the active constituents. The course will enable the students to develop their skills and knowledge about the different dosage forms, contraindications and side effects of most common herbal products available in the market.

B- Elective Courses

PHG 609: Marine Natural Products (2+0)

Prerequisite: PHG 314

The course provides a taxonomic survey of the secondary metabolites of diverse marine life including microbes, algae, and invertebrates. The students will be able to demonstrate techniques employed in modern structure elucidation of complex natural products. The course will include natural products in different groups of marine life including chemistry of microalgae and macro-algae, marine bacteria and fungi, and marine invertebrates. The course will include structure elucidation and biosynthesis of marine natural products. Marine toxins and its detection through LC/MS techniques will be included.

PHG 610: Forensic Pharmacognosy (2+0)

Prerequisite: PHG 314

Upon completion of this course, the student will be able to acquire enough knowledge about poisonous plants and their natural products that constitute health hazards, or intended for criminal uses to produce abortion, loss of mental control, hallucination, heart arrest, etc. Students will be able to define and understand drug dependence, narcotic analgesics, hallucinogens, etc. The student will be able to understand and can deal with other types of evidence such as animal and human hairs, textile fibers, toxic fungi and mycotoxins. Upon completion of this course, the student will be able to prepare reports describing their methodologies and findings; and providing professional testimony in court.

V. DEPARTMENT OF MICROBIOLOGY AND IMMUNOLOGY

A- Compulsory Courses

PMI 211: Parasitology (1+1)

Prerequisite: PHL 122

It is an introductory course on the occurrence and importance of human parasitic diseases. It deals with human parasites including protozoans, helminthes and ectoparasites. The vectors of parasites (snails and arthropods) will also be addressed. The course deals with biology of the parasite, clinical symptoms, diagnosis, treatment, prevention and control.

PMI 312: Basic and Pharmaceutical Microbiology (3+1)

Prerequisite: PBC 211

The course covers the fundamental aspects of microbiology including: taxonomy, structure, physiology, growth, reproduction and genetics. Basic techniques for culturing, staining, counting and identifying microorganisms are emphasized in the laboratory. The course will emphasize physical and chemical methods of control such as heat, radiation, and chemical sterilization. Classes and modes of action of chemotherapeutic agents and non antibiotics antimicrobial agents will be addressed. The course will also cover the mechanisms of development of resistance with emphasis on the biochemical and genetic basis of resistance; plasmids, transposons and inversion sequences as related to drug resistance. The course includes also the concepts of Microbial Quality Control and Quality Assurance as they apply to the pharmaceutical industry, laboratory procedures such as aseptic technique, enumeration and identification of micro-organisms from commercial products. Evaluation of antimicrobial effectiveness of disinfectants, preservatives and antibiotics, also vitamins assays.

PMI 413: Basic and Applied Immunology (2+1)

Prerequisite: PMI 312

The course emphasizes the basic principles of host parasite relationship, factors of pathogenicity and virulence, the role of human immune system in health and disease. Factors involved in host response to foreign antigens and detection of disease based on antigen antibody reactions using various immunologic methods. The course covers areas of relevant clinical-pathological interest, ranging from immuno-hematology, lymphoid and neoplasms, to transplantation immunology (both solid organ and bone marrow transplantation), congenital immunodeficiencies, and immunopathogenesis of infectious diseases (including HIV, HBV, HCV, TB, etc.), vaccinology, cancer immunology, and immunotherapy.

PMI 424: Clinical Microbiology (3+1)

Prerequisite: PMI 413

This course includes the introduction of the theory, practical application, technical performance and evaluation of procedures for isolation, identification and susceptibility testing of infectious disease organisms in humans. The microorganisms studied in this course include the bacteria, fungi, mycoplasmas, rickettsiae, chlamydiae, and viruses. Student will learn the concepts of pathogenicity, virulence, diagnosis, treatment, control and prevention of different infectious agents.

PMI 525: Pharmaceutical Biotechnology (1+1)

Prerequisite: : PMI 312

It deals with general introduction to biotechnology, fermentation, microbial growth processes, mode of fermentation processes, and design of a fermentor, achievement and maintenance of aseptic conditions in the fermentor, bioconversion process and major biotechnological products. The course addresses also the biodegradation, bioremediation, gene therapy applications, genetic engineering (applications; recombinant DNA technology; DNA cloning, hybridizations & sequencing) and application of stem cell therapy.

