



# **HARMONIZED CURRICULUM FOR TRAINING OF PHARMACY TECHNICIANS IN THE ECOWAS REGION**



2014



West African Health Organisation (WAHO)  
Organisation Ouest Africaine de la Santé (OOAS)  
Organização Oeste Africana da Saúde (OOAS)



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## ACKNOWLEDGEMENTS

The thought to harmonize the existing training programmes for Pharmacy technicians within the ECOWAS Region, though much more lately compared to that for the training of pharmacists themselves, is very laudable. This is so because it formidably makes holistic the harmonization of programmes for training pharmacists and Pharmacy-auxiliaries.

After recognizing the subtlety of not only the complementary role of the technician to the functional tasks of the pharmacist but its indispensable importance, based on concretely convincing argument advanced by the PO/Pharmacy, it was felt yet timely to harmonize the programmes for training of Pharmacy technicians.

Cognizant of the rapid speed with which all that bear stake in the training of this grade of pharmaceutical health practitioners put in so as to get its harmonization on par with those of Pharmacy (-proper) and other healthcare disciplines, the Director-General (DG) of WAHO commends them for their expended dexterity thereof. Particularly representatives of existing Pharmacy technician training institutions, representatives of Pharmacists and Nurses Councils (which are otherwise called Pharmacy and Nursing Boards) and of course staff of WAHO that participated in the process cannot be forgotten.

It is ardently hoped that, following the approval of this curriculum by the ECOWAS AHM, all provisions enshrined herein will be implemented by all member countries and that others wherein no institutions exist for the formal training of Pharmacy technicians will be encouraged to commence establishment of same. To this end, WAHO stands ready to render whatever facilitation may be requested of it by any Pharmacy technician training institution of any of the ECOWAS countries.

**Director General  
WAHO**



Dr Xavier Crespin.



## FOREWORD

The role of the Pharmacist technician is undoubtedly a big part of the changing role of the pharmacist, the latter which thus requires a modified curriculum for the training of today's pharmacist that will correspondingly compensate for the needed changes. Likewise there exists a similitude for the role and training of the Pharmacy technician. Some brief argument for this is narrated below.

Although the pharmacist could simply but yet accurately be described as the health professional who is trained to prepare and dispense drugs, the role mentioned in this definition/description (Family Health Magazine, 2013) is only a part of the pharmacist's job description which itself has been changing. Not only is it that the role, particularly that of the today's pharmacist, is changing but it has assigned many functional requirements to the pharmacist. For instance, of the thousands of (e.g.) prescription medicines that now exist, s/he is expected to be familiar with all as well as understand the effects of over-the-counter (OTC) drugs, vitamins, herbal and other natural medicinal products. More than this, they, as an integral part of the process of rational prescribing initiated by the physician in ensuring that the right patient gets the right medication, in the right strength, and in the right way as well as monitor the wide spectrum of said medications when so prescribed, must be familiar with the standards of treatment for many disease conditions such as diabetes, asthma and infections. And so is required of them to be on the alert for any interactions between drugs, foods and medical conditions. Succinctly put, the focus of the pharmacist's work or role has changed from a type of work that is based on commercial business to a profession that is more patient care-oriented.

Just as the role of the pharmacist has not merely changed but diversified today, the trend of her/his training has correspondingly changed. This change is in terms of the duration, the pedagogic and learning materials and the methodology of the training. Of note and no exception, relative to the training and/or learning tool, is technology – particularly use of the computer. An example is the use of the computer to enter prescription or demographic information, to take inventory of stock and to place orders.

Despite the availability of the technological tools and approaches employed by the pharmacist, s/he can only be efficient and effective on the job provided there is a relevantly trained person to assist her/him: this role is the primary function served by the Pharmacy technician. The Pharmacy technicians are, hence, a big part of the changing role of the pharmacist. In fact and as a vivid example, the work that the Pharmacy technician does enables the pharmacist (under whom s/he works) to spend more time with clients and to ensure that the right medication in the right dose is reaching the right patient. Technicians are therefore one main reason why more pharmacists can get out from behind the counter to discuss individual concerns with their patients and other would-be attended subjects and provide more education about managing chronic conditions.

Another important role, though rarely thought of and/or about which there considerably exists no adequate literature, of the Pharmacy technician and the reason for which her/his training needs to be taken very seriously much more than before is that s/he has a mutual role to play in the education/training of pharmacists (or best called, pharmacists-proper). In an article of the American Journal of Pharmaceutical Education, Mack argues that (Mack, 2008) the practice of Pharmacy dictates that Pharmacy technicians will have an impact on the (Pharmacy) student's practice-based experience. Some examples provided by Mack are (1) that the degree of mastery of activities such as processing, dispensing, and billing is likely to be influenced by the types of interactions between student pharmacists and practising Pharmacy technicians, although it is

thought that it is the ultimate responsibility of the Pharmacy educator/practising pharmacist to provide the (Pharmacy) student with adequate opportunities for growth and development such as the run of these roles. (2) The Pharmacy student gains experience in the intravenous (IV) room or the filling station as s/he pairs with Pharmacy technicians. It suffices then to say that the level of training and motivation of the Pharmacy technician deserve attention from all investments, including their stake holding sources, in the quality of Pharmacy student training and that consideration must be given to the Pharmacy technician's attitude toward teaching and the expectations communicated to the Pharmacy technician about student training.

It is in the context of the aforementioned scenario that WAHO was alarmed by the fact that most ECOWAS member countries lack training institutions for the formal training of Pharmacy technicians. In addition, WAHO has also noted that there are marked differences in the quality of existing Pharmacy technician training programmes in the region. To address such a lack and dissimilarities or disparities, just as was earlier observed and done in the case of the training of pharmacists, it has decided to facilitate harmonisation of training programmes, including curricula, for Pharmacy technicians in the region.

The provisions contained herein this document are contents of a harmonized curriculum for the training of Pharmacy technicians in the ECOWAS region. It is minced into seven important broad parts. Parts 1, 2 and 3 respectively talk about the general provisions (e.g. philosophy, objectives, nomenclature of the to-be-awarded qualification at end of the training, admission requirements/conditions and duration of the training programme); general structure of the programme (umbrella subject areas) and evaluation structure including accreditation. The last four parts respectively dwell on the infrastructural and human resource requirements; format of description of courses; the titles, objectives contents, methodology of delivery and the references of the teaching materials and the credits assigned to the work in each course.

## ABBREVIATIONS AND ACRONYMS

Abbreviation/Acronym	Expansion
<b>AHM</b>	Assemblies of Health Ministers
<b>A.S.</b>	Associate of Science (Degree)
<b>Bac. Sc.</b>	Baccalauréat Scientifique
<b>DG</b>	Director- General
<b>ENT</b>	Ear, Nose and Throat
<b>ECOWAS</b>	Economic Community of West African States
<b>Litr. Desgn</b>	Literal Designation
<b>LPTSP</b>	La License Professionnel de Technicien supérieur en Pharmacie
<b>LPTP</b>	La License Professionnel de Technicien en Pharmacie
<b>Numr. Desgn</b>	Numerical Designation
<b>OOAS</b>	Organisation Ouest Africaine de la Santé
<b>OTC</b>	Over-the-counter
<b>PCN</b>	Pharmacists Council of Nigeria
<b>PO</b>	Professional Officer
<b>PO/</b>	Professional Officer for
<b>SSSC</b>	Senior Secondary School Certificate
<b>WAHO</b>	West African Health Organisation
<b>WASSCE</b>	West African Senior Secondary School Certificate Examination

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## **PART I: GENERAL PROVISIONS**

### **I.1 Philosophy and Objectives of the Program for Pharmacy Technicians Training**

#### **1.1.1 Philosophy**

The philosophy of training of Pharmacy Technicians is to produce well-trained and well-qualified professionals who work under the supervision of the pharmacist.

#### **1.1.2 General Objective**

The ultimate goal of the program is to train a certain staff with the skills needed to assist in an efficient and responsible manner in compliance with the rules of the pharmacist, under whose responsibility he works.

#### **1.1.3 Specific Objectives**

At the end of the training a graduate should be able, under the responsibility of the pharmacist and in this regard, to:

- i. Participate in the management of a pharmacy at all levels of the health system
- ii. Ensure and promote information, education and communication about medicines to the population and health professionals
- iii. Promote evaluation, improving quality of service at a pharmacy
- iv. Perform pharmaceutical preparations
- v. Provide Medicines Control

### **1.2 Nomenclature**

The diploma issued is:

- The Professional Pharmacy Technician Bachelor's Degree (Francolusophone Countries)
- Associate of Science (A. S.) Degree for Pharmacy Technicians (Anglophone Countries)

### **1.3 Minimum Eligibility**

Minimum Admission Requirements are.

- SSSC / WASSCE Certificate (Anglophone)
- Bac. Sc. (Francolusophone)

### **1.4 Duration of Training Program**

Duration of study: 3 years

### **1.5 Level of Harmonisation for Pharmacy Technician Training Programmes**

- a. This harmonized curriculum is for the purpose of regional integration and not necessarily uniformity of programmes.
- b. Core and Elective Courses: Participating countries/schools should decide on what constitutes core and elective courses. Thereof, the correct load of the core courses should be at least 60% of total credit required to graduate. Implied, where any of the courses herein listed is already contained in the curriculum of a Pharmacy technician training institution of an ECOWAS member country, it could be offered as specified by said Pharmacy technician training institution.
- c. Member countries are to adopt and feel free to modify its provisions so as to suit their needs. As such, institutions therein are at liberty to prescribe textbooks, for their programmes, in addition to what are herein recommended or their contemporaneously latest editions and other learning and teaching aides, where mention of these was not made for any of the courses.
- d. Any Pharmacy technician school that implements 70% and above, shall be deemed to have complied with the conditions of harmonization.

**PART II:**  
**GENERAL STRUCTURE OF THE PHARMACYTECHNICIAN TRAINING**  
**PROGRAMME**

The Pharmacy technician training programme is structured so as to provide the student with knowledge in the following areas of training:

- 2.1 General Studies
- 2.2 Basic Sciences
- 2.3 Pharmaceutical Sciences
- 2.4 Biomedical Sciences
- 2.5 Management and Administration Sciences
- 2.6 Public Health Disciplines
- 2.7 Practical Training : Practical Attachment / Externship

## **PART III: EVALUATION STRUCTURE**

The evaluation will consist of that of the students and the programme.

### **3.1 Student Evaluation:**

- Written Examination (continuous assessment / oral and end-of-semester examination)
- Practical Evaluation
- Validation of externship
- Each training course will be assessed by a combination of continuous tests and tests of the end of the semester.
- The evaluation will consist of continuous tests, quarterly compositions, reports and or laboratory tests (written, oral or practical supervision, attendance, etc., depending on the institution).
- The evaluation of the end of training will consist of written and oral tests and practical exams.
- The minimum passing grade for all courses registered for per a given academic term and cumulative grade point for promotion to another higher level shall be fifty percent (50%).

### **3.2 Programme Evaluation**

- Regional Council for Training of Health Professionals
- Scientific Council
- Review Workshop
- National authority on education
- Pharmacy Board / Council

The method of program evaluation may include review workshops.

### **3.3 Accreditation Programme**

An accreditation system should be put in place to ensure the quality of teaching and program outputs. This should be implemented by the same authorities mentioned in provision 3.2.

## **PART IV: HUMAN RESOURCE AND INFRASTRUCTURAL REQUIREMENTS**

### **4.1 Academic Staff**

- Depending on the number of students enrolled, the instructor - student ratio is 1 / 10.
- Every and each instructor must have an advanced degree and / or appropriate professional qualification.

### **4.2 Academic and Physical Space**

- There shall be appropriate auditoria, classrooms, laboratories, reading rooms and offices for the staff and other research areas.
- For their externship, students shall be attached to only hospitals, pharmacies and other relevant sites accredited by the national Pharmacy practice regulatory authority. Hospitals and accredited pharmacies.

### **4.3 Library and Information Resources**

- There must be a school library with books, newspapers and periodicals for appropriate reference in all areas of Pharmacy. Access to the Internet is highly - desirable.

### **4.4 Laboratories and Equipment**

- There must be well-equipped laboratories with facilities for effective learning as required by the curriculum.

### **4.5 Teaching and Learning Methodology**

- Problem solving Case studies should be integrated in order to instill in the students the self-learning attitude that promotes the ability to learn throughout life required by the environment and the challenges of the future.

## **PART V: FORMAT OF DESCRIPTION AND CODING OF COURSES**

### **5.1 Description of Courses**

The description of the courses should be of such that it is developed along the following sequence or contains all elements mentioned therein:

1. Code and Title of courses and subject areas as applicable in in-country /institution
2. Objective (s)
3. Topic/s (Content /s)
4. Delivery (Teaching methodology)
5. Evaluation
6. Reference books/materials

### **5.2 Course Coding**

Each course should have a code and a descriptive title. Although each in-country Pharmacy technician training institution has the liberty to devise its own course coding system, the code should have, at least, a literal component and a numerical part following it.

For instance, supposing that the literal part is a four-letter portion which is derived from a “re-arranged” abbreviation of the name of the core subject (e.g. Chemistry, Botany, Zoology, Pharmacology, etc.). one could have, for instance, CHEM, MCHE, CPHA, COPH, etc. to respectively represent Chemistry, Medicinal Chemistry, Clinical Pharmacy and Community Pharmacy.

Also supposing that the numerical part of the course code is either only a four-digit number or a five digit-number (where the course appearance serial number is respectively a one-digit or a two-digit number) , the following could be obtained: the first digit represents the year in which the course is offered; the second indicates the course area (e.g. Mathematics & Statistics; Physics & Chemistry; Biology; Pharmaceutical Sciences, Methodology, etc.) of a given academic term; the third digit (for a one-digit serial number) or two-digit serial number represents, by semester, the serial number of the course whereas the fourth or fifth digit (in the case of a four or five-digit number) indicates the semester wherein it is offered.

NB: The serial numbers for the courses areas are the respective numbers indicating the chronological sequence of their appearance, per a given semester, as found on the Spread sheet in part VII showing the credits for the courses.

Thus MATH 1111: indicates that this is a Mathematics course that is taught in first year of the programme under Course Area #1 as course 1 in the first semester.

BOTA 1242: Botany-I (fully described as General Botany), is a course taught in the second semester of year 1, as course number #4, under course area # 2.

CHEM 2111: Chemistry (fully described as Organic Chemistry-II), is a course taught under course area # 1 and as course #1 in the first semester of the second year.

PHCO 3371: Pharmacology-I (fully described as General & Molecular Pharmacology), is a course taught in the third year under Course area #3 and as course 7 in the first semester.

PHCO 3111: Pharmacology-II (fully described as Applied Pharmacology), is a course taught as course number 1 under course area number 1 in the first semester of year 3.

COMM 2131: Communication Skills (fully described as Oral and Writing Techniques) is a course taught, as course 3 under course area 1, in the first semester of year 2.

PHAR 34101: Pharmacy-IV (Fully described as Pharmacy Law & Ethics) indicates that this is the 10th course offered under course area #4 in the first semester of year 3.



**PART VI:**  
**OBJECTIVES AND CONTENTS OF COURSES**  
**PER SUBJECT AREAS**

**6.1 General Studies Courses**

**LANG 1121: Foreign Language (English/French/Portuguese)-I**

**Objectives:**

1. To facilitate communication within ECOWAS.
2. To facilitate the exploration of academic and professional print and electronic resources.

**Contents:**

Countries must choose a foreign language with a focus on medical terminology (English, French, Portuguese).

**RECOMMENDED TEXTBOOKS**

1. Académie Nationale de Pharmacie (2009). Lexique médico-pharmaceutique d'abréviations, sigles et acronymes anglais et français. Paris: Pharmathèmes.
2. Académie Nationale de Pharmacie (2002). Glossaire médico-pharmaceutique anglais-français. Paris: Pharmathèmes.
3. Académie Nationale de Pharmacie (2001). Dictionnaire des sciences pharmaceutiques et biologiques. Paris: Louis Pariente. ISBN 10: 2840590565/13:9782840590569.
4. A. Kempton (1994). English for science Livre de l'élève. Paris : Éditions Belin.
5. Blattes, S., Jans, V. et Upjohn, J. (2013). Minimum Competence in Scientific English: *Pap-ebook Edition 2013*. Les Ulis (Paris): EDP Sciences.
6. Carnet, D., Foucher, G., Walker, P. et Jeannin, L. (2001). Words, Sciences de la santé. Paris : Éditions Ellipses.
7. Cristina Northleet Albuquerque (2009). Dicionário de Termos Farmacêuticos, 1<sup>a</sup> edição. Rio de Janeiro: Editora Guanabara Koogan: ISBN: 9788527715508.
8. François Tuffreau , dir. (2013). Dictionnaire de l'organisation sanitaire et médico-sociale, 2e éd. Rennes: Presses de l'EHESP. ISBN: 978-2-8109-0107-4.
9. Gladstone (2002). Dictionnaire anglais-français des sciences médicales et paramédicales. Québec / Paris: Éditions Edisem / Maloine.
10. Jean-Yves Pabst et Frédérique Berrod (2012). Dictionnaire des principaux termes de droit pharmaceutique. Paris: Éditions de Santé.
11. Manu Feildel (2014). French for Everyone, 1st edn. Melbourne: Penguin Books Aus. ISBN-10: 1921383410; ISBN: 9781921383410.

12. Mary E. Crocker. (2013). French Grammar, 6th edn: *Schaum's Foreign Language Series*. New York: McGraw-Hill Education. ISBN-10: 0071828982; ISBN-13: 978-0071828987.
13. M. Díaz-Gilbert (2009). English for Pharmacy Writing and Oral Communication. Philadelphia: Lippincott Williams & Wilkins, 2009 ISBN: 0781774322.
14. Overy, R. and Lecanuet. (2003). Hugo in Three Months French: Your Essential Guide to Understanding and Speaking *French*. London : Dorling Kindersley Publishers Ltd. ISBN-10: 1405301007/ ISBN-13: 978-1405301008.
15. Paul Teyssier. (1976). Manuel de langue portugaise: Portugal-Bresil. Paris: Editeur Klincksieck. ISBN-10: 2252017929/ ISBN-13: 978-2252017920.
16. R. Diez De La Cortina (1990). Conversational French in 20 Lessons: Cortina Method. New York: Cortina Learning International Inc./Henry Holt & Co. (ISBN: 0-8327-0003-7/0-8327-0011-8).

## **LANG 1122: Foreign Language (English/French/Portuguese)-II**

**Objectives and Content:** Same as those for Foreign Language-I.

### **RECOMMENDED TEXTBOOKS**

Same as those for Foreign Language-I.

## **MATH 1111: Mathematics-I (Basic Mathematics)**

**Objective:** Review of the basics of Arithmetic, Algebra and Geometry to address content of the course Math II of the program.

### **Contents:**

1. Integers;
2. Fractions;
3. Divisions of whole numbers and decimals angles;
4. Proportions (percentages, ratios, etc.) and the closed figures (circle, triangle, rectangle; polygon, etc.) and their properties (e. g, volume calculations, surface, etc.);
5. Studies functions (integers, logarithmic, derivatives, vector, differential).

### **RECOMMENDED TEXTBOOKS**

1. Angela Maria Vidigal e cols. (2009). Fundamentos de álgebra, 1ª Edição. Belo Horizonte: Editora UFMG. ISBN: 9788570414502.
2. Jean-Luc ROCUET (2013). Mathématiques générales, 3ème édn. Brest : ESTA (Édition des Sciences et Techniques Avancées).
3. L. Lang. (2006). Painless Algebra, 2nd edn. Hauppauge (NY): Barron's Educational Series, Inc. 2006 ISBN: 9780764134340.

4. Mark Zegarelli (2009). *Matemática Básica & Pre-Álgebra para Leigos*, 1ª edição. Rio de Janeiro: Editora Alta Books. ISBN: 9788576085072.
5. Mary Jane Sterling. (2008). *Álgebra I: Para Leigos (For Dummies)*, 1ª edição. Rio de Janeiro: Editora Alta Books. 9788576082569
6. Mary Jane Sterling. (2013 ) *Álgebra II: Para Leigos*, 1ª edição. Rio de Janeiro: Editora Alta Books. ISBN: 9788576086963
7. Selby, P.H. and Slavin, S. (1991). *Practical Algebra: A Self Teaching Guide*, 2nd edn. Hoboken (NJ): John Wiley & Sons, Inc.1991 ISBN: 9780471530121.

### **MATH 1112: Mathematics-II (Applied Mathematics)**

**Objective:** To introduce the student in applied mathematics: In retailing; The pricing of prescription drugs; In Inventory; and Control and Monitoring of Inventory Movements.

**Content:** Calculation of:

1. Doses;
2. Price;
3. Margins;
4. Proportions;
5. Dilutions;
6. Concentrations, including
  - Volumes,
  - The weight of volumes,
  - Volumes by weight;
  - Molarities;
  - Molalities;
  - Densities;
  - Powders.

### **RECOMMENDED TEXTBOOKS**

1. Angela Maria Vidigal e cols. (2009). *Fundamentos de álgebra*, 1ª Edição. Belo Horizonte: Editora UFMG. ISBN: 9788570414502.
2. AZOULAY Elie (2006). *Mathématiques pharmacie*. Paris: Ediscience.
3. CLERC Antoine (2012). *Éxercices de probabilités pour futurs ingénieurs et techniciens*. Paris : Éditions Ellipses.
4. COURRIÈRE, P. et PLUSQUELLEC, Y. (1997). *Mathématiques à l'usage des pharmaciens et des biologistes*. Paris : Éditions Ellipses.
5. Don Ballington (2010). *Pharmacy Calculations for Technicians: Succeeding in Pharmacy Math*. Saint Paul (MN): EMC/Paradigm Publishing. (ISBN-10: 0763834653/ ISBN-13: 978-0763834654).
6. Egler, L. M. and Booth, K. (2009 ) *Math for the Pharmacy Technician: Concepts and Calculations* (with student CD). New York: McGraw-Hill Professional

7. Lorraine Zentz (2013). Math for Pharmacy Technicians, *2nd edn.* Sudbury (MA): Jones & Bartlett Learning. ISBN-10: 128403139X; ISBN-13: 978-1284031393.
8. Sean Parsons (2013). Pharmaceutical Calculations. Pittsburgh: Parsons Printing Press. (ISBN 10: 0578063735 / 13: 9780578063737).

## 6.2 Basic Sciences

### **BOTA 2213: Botany (Fundamentals of Botany)**

**Objectives:** To introduce students to the basic principles of Botany.

#### **Content:**

1. Overview of the cells and the systematic classification
  - Summary comparison between cells and different kingdoms hierarchy within the kingdoms;
2. Fungi and lichens;
3. Pteridophytes;
4. Gymnosperms (plants with naked ovules);
5. Angiosperms;
6. Approach of the ecological environment;
7. Nomenclature;
8. Harvesting methods of preservation;
9. Morphology and recognition of plants;
10. Preservation of laboratory plants (herb, herbarium).