B- Elective Courses

PMI 611: Infection and Immunity (2+0)

Prerequisite: PMI 312

The course deals with the study of mechanisms of microbial pathogenicity including both overt microbial factors and complex interactions with the host that produce symptoms of the disease. The cellular, biochemical, molecular, and genetic basis for modern understanding of microbial disease will be included. An in-depth study of the advanced topics in immunology, primarily focusing on the genetics, mechanisms, and regulation of the immune system will be covered. In addition, the immune response during a variety of disease conditions and immune chemistry will be discussed.

PMI 612: Advanced Biotechnology (2+0)

Prerequisite: PMI 312

This course, taught by a team of instructors, covers different areas of biotechnology. This course introduces students to the different aspects of the biotechnology including principles of recombinant DNA technology, protein engineering, directed mutagenesis, manipulation of gene expression, microbial synthesis of biologics, biomass utilization, large scale production of proteins, transgenic animals, and the human genome project. The course also covers fermentation production of organic acids, amino acids, enzymes, vitamins, and antibiotics and the application in the medical field.

VI. DEPARTMENT OF PHARMACY PRACTICE AND CLINICAL PHARMACY

A- Compulsory Courses

PHP 221: Pathology and Pathophysiology (3+1)

Prerequisite: PHL 123

This Pathophysiology course is designed to promote the understanding and application of fundamental disease processes in clinical settings. General concepts of disease, including etiology, pathogenesis, and clinical significance and to relate them to pathologic changes in cells, tissues, organs and body systems. The course teaches students the pathogenesis of various symptoms & diseases affecting the human body accordingly altered physiological functions of human organs are explained to enable students to understand the relation between the symptoms & the disease, which might be helpful in diagnosis. These concepts are applied in a systems-oriented approach to disease processes affecting e.g. musculoskeletal, cardiopulmonary, renal, nervous, gastrointestinal, immune, hematological and endocrine systems.

PHP 322 : Pharmacy Practice-I (2+1)

Prerequisite: PHT 223

This course continues the process of developing skills needed for pharmaceutical care, including prescription components, pharmaceutical calculations, gathering information to complete a patient database using the medication history, comprehensive drug therapy assessment, identification of medication related

problems, and enhancement of both written and verbal communication skills, focusing on role of pharmacist in hospitals and the pharmacy services provided to in &out patients and counselling patients.

PHP 413: Drug Marketing (2+0)

Prerequisite: PHL 315

The course aims to provide a comprehensive management course to those entering employment in any capacity within the field of pharmacy. This include strategic planning, building the team; leadership and communication; self and time management, negotiation skills; corporate governance; communication in organizations/meetings, total quality management and audit; managing risk and problem solving; business planning, project management and change. This course provides a background of promotion, advertizing, marketing and selling principles as they are specifically related to the pharmaceutical industry and practice. It prepares students to a variety of careers in the pharmacy field including pharmaceutical sales, health information management, and pharmacy distribution system development.

PHP 414: Pharmacoeconomics (1+0)

Prerequisite: -

This course provides concepts of Pharmacoeconomics, beyond the traditional emphasis on cost-effectiveness analysis for reimbursement decisions through presentation of methodology, need and how and where it can come in use. It will explore the broader regulatory and policy environment in Egypt and internationally. The course is complementary to a dedicated cost-effectiveness course with an analytical focus on market studies.

PHP 415 : Community Pharmacy (2+1)

Prerequisite: PHL315

This course focuses on interpretation of prescriptions, principles of compounding and dispensing of medications, pharmaceutical calculations and community pharmacy management. Students learn a systematic approach to assessing, triaging and treating self-treatable conditions about non-prescription or over-the-counter medications: benefits and risks, use in the general population and special populations, therapeutic errors and misuse, storage and disposal, responding to symptoms for recommendation for analgesics and antipyretics, cold, cough, allergy, nighttime sleep-aids, gastrointestinal, dermatological, pediatric, vaginal, anorectal medications, head, hair, nail, nasal, optic, and otic products, dietary supplements, cosmetics, medical devices, kits and accessories.