### **RECOMMENDED TEXTBOOKS**

1. Bernard Bertrand (2013). L'herbier oublié : *Secrets de plantes retrouvés*. Toulouse (France) : Éditions Plume de carotte.
2. Bowes, B.G. et Mauseth, J.D. (2012). Structure des plantes (2e édition). Versailles : Éditions Quae. EAN13: 9782759216888.
3. Burnie, G., Forrester, S., Greig, D. et Guest, S. (2013). Botanica : *Encyclopédie de botanique et d'horticulture, plus de 10 000 plantes du monde entier*. Potsdam (Germ.) : Ullmann publishing GmbH.
4. Françoise BRICE (2011). Les Mots de la botanique: *Dictionnaire, Terminologie bilingue français-anglais*. ISBN-10: 2742798900 ; ISBN-13: 9782742798902.
5. Georges Ducreux (2002). Introduction à la botanique. Paris: Éditions Belin.
6. Gilbert M. Smith (2007). A Textbook of General Botany. Zurich : Muller Press (Lars Müller Publishers GmbH. ISBN-10: 1406773158; ISBN-13: 978-1406773156.
7. Guignard, Jean-Louis et Dupont, F. (2012). Botanique : *Les familles de plantes*, 15e éd. Issy-les-Moulineaux: Éditions Elsevier-Masson. EAN13: 9782294714269.

8. Heber W. Youngken (1921). 3rd revised or latest edn. *Pharmaceutical Botany: A Text- Book for Students of Pharmacy and Science*. Philadelphia: P. Blakiston's Son & Company.
9. Jean-Jacques Rousseau *et al.* (2012). *La Botanique*. Paris: Presses Universitaires de France (PUF). EAN13: 9782130592044.
10. Joëlle Magnin-Gonze (2009). *Histoire de la botanique*. Lonay (Suisse): Éditions Delachaux et Niestlé. (EAN13: 9782603016275).
11. Joël Reynaud (2011). *Botanique - Comprendre la botanique : Histoire, Évolution, Systématique*. Paris : Éditions Ellipses. EAN13: 9782729866792.
12. Salisbury, F.B. e Ross, C.W. (2013). *Fisiologia das Plantas*, 1ª edição. São Paulo: Editora Cengage Learning. ISBN: '9788522111534.
13. Taiz, L. e Zeiger, E. (2012). *Fisiologia Vegetal*, 5ª edição. Rio de Janeiro : Editora Artmed . ISBN: 9788536327952.

### **INFM 1251: Informatics (Computer Basics for the Pharmacy Technician)**

**Objectives:** This course is designed to provide an introduction to the main Windows applications (but any other relevant contemporary computer program), its interface, its tools and features.

#### **Contents:**

1. Operation, navigation and customization principles Windows interface;
2. The organization of files and folders;
3. The use of multimedia devices;
4. Searching for information.

### **RECOMMENDED TEXTBOOKS**

1. Bournaud, I. et Pfeifle, G. (2012). *Informatique, bureautique et système d'information*. Paris: Éditions Nathan. IBSN: 978-2-09-162073-2.
2. Elaine Marmel (2013). *Office 2013 Simplified*, 1st edn. London : Visual Editions. ISBN-10: 1118517172; ISBN-13: 978-1118517178.
3. Henri-Pierre Charles (2000). *Initiation à l'informatique*, 3ème édn. Paris: Éditions (Groupe) Eyrolles. ISBN-10: 2212090498 ; ISBN-13: 978-2212090499.
4. João Rabelo (2007). *Introdução à Informática e Windows XP*, Edição 1. Rio de Janeiro : Livraria Ciência Moderna. ISBN-10: 8573936096; ISBN-13: 978-8573936094.
5. Michael Miller (2013). *Easy Computer Basics*, Windows 8.1 Edition. Upper Saddle River (NJ): Que Publishing. ISBN-10: 0789752328; ISBN-13: 978-0789752321.
6. Ruth Maran. (2005). *Maran Illustrated Windows XP Guided Tour*, 1st edn. Boston: Cengage Learning PTR. ISBN-10: 1592008860; ISBN-13: 978-1592008865.

## **PHYS 1231: Physics (Theories and Concepts in Physics)**

### **Objective:**

To help student understand various theories and concepts of Physics that s/he might encounter during her/his training.

### **Contents:**

1. Mechanics and properties of matter;
2. Thermophysics, sound and optical;
3. Electromagnetism.

### **RECOMMENDED TEXTBOOKS**

1. Caruso, F., Oguri, V. e Santoro, A., eds. (2012). *Partículas Elementares : 100 Anos de Descobertas*, 2ª Edição. São Paulo: Livraria da Física. ISBN: 9788578611569.
2. Clément SANTAMARIA (2012). *Physique pour les Sciences de la vie et de la santé: Cours et exercices corrigés*. Paris: Éditions Dunod. ISBN-10: 2100573438 ; ISBN-13: 9782100573431
3. Dominique Meier *et al.* (2009). *La physique pour les nuls*. Paris: Éditions First (Éditions Éditis/Planeta). ISBN-10: 2754009159; ISBN-13: 978-2754009157.
4. Kirsten Franklin *et al.* (2019). *Introduction to Biological Physics for the Health and Life Sciences*, 1st edn. Hoboken (NJ): Wiley. ISBN-10: 0470665939; ISBN-13: 978-0470665930.
5. Paul G. Hewitt (2011). *Física Conceitual*, 11ª edição. Porto Alegre: Editora Brookman. ISBN: 9788577808908.
6. Pfeffer, J.I. and Nir, S. (2001). *Modern Physics: An Introductory Text*. London : Imperial College Press. ISBN-10: 1860942504; ISBN-13: 978-1860942501.
7. Steven Holzner (2009). *Física Para Leigos*, 1ª edição. Rio de Janeiro: Editora Alta Books. ISBN: 9788576082439.

## **CHEM 1241: Chemistry-I (General Chemistry)**

**Objectives:** To remind students of the general principles of General Chemistry.

### **Contents:**

1. Structure of the material
  - Atomic structure of atoms, chemical bonds, moles, atomic and molecular masses;
2. Chemical reaction
  - Balance of a chemical reaction, chemical kinetics, chemical equilibrium;
3. Ionic equilibria
  - Acid-base equilibria, solubility equilibria, equilibrium complexations;
4. Redox reactions
  - Oxidants, reducing the redox couple and the oxidation-reduction reactions, the potential redox, the oxidation number, oxidation in aqueous solution).

## RECOMMENDED TEXTBOOKS

1. Bettelheim, F.A., Brown, W.H., Campbell, M.K. e Farrel, S.O. (2011). Introdução à Química Geral, Orgânica e Bioquímica, Edição 1. São Paulo: Cengage Learning Editora. ISBN: 9788522111480..
2. Christian BELLEC (2003). Chimie générale PCEM - Dentaire - Pharmacie - DEUG : *Nouveaux exercices corrigés et rappels de cours*. Paris: Editeurs Vuibert.
3. Fry, M. and Page, E. (2005). CatchUp Chemistry for the Life and Medical Sciences. Oxfordshire: Scion Publishing Ltd.
4. Hill. J.W., Baum, S.J. and Scott-Ennis, R.J. (1999). Chemistry and Life: *An Introduction to General, Organic and Biological Chemistry*, 6th edn. Upper Saddle River (NJ) : Prentice Hall.
5. K. C. Timberlake (2011). Chemistry: *An Introduction to General, Organic, and Biological Chemistry*, 11th edn. Upper Saddle River: Prentice Hall. ISBN: 9780321741042.
6. Mcquarrie, D., Rock, P.A. et Gallogly, E.B. (2012). Chimie Generale, 3e édn. Bruxelles: De Boeck. ISBN-10: 2804171272; ISBN-13: 978-2804171278
7. Sarker, S.D. and Nahar, L. (2007). Chemistry for Pharmacy Students: *General, Organic and Natural Product Chemistry*. West Sussex: John Wiley & Sons Ltd.

## CHEM 1232: Chemistry-II (Mineral or Inorganic Chemistry)

### Objectives:

1. To review the student in the fundamentals of General and Inorganic Chemistry;
2. Understand the use of inorganic compounds in pharmacy

### Contents:

1. Basis of the periodicity of chemical elements;
2. The emphasis on the study of the elements of Group IA through Group VIIA and the inner group elements such as iron and their compounds;
3. Complexes of the above mentioned elements and their medicinal application (e.g. chelating agents);
4. Organometallic Chemistry;
5. Molecular orbitals;
6. Nuclear reactions and radioactivity.

## RECOMMENDED TEXTBOOKS

1. Housecroft, C.E. and Sharpe, A.G. (2012). Inorganic Chemistry, 4th edn. Upper Saddle River (NJ) : Pearson Education Limited. ISBN: 9780273742753.
2. Housecroft, C.E. et Sharpe, A.G.(2010). Chimie inorganique. Paris : Éditions De Boeck. ISBN-10: 2804162184 / ISBN-13: 9782804162184.

3. Isabelle Lagny (2014). Risque chimique au laboratoire: *Guide à l'usage des médecins du travail et des manipulateurs*. Palaiseau Cedex (Paris): Éditions Ecole Polytechnique. ISBN : 978-2-7302-1590-9.
4. J.D. Lee (2000). *Química Inorgânica Nao Tao Concisa*, 1ª edição. São Paulo: Edgard Blucher Editora. ISBN: 8521201761.
5. Katja A. Strohfeldt (2015). *Essentials of Inorganic Chemistry: For Students of Pharmacy, Pharmaceutical Sciences and Medicinal Chemistry*. Hoboken (NJ): John Wiley & Sons, Inc. ISBN: 978-0-470-66558-9.

### **CHEM 2224: Chemistry-III (Organic Chemistry)**

**Objectives:** To introduce students to the fundamental principles of Organic Chemistry

#### **Contents:**

1. Organic elemental analysis (qualitative analysis, quantitative analysis);
2. Basic principles of the nomenclature and classification of organic chemistry;
3. Carbon skeleton (the carbon atom and the carbon skeleton, concepts of functional groups, and isomers with stress on stereoisomerism);
4. Alkanes;
5. Alkenes;
6. Alkynes;
7. Aromatic compounds;
8. Alcohols;
9. Aldehydes and ketones;
10. Carboxylic acids and derived functions;
11. Amines;
12. Terpenes

### **RECOMMENDED TEXTBOOKS**

1. Arthur Winter (2014). *Organic Chemistry I for Dummies*, 2nd edn. Hoboken: John Wiley & Sons, Inc. ISBN: 9781118-828076.
2. Arthur Winter (2012). *Química Orgânica I Para Leigos*. Rio de Janeiro/ São Paulo: Alta Books Editora. ISBN-10: 8576085267; ISBN-13: 978-8576085263.
3. Brown, W.H. and Poon, T. (2013). *Introduction to Organic Chemistry*, 5th edn. Hoboken; Wiley. ISBN-10: 1118152182; ISBN-13: 978-1118152188.
4. Clayden, I., Greeves, N., Warren, S. et Pousse, A. (2013). *Chimie organique*, 2e éd. Paris: Éditions De Boeck. ISBN-10: 2804174417; ISBN-13: 978-2804174415.
5. GRUIA, M. et POLISSET, M. (2001). *Chimie organique - Dérivés insaturés - Dérivés halogénés - Synthèses magnésiennes Rappels de cours, exercices corrigés*. PCEM 1, DEUG A et B, Faculté de pharmacie 1ère année. Paris: Éditions Ellipses.
6. GRUIA, M. et POLISSET, M. (2001). *Stéréochimie Chimie organique - Rappels de cours, exercices corrigés*. PCEM 1, DEUG A et B, Faculté de pharmacie 1ère année. Paris: Éditions Ellipses.



7. GRUIA, M. et POLISSET, M. (2001). Dérivés carbonylés - Acides carboxyliques Chimie organique - *Rappels de cours, exercices corrigés*. PCEM 1, DEUG A et B, Faculté de pharmacie 1ère année. Paris: Éditions Ellipses.
8. GRUIA, M. et POLISSET, M. (2001). Alcools et dérivés Amines Chimie organique - *Rappels de cours, exercices corrigés*. PCEM 1, DEUG A et B, Faculté de pharmacie 1ère année. Paris: Éditions Ellipses.
9. Guylaine Drut-Grevoz (2009). Chimie organique : *Préparation au Brevet professionnel Préparateur en pharmacie*. Paris: Éditions Maloine. ASIN: B00FN46V2Y.
10. John McMurry (2012). Química Orgânica, Edição 1. São Paulo: Cengage Learning Editora. ISBN-10: 8522110085; ISBN-13: 9788522110087.
11. K. C. Timberlake (2011). Chemistry: *An Introduction to General, Organic, and Biological Chemistry*, 11th edn. Upper Saddle River (NJ): Prentice Hall. ISBN: 9780321741042.
12. Luiz Cláudio de Almeida Barbosa (2012). Introdução à química orgânica. São Paulo: Prentice-Hall.
13. Malkinson, J. and Falconer, R. (2012). Organic and Pharmaceutical Chemistry. London: Pharmaceutical Press. ISBN: 9780853698371.
14. McMurry, J. et Simanek, E. (2007). Chimie organique : *Les grands principes Poche*, 2e éd. Éditions Dunod. ISBN-10: 2100505475; ISBN-13: 978-2100505470.
15. Melania Kiel (2004). Chimie Organique: *Cours et Exercices Corrigés*. Issy-les-Moulineaux: Éditions ESTEM De Boeck Diffusion.
16. Moore, J.T. and Langley, R.H. (2010). Organic Chemistry II for Dummies. Hoboken: John Wiley & Sons, Inc. ISBN: 9780470178157.
17. Morrison, R. T., Boyd, R. N. and Bhattacharjee, S. K. (2011). Organic Chemistry, 7th edn. Singapore: Pearson Education Singapore Pte Ltd. ISBN-13 9788131704813; ISBN-10 8131704815.
18. Morrison, R.T. e Boyd, R.N. (2011). Química orgânica, 16ª edição. Lisboa: Editora Fundação Calouste Gulbenkian. ISBN: 978-972-31-0513-1.
19. P.M. Dewick (2006). Essentials of Organic Chemistry: *for Students of Pharmacy, Medicinal Chemistry and Biological Chemistry*. New York: Wiley. ISBN: 9780470016664.
20. Sarker, S.D. and Nahar, L. (2007). Chemistry for Pharmacy Students: *General, Organic and Natural Product Chemistry*. West Sussex: John Wiley & Sons Ltd.
21. Satyajit D. Sarker (2009). Química Para Estudantes de Farmácia, Química Geral, Orgânica. Rio de Janeiro: Editora Guanabara Koogan S.A.

22. Solomons, T. W., Fryhle, C. B. and Snyder, S. A. (2013). Organic Chemistry, 11th edn. New Jersey: John Wiley & Sons. ISBN-10: 1118147391 ISBN-13: 978-1118147399.
23. Solomons, T.W. G. e Fryhle, C.B. (2012). Química Orgânica - Vol. 2. 2 - 10ª Ed. Rio de Janeiro: Editora LTC (Livros Tecnicos e Cientificos Editora). ISBN-10: 8521620349; ISBN-13: 978-8521620341.
24. Solomons, T.W. G. e Fryhle, C. (2012). Química Orgânica - Vol.1. Rio de Janeiro: Editora LTC (Livros Tecnicos e Cientificos Editora). ISBN-10: 8521620330; ISBN-13: 978-8521620334.

#### **RECH 2214: Research (Introduction to Research)**

**Objective:** Introduction to research methodology.

#### **Content:**

1. Introduce the student s to research methodology.
2. Introduction to research;
3. Development of research project/issues
4. Research Methodology
5. Different steps of a report/memoir
6. Publication and dissemination of research results.

#### **RECOMMENDED TEXTBOOKS**

1. Bowers, D., House, A. and Owens, D. (2006). Understanding Clinical Papers, 2ndedn. West Sussex: John Wiley & Sons Ltd. (ISBN: 0-470-09130-4).
2. Di Giovanna, I. And Haynes, G. (2001). Principles of Clinical Research. Petersfield (UK): Wrightson Biomedical Publishing Ltd. ISBN: 1871816459, 9781871816457.
3. Dresch, A., Lacerda, D.P. e Antunes, Jr., J.A.V. (2014). Design Science Research: *Método de Pesquisa para Avanço da Ciência e Tecnologia*, 1ª edição. Porto Alegre: Editora Bookman ISBN: 9788582602980
4. Felicity J. Smith (2005). Conducting Your Pharmacy Practice Research Project. London: Pharmaceutical Press. (ISBN: 0-85369-606-3).
5. Kathryn H. Jacobson (2011). Introduction To Health Research Methods: *A Practical Guide*, 1st edn. Burlington: Jones & Barlett Learning. ISBN-10: 076378334X; ISBN-13: 978-0763783341.
6. Lakatos, E.V. e Marconi, M. de Andrade. (2008). Técnicas de Pesquisa. ISBN: 9788522451524. 7ª edição. Monte Alegre (S-P): Livraria Atlas. ISBN: 8522451524.
7. Louis Rachid Salmi (20120). Lecture Critique et Communication Médicale Scientifique: *Comment lire, présenter, rédiger et publier une étude clinique ou épidémiologique*, 3e éd. revue et augmentée. Issy-les-Moulineaux: Elsevier Masson.

8. Maisonneuve , H., Lorette, G., Maruani, A. et Huguier, M. (2010). *La Rédaction Médicale, 5e édn. Rueil-Malmaison (Paris)* : Éditions DOIN: ISBN-10: 2704012849; ISBN: 978-2704012848.
9. Mounir M. Toure ( 2007). *Introduction à la méthodologie de la recherché : Guide pratique pour étudiants et professionnels des services sociaux et sanitaires .* Paris: Éditions L'Harmattan. ISBN-10: 2296026842; ISBN-13: 978-2296026841.
10. Nebia Maria A. de Figueiredo. (2008). *Metodo e Metodologia Na Pesquisa Cientifica, Edição 3. São José (SP): Yendis Editora S.A.* ISBN-10: 8577280853; ISBN-13: 9788577280858.
11. Pierre-Marie ROY *et al.* (2008). *Guide pratique de recherché clinique.* Milon-la-Chapelle (France): S-Éditions. ISBN-10: 2356400184 ; ISBN-13: 978-2356400185.
12. Polgar, S. and Thomas, S.A. (2000). *Introduction to Research in the Health Sciences, 4th edn.* London: Elsevier/Churchill Livingstone. (ISBN: 0-443-06265-X).
13. Rajender Aparasu (2010). *Research Methods for Pharmaceutical Practice and Policy, 1st edn.* London: Pharmaceutical Press. ISBN 978 0 85369 880 7.

### **6.3 Pharmaceutical Sciences**

#### **PHAR 1361: Pharmacy-I (Introduction to the Pharmaceutical Profession)**

**Objective:** To enable the student to understand the concept of the pharmaceutical profession

#### **Contents:**

1. Definition of pharmacy;
2. Place of the pharmacist and Pharmacy technician in the health system;
3. History of Pharmacy:
  - Role of the pharmacist in general,
  - Evolution of Pharmacy training through the centuries;
4. The different types of pharmacies;
5. Pharmacy in the current context (as a profession and practice).

#### **RECOMMENDED TEXTBOOKS**

1. Alfonso R. Gennaro (2004). *Remington - A Ciência e a Prática da Farmácia.* Português do Brasil: Editora Nova Guanabara. ISBN: 9788527708739.
2. Aiache, J-M., Renoux, R. et Aiache, S. (2001). *Initiation à la connaissance du médicament Pharmacie, 1ère année, 4ème édn.* Issy-les-Moulineaux: Éditions Elsevier-Masson. ISBN-10: 2294005473; ISBN-13: 978-2294005473.
3. Al-Shukry Rahma (2011). *Initiation à la connaissance du médicament - Pharmacologie (Limoges) : Optimisé pour Limoges.* Paris: Éditions vernazobres Grego.
4. Ben J. Whalley *et al* (2008). *Foundation of Pharmacy Practice.* London: Pharmaceutical Press. (ISBN: 978-0-85369-747-3).

5. Gosselin, R.A. and Robbins, J. (1999). Inside Pharmacy: *The Anatomy of a Profession*. Lancaster: Technomic Publishing Co. ISBN: 1-56676-679-6.
6. Gray, H. C. and Bryan, C. H. (2009). A Condensed Compendium of Pharmaceutical Knowledge. Charleston: BiblioBazaar. (ISBN-10:1110429312/ISBN-13:978-1110429318).
7. Jahangir Moini (2009). Pharmacy Terminology, 1st edn. Boston: Cengage Learning. (ISBN-10: 1428317872 /ISBN-13: 978-1428317871).
8. Jiben Roy (2011). *An Introduction to Pharmaceutical Sciences: Production, Chemistry, Techniques and Technology*. Cambridge (UK): Woodhead Publishing Ltd. ISBN: 9781907568527.
9. Lovett, A.W., Peasah, S. K., Xiao, H. and Ryan, G.J. (2013). Introduction to the Pharmacy Profession, 1st edn. Burlington: Jones & Barlett Learning. ISBN-10: 1449698190; ISBN-13: 978-1449698195.
10. Loyd X. Allen, Jr., ed. (2012). Remington: *The Science and Practice of Pharmacy*, 22nd edn. London: Pharmaceutical Press. ISBN: 978 0 85711 062 6
11. Perspective Press (2013). *The Pharmacy Technician (American Pharmacists Association Basic Pharmacy & Pharmacology Series)*, 5th edn. Englewood (CO): Morton Publishing Company. ISBN-10: 1617310700; ISBN-13: 978-1617310706.
12. Reis, A. M.M. e Magalhaes, J. Batista Sp (2001). *Ciencias Farmaceuticas: Uma Abordagem em Farmacia Hospitalar*, 1ª edição. São Paulo: Editora Atheneu Ltda. ISBN-10: 8573793112; ISBN-13: 9788573793116.
13. Roselyne Boulieu ( 2013). Initiation à la Connaissance du Médicament: *Le Médicament - de sa Conception à Son Bon Usage* (UE6), 2e éd. Paris: Éditions Ellipses Marketing. ISBN-10: 2729882677 ; ISBN-13: 978-2729882679.
14. William N. Kelly (2011). Pharmacy: *What It Is and How It Works*, 3rd edn. -*Pharmacy Education Series*. Boca Raton: CRC Press. (ISBN-10: 1439853053/ISBN-13: 978-1439853054).