PHP 426: Pharmacotherapeutics-I (3+1)

Prerequisite: PHL 326

In this course students will integrate information about etiology, pathophysiology, pharmacology, pharmacokinetics, clinical pharmacology, and interpret patient's laboratory investigation together with clinical manifestation of some common chronic and acute conditions. The student can develop rational drug therapy and pharmacotherapeutic plans for patients in order to provide safe, effective, and rational drug therapy in the management of disease states concerning cardiac, vascular,

pulmonary, and gastrointestinal disorders .The role of evidence based medicine in regard to therapeutic decisions is emphasized so that the student can design plans for monitoring pharmacotherapy in patients. In practical sessions students will develop skills in pharmacy practice and patient education.

PHP427: Pharmacy Practice-II (3+1)

Prerequisite: PHP221, PHT416

This course provides the student with the basic information about influence of different disease states including neoplastic disease and special populations. and special population on drug's pharmacokinetics, dosage calculations and correlates them to drug therapy problems as unnecessary drug therapy, needs additional drug therapy, ineffective drug, dosage too low , dosage too high and noncompliance, drug therapy resolution as duplication, dosage, adverse drug reactions and interactions, dose frequency, dosage form, indication mismatches, identifying, reducing, and preventing medication errors; managing the medication use process; medication taking behavior and the practical will focus on preparation of IV admixture as well as total parenteral nutrition.

PHP 518: Pharmacotherapeutics-II (3+1)

Prerequisite: PHL 417

This is the second course on pharmacotherapy in which students continue their study to gain skills of interpreting and integrating information on etiology, pathophysiology, pharmacology, pharmacokinetics, clinical pharmacology, laboratory investigation and clinical manifestation of different common chronic and acute conditions related to neurologic, psychiatric, endocrine, arthritic, infectious diseases and women's health.. The role of evidence based medicine in regard to therapeutic decisions is emphasized and builds upon basic biological, pharmacological and pharmaceutical sciences. Emphasis will be placed on problem-solving practical skills by studying analyzing actual patient cases going through their files in hospitals.

PHP 519: Professional Pharmacy Skills and Drug Information (2+1)

Prerequisite: PHP 426

This course provide the student with concepts and application of effective communication, interpersonal communication, presentation skills, lifelong learning skills, leadership skills, research and analysis skills, problem-solving skills, decision making skills , attitude, and critical thinking skills in pharmacy practice. The course covers patient counseling and patient education. This course is designed to help students understand the types of drug information available and what sources of information are appropriate to use in a variety of situations; the use the internet to obtain drug information and determine the strengths and weaknesses of various types of drug information; concepts of drug information, systematic approach to answering drug information requests, literature evaluation skills: study objective and outcomes, methodology assessment and practicing drug information in different settings. This course teaches the principles of drug information and literature evaluation using the concepts of evidence based practice.

PHP 520: Clinical pharmacy (2+1)

Prerequisite: PHP 426

The course includes seminar, practical sessions and hospital visits. It will focus on the clinical pharmacist role in hospitals giving considerations and skills required for formulating, recommending and applying full pharmaceutical care plan including individualize drug therapy and the proper selection, dosage, and monitoring of drugs and the recognition of clinically significant, efficacious, and/or toxic drug interactions. This course will include field practice in selected hospitals that possess in-patient care facilities so as to provide students with a chance for practical experience as future clinical pharmacists.

PHP 521: Pharmacoepidemiology, Pharmacovigilance and Public Health (3+1)

Prerequisite: PHP 426

The purpose of this course is to introduce the concepts of safety and effectiveness of pharmaceutical products to pharmacy students in addition to the components of health care systems in Egypt. It will also cover the historical and legal background of pharmacovigilance and pharmacoepidemiology. The evaluation of effectiveness includes: pharmacoepidemiology study designs, introduction of diverse topics such as drug utilization reviews, patient reported outcomes, medication error reduction, health disparities, medication use-related database evaluations as well as addressing ADE issues on the individual and population levels, and the application of pharmacoepidemiology principles and methods into practical drug issues focusing on retro- and prospective study design as a future area in pharmacy practice. The course also provides pharmacy student with basic concepts and knowledge of public health to promote the attitude of the student towards Public Health, prevention of diseases and the impact of environment on health and understand the relationship between health and environmental quality such as water, sewage disposal, air, industrial and toxic wastes, and occupational hazards.