### **PHAR 3345: Pharmacy-II (Pharmaceutical Calculations)**

**Objective:** To introduce the student to basic pharmaceutical calculations generally encountered.

#### **Contents:**

1. Calculations required for sterile and non-sterile mixtures;
2. Dilution of concentrated solutions;
3. Allegation and dose of parenteral drugs;
4. Medicines administration protocols;
5. An infusion package;
6. Infusion pump;
7. Calculating the duration / speed of infusion;

8. Calculating the molecular weight of a medicament;
9. Calculating the dose of a medicament.

### **RECOMMENDED TEXTBOOKS**

1. Ansel, H.C. e Stoklosa, M. J. (2008). Manual de Cálculos Farmacêuticos, 12<sup>a</sup> Edição. Rio de Janeiro : Editora Artmed. ISBN-13: 9788536311661.
2. Barbara Lacher (2007). Pharmaceutical Calculations for the Pharmacy Technician. Philadelphia: Lippincott Williams & Wilkins/Wolters Kluwer. ISBN/ISSN: 9780781763103.
3. Courrière, P. et Plusquellec, Y. (1997). Mathématiques à l'Usage des Pharmaciens et des Biologistes. Paris: Editions Ellipses. ISBN-10: 2729857818; ISBN-13: 9782729857813.
4. Don Ballington (2010). Pharmacy Calculations for Technicians: *Succeeding in Pharmacy Math*. Saint Paul (MN): EMC/Paradigm Publishing. (ISBN-10: 0763834653/ ISBN-13: 978-0763834654).
5. Howard, C. A. (2008). Calculos Farmaceuticos, Edição 12. Rio de Janeiro : Artmed Editora Ltda.
6. Howard, C. A.. (2005). Manual de Calculos Farmaceuticos, 1<sup>a</sup> edição. Porto Alegre : Artes Médicas Sul Ltda.
7. Jeanguiot, N., Kovalevitch, M-C. et Poulet, A.(2014). Le Calcul de Doses sans Erreur, 3e éd. Paris: Editions De Boeck/ Estem. EAN13 : 9782843717079.
8. Khan, M. A. and Reddy, I.K. (2000). Pharmaceutical and Clinical Calculations, 2nd edn. Boca Raton: CRC Press.
9. Khan, M. A. and Reddy, I.K. (2000). Essential Mathematical Calculations for Pharmacy Technicians. Boca Raton: CRC Press. ISBN: 9781566768122
10. Pickar, G.D. and Pickar-Abernethy, A. (2012). Dosage Calculations, 9th edn. Stamford: Cengage Learning Publishing. (ISBN-10: 1439058474/ISBN-13: 978-1439058473).

### **PHAR 3355: Pharmacy-III (Metrology)**

#### **Objectives:**

This course aims to provide students with the knowledge and skills necessary to perform accurate measurements of weight and volume pharmacy.

#### **Contents:**

1. Good practice in a pharmacy in the pharmacopoeia standards;
2. The weights;
3. Volumetric measurements;
4. Instruments Calibration and calculation of uncertainties.

## RECOMMENDED TEXTBOOKS

1. Barbara Lacher (2007). Pharmaceutical Calculations for the Pharmacy Technician. Philadelphia: Lippincott Williams & Wilkins/Wolters Kluwer. ISBN/ISSN: 9780781763103.
2. Czichos, H., Saito, T. and Smith, L.E., eds. (2011). Springer Handbook of Metrology and Testing, 2nd edn. New York : Springer. ISBN-10: ; ISBN-13: 978-3-642-16641-9.
3. Jay L. Bucher, ed.(2012). The Metrology Handbook, 2nd edn. Milwaukee (WI) : ASQ Quality Press.ISBN-10:0873898389 ; ISBN-13: 978-0873898386.
4. José Carlos de Toledo (2013). Sistemas de Medição e Metrologia, Edição 1. Curitiba (Paraná).: Editora Intersaberes. ISBN: 9788582129425
5. Pickar, G.D. and Pickar-Abernethy, A. (2012). Dosage Calculations, 9th edn. Stamford: Cengage Learning Publishing. (ISBN-10: 1439058474/ISBN-13: 978-1439058473).
6. Reinaldo Gomes Santana (2012). Metrologia, 1ª edição. Curitiba(Paraná): Editora Livro Tecnico. ISBN: 978856368749

## **PHAR 3385: Pharmacy-IV (Community Pharmacy: Community Pharmacy Practice for Pharmacy Technicians)**

**Objective:** This course aims to enable the student to achieve competency in the practical aspects of Pharmacy in the community settings.

### **Content:**

1. Management Skills in the Pharmacy (e.g. inventory control, drug / product storage, and medication distribution, etc.);
2. Responding to Symptoms ;
3. Supplying Medication ;
4. Patient counseling including use or application of Pharmacy systems and technology that improve patient safety and offering of other aspects of enhanced services;
5. Teaming or collaborative roles of the technician and pharmacist in providing community Pharmacy services;
6. Medicines Use-review
7. Contractual Framework for Community Pharmacy;
8. Multidisciplinary Working;
9. Continuing Professional Development

## RECOMMENDED TEXTBOOKS

1. Barber, N. and Willson, A. (2006). Churchill's Pocketbook of Clinical Pharmacy. Edinburgh: Churchill Livingstone. ISBN: 9780443074431.
2. Bope, E.T. and Kellerman, R.D., eds. (2015). Conn's Current Therapy 2015, 1st edn. Philadelphia: Saunders. ISBN-10: 1455702978; ISBN-13: 978-1455702978.

3. Charlas, C. (2009). Le Guide de l'Officine de Pharmacie Management. Paris: Éditions Publibook. ISBN-10: 2748351266; ISBN-13: 9782748351262.
4. Collectif. (2014). Vidal 2014 Le dictionnaire, 89ème édn. Paris: Le Groupe VIDAL. ISBN-10: 2850912050; ISBN-13: 9782850912054.
5. Correr Correr (2013). Pratica Farmaceutica Na Farmacia Comunitaria, 1ª edição. Rio de Janeiro: Artmed Editora Ltda.
6. Correr, C. J. e Otuki, M.F. (2013). A Prática Farmacêutica Na Farmácia Comunitária, 1ª edição. São Paulo: Editora Grupo A. ISBN: 9788565852821.
7. Don A. Ballington (2014). Pharmacy Practice for Technicians, 5th edn. St. Paul (MN): EMC/Paradigm Publishing. ISBN-10: 0763852260; ISBN-13: 978-0763852269.
8. Dunphy, L.M., Winland-Brown, J.E., Porter, B.O. and Thomas, D.J. (2011). Primary Care: *Art and Science of Advanced Practice Nursing*, 3rd edn. Philadelphia: F.A. Davis Company. ISBN-10: 0803622554; ISBN-13: 978-0803622555.
9. Durand, D.V. , Jeune, C. Le et DO., Ph.(2014). Guide pratique des médicaments 2015, 34ème édn. Paris: Éditions Maloine. ISBN-10: 2224033893; ISBN-13: 9782224033897.
10. Durgin, J.M. and Hanan, Z.I. (2008). Pharmacy Practice for Technicians, 4th edn. Boston: Cengage Learning. ISBN-10: 1428320326; ISBN-13: 978-1428320321.
11. Fabiole MOREDDU (2014). Le Conseil Pédiatrique à l'Officine, 3ème édn. Courbevoie: Éditions le Moniteur des pharmacies. ISBN-10: 1090018762; ISBN-13: 9791090018761.
12. Florence BONTEMPS (2014). Le Conseil à l'Officine dans la Poche, 7ème édn. Courbevoie: Éditions le Moniteur des pharmacies. ISBN-10: 1090018665; ISBN-13: 9791090018662 .
13. F.MOREDDU. (2012). Guide du Management à l'Officine. Courbevoie: Éditions le Moniteur des pharmacies. ISBN-10: ; ISBN-13:1090018363; ISBN-13: 9791090018365.
14. François MARTIN. (2010). La vente-conseil: *Un engagement au quotidien*, 3ème édn. Courbevoie: Éditions le Moniteur des pharmacies. ISBN-10: 291558592x; ISBN-13: 9782915585926.
15. Jon Waterfield (2008). Community Pharmacy Handbook. London: Pharmaceutical Press. ISBN: 978 0 85369 716 9.
16. Paul Rutter (2004). Community Pharmacy: Symptoms, Diagnosis and Treatment. London: Churchill Livingstone. ISBN: 978 0 443 07362 5.
17. Perlemuter, L. et Perlemuter, G. (2015). Guide de thérapeutique 2015, 8ème édn. Issy-les-Moulineaux: Elsevier /Masson. ISBN-10: 229473971x ; ISBN-13: 9782294739712.
18. Seller, R. H. and Symons, A.B. (2011). Differential Diagnosis of Common Complaints (with Student Consult Online Access), 6th edn. Philadelphia: Saunders. ISBN-10: 1455707724; ISBN-13: 978-1455707720.

19. Sheridan, J. and Strang, J. (2002). Drug Misuse and Community Pharmacy. Boca Raton: CRC Press - A Taylor & Francis Group. ISBN: 9780415282895.
20. Tindall, W.N. and Millonig, M.K. (2002). Pharmaceutical Care: *Insights from Community Pharmacists*. Boca Raton: CRC Press - A Taylor & Francis Group. ISBN: 9781566769532.

### **PHAR 3365: Pharmacy-V (Hospital Pharmacy: Hospital Pharmacy Practice for Pharmacy Technician)**

**Objective:** The course is designed to provide the student with a comprehensive knowledge of the various forms of Pharmacy-related hospital work as well as its application.

#### **Content:**

1. History and evolution of hospital practice;
2. Summary-insights of the technician's duties in the hospital setting;
3. Specific roles and responsibilities typical in the hospital environment;
4. IV and other extemporaneous preparations ;
5. Management including storage, inventory and dispensing of other medicinal dosage forms and non-drug health ancillary items;
6. Use of prescription-related symbols, abbreviations and terminologies including jargons;
7. Automated prescription filling including prescription assessment and evaluation;
8. Supervisory roles such as pharmacist-led overseeing in-service-training;
9. medication-delivery devices ;
10. Interpersonal professional interaction including communication (e.g. decorum, appearance, punctuality, mutual colleagueability, etc.) with other members of the hospital team;
11. Networking and interviewing techniques ;
12. Pharmacist-led healthcare of patients ;
13. Other relevant medication-based duties.

#### **RECOMMENDED TEXTBOOKS**

1. Barber, N. and Willson, A. (2006). Churchill's Pocketbook of Clinical Pharmacy. Edinburgh: Churchill Livingstone. ISBN: 9780443074431.
2. Bennett, P., Brown, M. and Sharma, P. (2012). Clinical Pharmacology, 11th Edn. Edinburgh: Churchill Livingstone. ISBN: 9780702040849.
3. Bope, E.T. and Kellerman, R.D., eds. (2015). Conn's Current Therapy 2015, 1st edn. Philadelphia: Saunders. ISBN-10: 1455702978; ISBN-13: 978-1455702978.
4. Brunton, L.L., Chabner, B.A. e Knollmann, B.C. (2012). Goodman & Gilman As Bases Farmacológicas da Terapêutica, 12ª Edição. Lisboa: McGraw-Hill. ISBN: 9788580551167.
5. Calop, J., Limat, S., Fernandez, C. et Aulagner, G. (2012 ). Pharmacie clinique et thérapeutique, 4ème édn. Issy-les-Moulineaux: Elsevier /Masson. ISBN-10: 2294711327; ISBN-13: 9782294711329.



6. Dunphy, L.M., Winland-Brown, J.E., Porter, B.O. and Thomas, D.J. (2011). *Primary Care: Art and Science of Advanced Practice Nursing*, 3rd edn. Philadelphia: F.A. Davis Company. ISBN-10: 0803622554; ISBN-13: 978-0803622555.
7. Holdford, D.A and Brown, T.R. (2010). *Introduction to Hospital and Health-System Pharmacy Practice*, 1st edn. Bethesda (MD): ASHP. ISBN-10: 1585282375; ISBN-13: 978-1585282371.
8. Marcelo Polacow Bisson. (2010). *Farmacia Hospitalar: Um Enfoque em Sistemas de Saude*, Edição 2. Barueri (SP) : Editora Manole Ltda. ISBN-10: 8520428533; ISBN-13: 9788520428535.
9. Miriam Elias Cavallini (2010). *Farmácia Hospitalar*, 2ª edição. Barueri (São Paulo): Editora Manole. ISBN: 8520428533.
10. Mark Brunton (2013). *Hospital Pharmacy Practice For Technicians*, 1st edn. Burlington : Jones & Bartlett Learning. ISBN-10: 1284030466; ISBN-13: 978-1284030464.
11. Ministère de l'emploi et de la solidarité et Ministère de la santé (2001). *Bonnes pratiques de pharmacie hospitalière*. Paris: Documentation Francaise.
12. Roberta Joly Ferreira Braga (2014). *ABC da Farmacia Hospitalar*, Edição 1. São Paulo : Editora Atheneu Ltda. ISBN-10: 8538804537; ISBN-13: 9788538804536.
13. S BRAFH. (2009). *Guia de Boas Praticas em Farmacia Hospitalar Servicos Saude*. São Paulo : Socied Brasileira de Farmacia Hospitalar (SBRAFH ) Editora. ISBN 10: 8562535001/ ISBN 13-9788562535000.
14. Seller, R. H. and Symons, A.B. (2011). *Differential Diagnosis of Common Complaints (with Student Consult Online Access)*, 6th edn. Philadelphia: Saunders. ISBN-10: 1455707724; ISBN-13: 978-1455707720.
15. Walker, R. and Whittlesea, eds. (2007). *Clinical Pharmacy and Therapeutics*, 4th edn. Edinburgh: Churchill Livingstone. ISBN: 9780443102851.