B- Elective Courses

PHP 613: Medical Devices (1+1)

Prerequisite: PHP 426

The role of medical devices in healthcare is essential. The diversity and innovativeness of this sector contribute significantly to enhance the quality and efficacy of healthcare. Covering a wide range of products, from simple bandages to the most sophisticated life-supporting products, the medical devices sector plays a crucial role in the diagnosis, prevention, monitoring, and treatment of diseases and the improvement of the quality of life of people suffering from disabilities.

PHP 614: Clinical Trials (1+1)

Prerequisite: PHP 426

This course aims at giving students detailed and comprehensive knowledge about health care system. Students are introduced to different methods of comparing therapy, describing clinical data, assessing risk and causality, clinical decision analysis and the experimental approach to evaluating treatment, as well as conducting a randomized controlled clinical trial.

PHP 615: Evidenced Based Medicine (1+1)

Prerequisite: PHP 426

This course teaches the principles of drug information and literature evaluation using the concepts of evidence-based practice. Skills include identifying resources to answer clinical questions, developing search strategies, and critically evaluating scientific literature, applying the evidence in clinical practice, allowing students to identify, utilize the best evidence to make decisions regarding patient care and exploring.

PHP 616: First Aid (1+1)

Prerequisite: PHP 221.

The course includes the first aid measures for different types of accidents as well as some critical medical conditions e.g. coma, cardiopulmonary resuscitation, burn, fractures, choking, drowning, wounds, bleeding, shock, and poisoned patients

PGP 617: Pharmacy Graduation Project (1+1)

This course provides pharmacy students with the opportunity to conduct simple research projects on a selected topic of interest. The course also serves as a learning tool for self-assessment, self-awareness and lifelong learning and supports evidence of competency defined by established performance standards. (e-Portfolio).

6. Program Admission Requirements:

- The Faculty of Pharmaceutical Sciences and Pharmaceutical Industries at FUE follows the regulations and score set by the Supreme Council of higher education in Egypt.
- FUE accepts students holding the Egyptian General Secondary Certificate of Education (Thanawya Amma) or its equivalent, as per the rules and regulations set by the Supreme Council of the Egyptian Universities; Thanawya Amma from other Arab countries, the American High School Diploma, the British Secondary School Certificates (GCSE, IGCSE), the German Secondary School Certificate (Abitur), the French Secondary School Certificate (Baccalaureat de L'Enseignement Secondaire), and the International Baccalaureate.
- According to the regulations of the Egyptian Ministry of Higher Education, all students who have an Egyptian nationality holding foreign high school certificates and who did not take Thanawya Amma Arabic Language and religion exams during their high school MUST sit for and obtain a passing grade in the Thanawya Amma Arabic Language and religion exams prior to graduation from the University.
- All new students applying for admission at FUE must sit for the English Placement Test (EPT) and achieve the required English proficiency level before they can enroll in English language credit courses. Students will be placed according to their

scores in five levels of extra English language courses. Students holding a valid International TOEFL certificate with an equivalent score of 550 or ILETS of valid score 6.5 and above are exempt from the placement test.

- According to the university regulations, applicants should pass a medical examination prior to their acceptance.
- Students, who had their General Secondary certificate or its equivalent two years before the date of submission, can apply to the university on condition that they were not registered in other Universities the year they had their certificate and according to the previously mentioned regulations.

Requirements for Transfer-Students:

- **Transfer from other Universities**
 - The transfer student must fulfill FUE admission requirements including the attainment of high school certificate with a score complying with the Supreme Council of Egyptian Private Universities regulations for the year during which the certificate was obtained.
 - Applicants should pass the tests specified by the University.
 - Transfer students should study in the faculty for at least four semesters with a minimum of 50 credit hours.
 - The student must submit official transcripts of the courses taken with detailed course descriptions stamped from an accredited university, including the credit hours and grades achieved.
 - Upon final acceptance at FUE, the student will be requested to submit a withdrawal letter from the previous university.
 - Courses that accepted to be transferred must be substantially the same in both content and quality to that of FUE courses.
- **Transfer from FUE Faculties:** Transfer from an FUE faculty to another is only available within two weeks from the beginning of the semester during the Add/Drop period. Students who wish to transfer from one faculty to another must obtain the approval of both the Dean and the academic advisor. Students score should be compatible with the score required by the faculty they want to join.
- **Registration:** Each student is assigned an academic advisor from the faculty staff. At the beginning of each semester, the student selects the courses to be studied

during the semester from the list of courses offered by the faculty, with the guidance and consultation of the academic advisor assigned to him and according to the general study plan. The selected courses could only be studied after successful completion of the pre-requisite for registration.