### **PHAR 3375: Pharmacy-VI (Institutional Pharmacy: Institutional Pharmacy Practice for PharmacyTechnicians)**

**Objective:** The course is tailored to provide the student with a comprehensive overview of the essential components of health-system Pharmacy practice including health delivery systems, hospital pharmacy and other practice settings.

#### **Content:**

1. History, evolution and types of institutional Pharmacy practice
2. Home care,
3. Long-term care including mycobacterium diseases and HIV infections/AIDS management
4. Hospice and palliative care,
5. Ambulatory care
6. Managed care
7. Principles of career development
8. Implementation and monitoring of therapeutic plans and evidence-based Medicine
9. Collaborative Practice / Interprofessional alliances and teambuilding.

#### **RECOMMENDED TEXTBOOKS**

1. Bergouignan, M-C., Montalban, M., Smith, A. et Sakine, E.(2014). L'industrie pharmaceutique - Règles, acteurs et pouvoir. Paris: La Documentation française. ISBN-10: 3331953946; ISBN-13: 3303331953944.
2. GUÉRIN, A. et CACHARD, C. (2013). Manuel Pratique et Poétique à l'Usage des Soignants et autres Curieux. Paris: Presses Universitaires de France (PUF). ISBN-10: 2130624987 ; ISBN-13: 9782130624981.
3. Jason Hall (2013). Pharmacy Practice : *Integrated Foundations of Pharmacy Series*. Oxford: Oxford University Press. ISBN-10: 0199655324; ISBN-13: 978-0199655328.
4. Robert F. MAGER. (2013). Comment Définir des Objectifs Pédagogiques, 2ème edn. Paris: Éditions Dunod. ISBN-10: 2100700782; ISBN-13: 9782100700783.
5. Sylvia, L.M. and Barr, J.T. (2010). Pharmacy Education: *What Matters in Learning and Teaching* , 1st edn. Burlington: Jones & Bartlett Learning. ISBN-10: 0763773972; ISBN-13: 978-0763773977.
6. Teresa Hopper. (2014). Mosby's Pharmacy Technician: *Principles and Practice*, 3rd edn. Philadelphia: Saunders. ISBN-10: 1437706703; ISBN-13: 978-1437706703.
7. Thomas R. Brown, ed. (2006). Handbook of Institutional Pharmacy Practice, 4th edn. Bethesda (MD): American Society of Health-System Pharmacists. ISBN:158528114X.
8. Wladimir Mendes Borges FILHO (2011). Farmacia Clinica: *Seguranca Na Pratica Hospitalar*, 1ª edição. São Paulo : Editora Atheneu Ltda. ISBN-10: 8538802607; ISBN-13: 9788538802600.

### **PHAR 3336: Pharmacy-VII (Pharmaceutical Legislation/Pharmacy Law and Ethics)**

**Objective:** To know the aspects of:

1. Legislation;
2. Regulations;
3. Ethics of Pharmacy practice.

#### **Contents:**

1. Pharmacy Act/Law and its objectives;
2. Legislation and regulatory bodies: the College of Pharmacists and its committees, food and drug standards under counseling, drug control, etc.;
3. Interpretation of the words / phrases used in Pharmacy Act/Law;
4. Classification of pharmacy / drug scheduling, a person authorized to deliver sensitive drugs;
5. Prescription containers and labels, the supply of medicines in hospitals and similar Institutions;
6. Outpatient prescription drugs supply;
7. Production control, stability of drugs on the storage etc.

## RECOMMENDED TEXTBOOKS

1. Andrew LAKOFF (2008). La raison pharmaceutique. Paris: Les Empêcheurs de Penser en Rond.
2. Antoine LECA (2013). Droit pharmaceutique, 7ème édn. Bordeaux: Éditions Les Études Hospitalières. ISBN-10: 284874510x; ISBN-13: 9782848745107.
3. Antoine LECA (2006). Droit pharmaceutique. Aix-en-Provence: Presses Universitaires D'aix-Marseille.
4. B.S. Kuchekar (2008). Pharmaceutical Jurisprudence. Pune City (Ind.): Pragati Books Pvt. Ltd. ISBN: 8185790280, 9788185790282.
5. Douglas J. Pisano (2002). Essentials of Pharmacy Law. CRC Press - A Taylor & Francis Group. ISBN: 9781566769181.
6. Éric FOUASSIER (2002). La responsabilité juridique du pharmacien. Issy-les-Moulineaux: Elsevier / Masson.
7. Guerreiro, M. P. e Fernandes, A. A. (2013). Deontologia e Legislação Farmacêutica. Lisboa (Lisbon): Editora Lidel (Lidel Edições Técnicas Lda). ISBN: 9789727578900.
8. Hélène GAUMONT-PRAT (2013). Le Droit du Médicament. Bordeaux: Éditions Les Études Hospitalières. ISBN-10: 2848744618; ISBN-13: 9782848744612.
9. Kenneth M. Strandberg (2007). Essentials of Law and Ethics for Pharmacy Technicians, 2nd ed. Boca Raton (FL): CRC Press - A Taylor & Francis Group. ISBN-10: 1420045571; ISBN-13: 9781420045574.
10. Osorio Paiva Filho (2011). ABC da Etica Farmaceutica, Edição 1. Rio de Janeiro: Proprio Autor. ISBN-10: 8591300602; ISBN-13: 9788591300600.
11. Pabst, J-Y. et Berrod, F. (2012) . Dictionnaire des Principaux Termes de Droit Pharmaceutique, 2012. Paris : Éditions de Santé. ISBN-10: 2864112663; ISBN-13: 9782864112662.

## CHEM 3326: Chemistry-IV (Pharmaceutical Chemistry)

**Objective:** This course is intended to introduce the student to Pharmaceutical Chemistry and knowledge of the structures and physicochemical properties of drugs (e.g. interaction between them and water) and to also allow her/him to run simple analysis of medicines.

### Content :

1. Introduction: Nomenclature and chemical and therapeutic classification of drugs.
2. Structures of the chemical classes of drugs: Chemotherapeutics (anti-infective antibiotics, anti-infective non-antibiotics) and pharmacodynamic agents.

Stress will be made on the sulphonamides including the sulfones; Lactam antibiotics and non-lactam antibiotics (e.g. respectively the penicillins and cephalosporins and chloramphenicol,

etc.), other anti-infectives such as the antimalarials, antihelminthics, anti-inflammatories and other analgesics.

## RECOMMENDED TEXTBOOKS

1. Donald Cairns (2012). Essentials of Pharmaceutical Chemistry, 4th edn. London: Pharmaceutical Press. ISBN: 978 0 85369 979 8
2. Graham L. Patrick (2002). Chimie pharmaceutique. Paris : Éditions De Boeck ISBN-10: 2744501549; ISBN-13: 978-2744501548.
3. Karim Slama (2000). Chimie générale et organique BP. Courbevoie: Les Éditions Porphyre. ISBN: 2910228487; EAN: 978-2910228484
4. Korolkovas, A. (2008). Quimica Farmaceutica, 2<sup>a</sup> edição. Rio de Janeiro: Editora Guanabara Koogan S.A. ISBN-10: 8527714833; ISBN-13: 9788527714839
5. Korolkovas, A. e Burckhalter, J. H. ( ). Química Farmacêutica, 1<sup>a</sup> edição. Rio de Janeiro : Editora Guanabara Koogan. ISBN: 8570301448
6. Leslie G. Chatten, ed. (2008). Pharmaceutical Chemistry, Vol. 1: Theory and Application, 1st edn. New Delhi: CBS Publishers and Distributors. ISBN: 9788123916026.
7. Leslie G. Chatten, ed. (2008). Pharmaceutical Chemistry, Vol. 2: Instrumental Techniques, 1st edn. New Delhi: CBS Publishers and Distributors. ISBN: 9788123916019.
8. Hélio. A. Stefani (2008). Ciências Farmacêuticas: *Introdução à Química de Compostos Heterocíclicos*, 1<sup>a</sup> edição. Rio de Janeiro : Editora Guanabara Koogan. ISBN:9788527714990.

## PHCO 2333: Pharmacology-I: (General Pharmacology)

**Objective:** To enable the student to learn the basics of General Pharmacology.

### Contents:

1. Overview of Pharmacology:
  - The routes of drugs/medicines administration,
  - Pharmacokinetics,
  - The mechanism of action of drugs;
2. Overview of the drug:
  - Definitions,
  - Development of the drug;
  - Preparation, composition and classification;
  - Concept of essential drugs;
  - Generic medicine;
  - Use of drugs;
  - Pharmacovigilance;
  - Adverse effects;
  - Prescription orders and rules, etc..

## RECOMMENDED TEXTBOOKS

1. BAYOT Dominique et FARON Gilles (2011). Pharmacologie pour les sages-femmes. Paris: De Boeck.
2. Claverie, I. et Hedde, H. (2008). Pharmacologie générale: *Mécanismes fondamentaux*, 2<sup>ème</sup> edn. Philadelphia: Wolters Kluwer. ISBN-10: 2915585601; ISBN-13: 9782915585605.
3. Clayton, B. e Stock, Y. (2002). Fundamentos de Farmacologia, 12<sup>a</sup> Edição. Loures (Lisboa) : Editora Lusodidáctica. ISBN: 9789728383367.
4. Don Ballington, D. and Laughlin, M. (2010). Pharmacology for Technicians: *Understanding Drugs and Their Uses*, 4th edn. Saint Paul (MN): EMC/Paradigm Publishing. (ISBN-10: 0763834815/ISBN-13: 978-0763834814).
5. Humphrey P. Rang *et al.* (2011). Rang & Dale's Pharmacology, 7th edn. Philadelphia: Saunders. ISBN: 9780702034718.
6. Humphrey P. Rang *et al.* (2012). Rang & Dale Farmacologia, 7<sup>a</sup> Edição. Philadelphia: Elsevier Editora. ISBN: 9788535241723.
7. Jahangir Moini (2009). Fundamental Pharmacology for Pharmacy Technicians. Clifton Park (NY): Cengage Delmar Learning (Delmar Publishers Inc.).
8. Jahangir Moini (2009). Workbook for Moini's Fundamental Pharmacology for Pharmacy Technicians. Clifton Park (NY): Cengage Delmar Learning (Delmar Publishers Inc.).
9. Katzung, B.G., Masters, S.B. and Trevor, A.J. (2012). Basic and Clinical Pharmacology, 12th edn. Maidenhead (UK)/New York: McGraw-Hill. ISBN: 9780071764018.
10. Katzung, B.G., Masters, S.B. and Trevor, A.J. (2013). Farmacologia Básica e Clínica, 12<sup>a</sup> Edição. Lisboa: McGraw-Hill. ISBN: 9788580552263.
11. Moscou, K. and Snipe, K. (2012). Pharmacology for Pharmacy Technicians, 2nd edn. Maryland Heights (MO) : Mosby. ISBN-10:0323084974 ; ISBN-13:978-0323084970.
12. Moscou, K. and Snipe, K. (2012). Workbook for Pharmacology for Pharmacy Technicians, 2nd edn. Maryland Heights (MO) : Mosby. ISBN-10: 0323084982 ; ISBN-13:978-0323084987.
13. NEAL Michael (2013). Pharmacologie médicale, 5<sup>ème</sup> édn. Paris : De Boeck.
14. Sakai Joy Bellis (2008). Practical Pharmacology for the Pharmacy Technician. Philadelphia: Lippincott, Williams & Wilkins.
15. W. Renée Acosta (2012). Fundamentos de Farmacologia para Técnico em Farmácia, 1<sup>a</sup> Edição. Rio de Janeiro: Editora Guanabara Koogan. ISBN: 9788527718417.

## PHCO 2334: Pharmacology-II (Systemic Pharmacology-I)

**Objective:** To enable the student to know the pharmacological properties of drugs.

**Contents:** The therapeutic classes of drugs:

1. Analgesics;
2. Anti-inflammatory;
3. Antibiotics;
4. ARVs;
5. Contraceptives;
6. Antacids;
7. Anticancer and other drug classes etc.;
8. Pest Control.

## **RECOMMENDED TEXTBOOKS**

1. BAYOT Dominique et FARON Gilles (2011). Pharmacologie pour les sages-femmes. Paris: De Boeck.
2. Bennett, P., Brown, M. and Sharma, P. (2012). Clinical Pharmacology, 11th Edn. Edinburgh: Churchill Livingstone. ISBN: 9780702040849.
3. Brunton, L.L., Chabner, B.A. e Knollmann, B.C. (2012). Goodman & Gilman As Bases Farmacológicas da Terapêutica, 12ª Edição. Lisboa: McGraw-Hill. ISBN: 9788580551167.
4. Claverie, I. et Hedde, H. (2008). Pharmacologie générale: *Mécanismes fondamentaux*, 2ème edn. Philadelphia: Wolters Kluwer. ISBN-10: 2915585601; ISBN-13: 9782915585605.
5. Clayton, B. e Stock, Y. (2002). Fundamentos de Farmacologia, 12ª Edição. Loures (Lisboa) : Editora Lusodidáctica. ISBN: 9789728383367.
6. Don Ballington, D. and Laughlin, M. (2010). Pharmacology for Technicians: *Understanding Drugs and Their Uses*, 4th edn. Saint Paul (MN): EMC/Paradigm Publishing. (ISBN-10: 0763834815/ISBN-13: 978-0763834814).
7. Humphrey P. Rang *et al.* (2011). Rang & Dale's Pharmacology, 7th edn. Philadelphia: Saunders. ISBN: 9780702034718.
8. Humphrey P. Rang *et al.* (2012). Rang & Dale Farmacologia, 7ª Edição. Philadelphia: Elsevier Editora. ISBN: 9788535241723.
9. Jahangir Moini (2009). Fundamental Pharmacology for Pharmacy Technicians. Clifton Park (NY): Cengage Delmar Learning (Delmar Publishers Inc.).
10. Jahangir Moini (2009). Workbook for Moini's Fundamental Pharmacology for Pharmacy Technicians. Clifton Park (NY): Cengage Delmar Learning (Delmar Publishers Inc.).
11. Katzung, B.G., Masters, S.B. and Trevor, A.J. (2012). Basic and Clinical Pharmacology, 12th edn. Maidenhead (UK)/New York: McGraw-Hill. ISBN: 9780071764018.
12. Katzung, B.G., Masters, S.B. and Trevor, A.J. (2013). Farmacologia Básica e Clínica, 12ª Edição. Lisboa: McGraw-Hill. ISBN: 9788580552263.

13. Moscou, K. and Snipe, K. (2012). Pharmacology for Pharmacy Technicians, 2nd edn. Maryland Heights (MO) : Mosby. ISBN-10:0323084974 ; ISBN-13:978-0323084970.
14. Moscou, K. and Snipe, K. (2012). Workbook for Pharmacology for Pharmacy Technicians, 2nd edn. Maryland Heights (MO) : Mosby. ISBN-10: 0323084982 ; ISBN-13:978-0323084987.
15. NEAL Michael (2013). Pharmacologie médicale, 5ème édn. Paris : De Boeck.
16. Sakai Joy Bellis (2008). Practical Pharmacology for the Pharmacy Technician. Philadelphia: Lippincott, Williams & Wilkins.
17. W. Renée Acosta (2012). Fundamentos de Farmacologia para Técnico em Farmácia, 1ª Edição. Rio de Janeiro: Editora Guanabara Koogan. ISBN: 9788527718417.

### **PHCO 3325: Pharmacology-III (Systemic Pharmacology-II)**

**Objective:** This course, a continuation of Special Pharmacology-I, is designed to enable the student to further know the pharmacological properties of drugs.

**Contents:** The therapeutic classes of drugs:

- The cardiovascular system drugs;
- The central nervous system drugs, anesthetics, etc..

### **RECOMMENDED TEXTBOOKS**

1. BAYOT Dominique et FARON Gilles (2011). Pharmacologie pour les sages-femmes. Paris: De Boeck.
2. Bennett, P., Brown, M. and Sharma, P. (2012). Clinical Pharmacology, 11th Edn. Edinburgh: Churchill Livingstone. ISBN: 9780702040849.
3. Brunton, L.L., Chabner, B.A. e Knollmann, B.C. (2012). Goodman & Gilman As Bases Farmacológicas da Terapêutica, 12ª Edição. Lisboa: McGraw-Hill. ISBN: 9788580551167.
4. CLAVERIE, I. et HEDDE, H. (2008). Pharmacologie générale: *Mécanismes fondamentaux*, 2ème edn. Philadelphia: Wolters Kluwer. ISBN-10: 2915585601; ISBN-13: 9782915585605.
5. Don Ballington, D. and Laughlin, M. (2010). Pharmacology for Technicians: *Understanding Drugs and Their Uses*, 4th edn. Saint Paul (MN): EMC/Paradigm Publishing. (ISBN-10: 0763834815/ISBN-13: 978-0763834814).
6. Humphrey P. Rang *et al.* (2011). Rang & Dale's Pharmacology, 7th edn. Philadelphia: Saunders. ISBN: 9780702034718.
7. Humphrey P. Rang *et al.* (2012). Rang & Dale Farmacologia, 7ª Edição. Philadelphia: Elsevier Editora. ISBN: 9788535241723.
8. Jahangir Moini (2009). Fundamental Pharmacology for Pharmacy Technicians. Clifton Park (NY): Cengage Delmar Learning (Delmar Publishers Inc.).

9. Jahangir Moini (2009). Workbook for Moini's Fundamental Pharmacology for Pharmacy Technicians. Clifton Park (NY): Cengage Delmar Learning (Delmar Publishers Inc.).
10. Katzung, B.G., Masters, S.B. and Trevor, A.J. (2012). Basic and Clinical Pharmacology, 12th edn. Maidenhead (UK)/New York: McGraw-Hill. ISBN: 9780071764018.
11. Katzung, B.G., Masters, S.B. and Trevor, A.J. (2013). Farmacologia Básica e Clínica, 12ª Edição. Lisboa: McGraw-Hill. ISBN: 9788580552263.
12. Moscou, K. and Snipe, K. (2012). Pharmacology for Pharmacy Technicians, 2nd edn. Maryland Heights (MO) : Mosby. ISBN-10:0323084974 ; ISBN-13:978-0323084970.
13. Moscou, K. and Snipe, K. (2012). Workbook for Pharmacology for Pharmacy Technicians, 2nd edn. Maryland Heights (MO) : Mosby. ISBN-10: 0323084982 ; ISBN-13:978-0323084987.
14. NEAL Michael (2013). Pharmacologie médicale, 5ème édn. Paris : De Boeck.
15. SAKAI Joy Bellis (2008). Practical Pharmacology for the Pharmacy Technician. Philadelphia: Lippincott, Williams & Wilkins.
16. W. Renée Acosta (2012). Fundamentos de Farmacologia para Técnico em Farmácia, 1ª Edição. Rio de Janeiro: Editora Guanabara Koogan. ISBN: 9788527718417.

### **PHCT 2343: Pharmaceutics-I (Pharmaceutics/Pharmaceutical Technology-I)**

**Objective:** To let the student learn the basics of Pharmaceutics:

1. The various operations and dosage forms;
2. The techniques for preparing medicines.

#### **Contents:**

1. Definitions;
2. Pharmaceutical operations;
3. The different dosage forms;
4. Raw materials (active ingredients, excipients / adjuvant / colorants, preservatives) and packaging of preparations;
5. Measurement operations in Pharmacy;
6. The different drug-dosage forms:
  - Solid forms,
  - Dry
  - Soft,
  - Liquid
  - Powders, etc.

### **RECOMMENDED TEXTBOOKS**

1. A. Le Hir, J-C. Chaumeil et Brossard, D. (2009). Pharmacie galénique : *Bonnes pratiques de fabrication des médicaments*, 9ème édn. Issy-les-Moulineaux: Elsevier / Masson.



2. Allo, O., Blanc, P. et Dalmaso, M-A., eds. (2013). Pharmacie galénique BP, 3ème édn. Rueil-Malmaison: Wolters Kluwer.
3. Aulton, M. and Taylor, K. (2013). Aulton's Pharmaceutics, 4th edn. Edinburgh: Churchill Livingstone. ISBN: 9780702042904.
4. Gazengel, J-Marie et Orecchioni, A-Marie. (2013). Le préparateur en pharmacie : *Guide théorique et pratique*. Paris : Éditions TEC et DOC / Lavoisier.
5. John F. Marriot et al. (2006). Pharmaceutical Compounding and Dispensing. London: Pharmaceutical Press.
6. Lafont, O. et Duval, D. (2000). Le Préparateur en pharmacie : guide théorique et pratique, numéro 1, Chimie, biochimie. Paris: Éditions Tech.& Doc./Lavoisier. ISBN-10: 2743004428; ISBN-13: 978-2743004422
7. Loyd V. Allen, Jr. (2003). Allen's Compounded Formulations. Washington, D.C.: American Pharmaceutical Association/Jobson Publishing L.L.C. ISBN: 1-582120412.
8. Loyd V. Allen, Jr. (2002). The Art, Science and Technology of Pharmaceutical Compounding, 2nd edn. Washington, D.C.: American Pharmaceutical Association. (ISBN: 1-58212-086-2).
9. Marie-Josée Mathieu et Jean-Marie Fonteneau, eds. (2008). Le manuel Porphyre du préparateur en pharmacie. Rueil-Malmaison : Wolters Kluwer France. ISBN-10: 2910228703; ISBN-13: 9782910228705.

### **PHCG 2344: Pharmacognosy**

**Objective:** To let the student learn the essential active substances derived from plant and animal kingdoms for formulation/preparation into drug forms.

#### **Contents:**

1. Overview of Pharmacognosy;
2. The drug carbohydrates:
  - Monosaccharides,
  - Disaccharides and Polysaccharides,
  - Heterogeneous polysaccharides,
  - Gums and mucilages;
2. Drug glycosides
3. Plants lipids;
4. Plants resins, oleoresins and balm;
5. Alkaloids;
6. Iridoid plants;
7. Essential oils;
8. Animal products (insulin, fats, oils, etc.).
9. Introduction to traditional medicine.