- **Academic load:** The academic load is the number of registered credit hours per student each semester. The academic load in each semester for regular students ranges from 12-19 credit hours. Distinguished students (having cGPA 3.5 or more) could register more hours (with a maximum of 21 hours) after the approval of the academic advisor and the Vice Dean of education and students' affairs. Academic load could also be increased to 21 hours for graduation purpose, on condition that the cGPA should not be less than 2. If a student is put under probation (obtaining cGPA less than 2), he is not allowed to take an academic load more than 14 hours. The academic load for the summer semester is 7 credit hours and could be increased to 9 for graduation purpose.
- **Add/drop:** The student is allowed to add or drop a course within the first 2 weeks from the beginning of the semester.
- **Withdrawal, absence, and deprivation:** The student is allowed to withdraw a course during the first ten weeks of the semester. If the absence percentage was more than 25% in the twelfth week, the student will not be allowed to withdraw the course and will be deprived from the final exam, and he receives an (F) grade.

7. Regulations for progression and program completion

- First Year (Freshman):** Students are required to complete less than 36 credit hrs.
- Second Year (Sophomore):** Students are required to complete from 36 to less than 73 credit hrs.
- Third Year (Junior):** Students are required to complete from 73 to less than 109 credit hrs.
- Fourth Year (Senior1):** Students are required to complete from 109 to less than 147 credit hrs.
- Fifth Year (Senior 2):** Students are required to complete from 147 to less than 182 credit hrs.

Requirements for Graduation: To graduate, a student must pass all required courses and achieve a minimum cumulative GPA of 2.00. Students are required to complete 300 hours of Practical/Field Training.

Calculation of CGPA:

$$CGPA = \frac{\sum_{\text{for all studied courses}} (\text{Grade of a course} \times \text{Credit hours of the course})}{\sum_{\text{for all studied courses}} (\text{Credit hours})}$$

The Equivalent Grade to each CGPA

CGPA	Grade	Percentage	Equivalent Grade
4.0	A	90 to 100	Excellent
3.7	A-	85 to <90	
3.3	B+	80 to <85	Very Good
3.0	B	75 to <80	
2.7	B-	72 to <75	Good
2.3	C+	70 to <72	
2.0	C	67 to <70	

Honors: Students with a cumulative average of 3.7 or above at graduation are granted a B.Sc. with 1st class honors. Students with a cumulative average between 3.0 and 3.7 at graduation are granted a B.Sc. with 2nd class honors. To be granted with class honors, students must not fail in any of the provided courses.

8. Teaching and Learning methods

- Blended education (Online and on campus lectures and labs)
- Tutorials
- Laboratory Sessions
- Experiential education (Case Studies- Role Play- Hospital visits- Apps. - Patient counselling), simulation

- Field Trips
- Learning projects
- Problem Solving
- Workshops
- Summer training
- Graduation project

9. Assessment Methods for Students:

Exam	Courses with practical sessions		Courses without practical sessions	
	With Oral Exam	Without oral exam	With oral exam	Without oral exam
• Written exams:				
- First Midterm	5%	5%	10%	10%
- Second Midterm	15%	15%	20%	20%
- Final exam	30%	40%	40%	40%
• Class Work	10%	10%	20%	30%
• Practical exam	30%	30%	--	--
• Oral exam	10%	--	10%	--
Total	100%	100%	100%	100%

- The student will receive an (F) grade if he obtains a mark less than 30% in the final written exam.
- A student either receives a Pass or Fail in summer training.

10. Evaluation of the program

Evaluator	Tool	Sample
1. Senior students (Students at level 5)	- Meetings - Questionnaire	25%
2. Alumni	- Questionnaire	20%

3. Stakeholders	- Questionnaires. - Meetings	Representative samples from different related sectors
4. Internal evaluator (s)	Report	1
5. External Evaluator (s)	Report	1-2
6. Other Audits	Reports from external reviewers of the course	one per department

Program Coordinator:	Prof. Dr. Amal Emad – Vice Dean for Education and Students Affairs
Signature of Faculty Dean	Prof. Dr. Hanan Refaat
Faculty Council Approval Date	9/2022