### **RECOMMENDED TEXTBOOKS**

1. Anon (2013). West African Herbal Pharmacopoeia. Bobo-Dioulasso: West African

2. Proença da Cunha, ed. lit. (2009). *Farmacognosia e Fitoquímica*, 2ª Edição. Lisboa: Fundação Calouste Gulbenkian. ISBN: 9789723111422.
3. Bernard Bertrand (2014). *Plantes aphrodisiaques*. Toulouse (Haute-Garonne): Editeurs Plume de carotte. EAN13: 9782366720426.
4. Bernard Bertrand (2013). *L'herbier oublié : Secrets de plantes retrouvés*. Toulouse (Haute-Garonne): Editeurs Plume de carotte.
5. Catier, O. et Roux, D. (2007). *Botanique, Pharmacognosie Phytothérapie*, 3ème edn. Rueil-Malmaison: Wolters Kluwer. ISBN-10:2915585520 ; ISBN-13: 9782915585520.
6. Cutler, D.F., Botha, T. e Stevenson, D. Wm. (2011). *Anatomia Vegetal*, 1ª edição. Rio de Janeiro: Artmed Editora. ISBN: 9788536324968.
7. De Oliveira, F. e Akisue, G. (2008). *Fundamentos de Farmacobotânica e de Morfologia Vegetal*, 3ª Edição. São Paulo: Editora Atheneu. ISBN: 9788573791884.
8. Evans, W. C., Trease, G.C and Evans, D. (2009). *Trease and Evans' Pharmacognosy*. Philadelphia: W B Saunders. ISBN: 9780702029332.
9. Fernanda Botelho (2013). *As Plantas e a Saúde Guia prático de remédios caseiros*. Lisboa (Lisbon): Editora Dinalivro. ISBN: 9789725766255.
10. Fernanda Botelho (2013). *Plantas Medicinais Ervas silvestres e flores comestíveis: agenda 2014*. Lisboa (Lisbon): Editora Dinalivro. ISBN: 9789725766279.
11. Harri Lorenzi (2014). *Manual de Identificação e Controle de Plantas Daninhas*, 7ª edição. Nova Odessa (São Paulo) : Editora Plantarum.
12. Heinrich, M., Barnes, J. and Gibbons, S. (2012). *Fundamentals of Pharmacognosy and Phytotherapy*, 2nd edn. Oxford: Elsevier Health Sciences, UK. ISBN: 9780702033889.
13. Jean BRUNETON (2009). *Pharmacognosie : Phytochimie Plantes médicinales*, 4ème éd. Paris : TEC et DOC / EM INTER.
14. Jean-Claude RODET (2013). *Vertus médicinales des plantes aromatiques : Fleurs comestibles et épicées, une pharmacie dans notre cuisine*. Paris: Éditions MÉDICIS.
15. Laïd Boukraâ, ed. (2013). *Honey in Traditional and Modern Medicine*. Boca Raton (FL): CRC Press - Taylor & Francis Group. ISBN: 9781439840160.
16. Proença da Cunha, A., Pereira da Silva, A. e Roque, O.R. (2012). *Plantas e Produtos Vegetais em Fitoterapia*, 4ª Edição. Lisboa: Fundação Calouste Gulbenkian. ISBN: 9789723114355.
17. Rusby, H. H. and Jelliffe, S. E. ( ). *Essentials of Vegetable Pharmacognosy: The Gross and Minute Structure of Plants*. New York: D.O. Haynes & Co.
18. Samuelsson, G. and Bohlin, L. (2010). *Drugs of Natural Origin: A Treatise of Pharmacognosy*, 6th edn. Boca Raton (FL): CRC Press.

19. Tyler, V. E., Brady, L. R. and Robbers, J. E. (1988). Pharmacognosy, 9th edn. Philadelphia : Lea & Febiger. ISBN: 9780812110715.

### **TXCL 2353: Toxicology (General Toxicology)**

#### **Objective:**

Introduce students to concepts of:

- Basic of Toxicology;
- Toxic effects of drugs.

#### **Contents:**

1. General Toxicology:
  - Definitions,
  - History,
  - Different types of poisoning (food, inhalation, gas, medicines, etc..)
  - Different types of toxicities (acute, chronic, etc.).
2. Drug poisoning and antidotes.

### **RECOMMENDED TEXTBOOKS**

1. Curtis Klaassen (2007). Casarett & Doull's Toxicology: *The Basic Science of Poisons*, 7th edn. McGraw-Hill Professional. ISBN-10: 0071470514; ISBN-13: 978-0071470513.
2. Hayes, A. W. and Kruger, C.L. (2014). Hayes' Principles and Methods of Toxicology, 6th edn. Boca Raton (FL). : CRC Press. ISBN-10: 1842145363; ISBN-13: 978-1842145364
3. Jones, A.L. et Dargan, P.I. (2008). Toxicologie d'urgence. Issy-les-Moulineaux: Éditions Esevier /Masson. ISBN-10: 2842998499; ISBN-13: 9782842998493.
4. Klassen, C. (2012).Casarett e Doull Fundamentos de Toxicologia, 2ª edição. Editora McGRAW-HILL InterAmericana. ISBN-10: 8580551315; ISBN-13: 9788580551310.
5. Klaassen, C. and Watkins III, J. B. (2010). Casarett & Doull's Essentials of Toxicology, 2nd edn. New York: McGraw-Hill Professional. ISBN-10: 0071622403; ISBN-13: 978-0071622400.
6. Leyral, G. et Vierling, E. (2007). Microbiologie et Toxicologie des Aliments Hygiène et Sécurité Alimentaires. Paris: Éditions Doin / CRDP/ Aquitaine. ISBN-10:2704012334; ISBN-13:9782704012336
7. MEBS, D. (2006). Animaux venimeux et vénéneux. Paris: Éditions TEC et DOC / Lavoisier. ISBN-10: 2743008172; ISBN-13: 9782743008178.
8. Ménager , M.-T. et Goyffon, M. (2009). Toxicologie nucléaire environnementale et humaine. Paris: Éditions TEC et DOC / EM INTER / Lavoisier. ISBN-10: 2743011742; ISBN-13: 9782733011741.
9. OGA, S. (2014). Fundamentos de Toxicologia, 4ª edição. São Paulo: Editora Atheneu Ltda. ISBN-10: 8574541079; ISBN-13: 9788574541075

10. Shibamoto, T. e Bjeldanes, L.F. (2013). Introdução à Toxicologia dos Alimentos, 1ª edição. São Paulo - SP: Editora ST. ISBN: 9788535271188.
11. Viala, A. et Botta, A. (2009). Toxicologie, 2ème édn. Paris: Éditions TEC et DOC / Lavoisier. ISBN-10: 2743006781; ISBN-13: 9782743006785.

## **INFM 1242: Informatics II (Pharmacy Software for Pharmacy Technicians)**

**Objective:** To introduce the student to the practical use of Pharmacy software and other computer program applicable in Pharmacy.

### **Contents:**

1. Windows environment;
2. Word-processing Software;
3. Spreadsheets (Excel);
4. Specific software (patient management software, Order management software, drug stock inventory-management software);
5. Internet browsing;
6. Introduction to Pharmacy software use- drug distribution and familiarity with different software (e.g. Community Pharmacy software);
8. Creating or updating new files of drugs (including directives or legislation and selection, based on the current inventory of generic products)
9. Third party's medical information including that of prescription billing and settlement of online prescriptions.

## **RECOMMENDED TEXTBOOKS**

1. Anderson, P.O., McGuinness, S.M. and Bourne, P.E. (2009). Pharmacy Informatics. Boca Raton: CRC Press - A Taylor & Francis Group. ISBN: 9781420071757.
2. Beskeen, D.W., Duffy, J., Friedrichsen, L. and Reding, E.E. (2013). Microsoft Office 2013 for Medical Professionals Illustrated , 1st edn. Boston: Cengage Learning. ISBN-10: 1285083903 ; ISBN-13: 978-1285083902.
3. Burke, L. and Weill, B. (2012). Information Technology for the Health Professions, 4th edn. Upper Saddle River (NJ): Prentice Hall. ISBN-10: 0132897644 ; ISBN-13: 978-0132897648.
4. Caetano, K.C. e Malagutti, W. (2012). Informática em Saúde : *Uma Perspectiva Multiprofissional dos Usos e Possibilidades*, 1ª edição. São José (SP): Yendis Editora S.A. ISBN: 9788577282944.
5. C.William Hanson (2005). Healthcare Informatics, 1st edn. Maidenhead (UK): McGraw-Hill Professional. ISBN-10: 0071440666 ; ISBN-13: 978-0071440660.
6. Doina Domitru (2008). The Pharmacy Informatics Primer. 1st ed. Bethesda (MD) : ASHP. ISBN-10: 1585281662; ISBN-13: 978-1585281664.
7. Gustavo Kreuzig Bastos (2002). Internet e Informática para Profissionais da Saúde, 1ª edição. Rio de Janeiro: Livraria e Editora Revinter. ISBN-13: 9788573095482.

8. Stephen Goundrey-Smith (2012). *Information Technology in Pharmacy: An Integrated Approach*, 12th edn. New York: Springer. ISBN-10: 144712779X; ISBN-13: 978-1447127796.
9. Toni Hebda (2012). *Handbook of Informatics for Nurses & Healthcare Professionals*, 5th edn. Upper Saddle River (NJ): Pearson Education Ltd. ISBN-10: 0132959542 ; ISBN-13: 978-0132959544.
10. Venot, A., Burgun, A. et Quantin, C. (2013). *Informatique Médicale, e-Santé : Fondements et applications*. Berlin/New York: Springer, ISBN-10: 281780337X; ISBN-13: 978-2817803371.

### **PHQC 3335: Quality Control (Pharmaceutical Quality Control)**

**Objective:** To introduce students to the fundamentals of the technical quality control of drugs

#### **Contents:**

1. Overview of quality control
  - Definitions, interests, goals, steps, type;
2. Tools for quality control
  - International rules for the administration of drugs, MA, certifications WHO regulatory provision at national level, etc.;
3. Materials and methods of control of matter;
4. The Treasury;
5. The ISO14971 standard;
6. Control charts;
7. Quality pharmaceuticals and generic multiple source insurance.

### **RECOMMENDED TEXTBOOKS**

1. Ammar GROUS (2013). *Éléments d'analyse de la fiabilité et du contrôle de qualité: Statistiques appliquées par l'exemple*. Paris : Éditions Hermès / Lavoisier. ISBN-10: 2746238926; ISBN-13: 9782746238923.
2. Ammar GROUS (2013). *Contrôle de qualité appliquée: Études de cas et nouvelle organisation du travail*. Paris : Éditions Hermès / Lavoisier. ISBN-10: 2746239302; ISBN-13: 9782746239302.
3. Eric S. Gil (2010). *Controle Fisico Quimico de Qualidade de Medicamentos*, 3<sup>a</sup> edição. Belenzinho (São Paulo): Pharmabooks Editora. ISBN-10: 8589731391; ISBN-13: 9788589731393
4. Gratacap, A. et Médan, P.(2013). *Management de la Production : Concepts, Méthodes et Cas*, 4<sup>ème</sup> éd. Paris: Éditions Dunod. ISBN-10: 2100587447; ISBN-13: 978-210058744.
5. Hansen, S., Pedersen-Bjergaard , S. and Rasmussen, K. (2011). *Introduction to Pharmaceutical Chemical Analysis*. Hoboken: Wiley. ISBN: 978-0-470-66121-5.
6. Ira R. Berry (2007 ). *Introduction to the Pharmaceutical Regulatory Process (Drugs and the Pharmaceutical Sciences Series)*, 1st edn. New York : Pocket Books. ISBN: 0824754646.

7. Webber, L. and Wallace, M. (2012). *Quality Control for Dummies*, 1st edn. Hoboken : Wiley. ISBN-10: 0470069090; ISBN-13: 978-0470069097.

## **6.4 Biomedical Sciences**

### **NUTR 3216: Nutrition (Nutrition and Dietetics)**

**Objectives:** Provide Pharmacy technician sufficient knowledge in nutrition, diet and their importance in pharmaceutical patient care.

**Content:**

1. Carbohydrates;
2. Proteins;
3. Fats and oils;
4. Micronutrients, including vitamins and minerals;
5. The interaction of food and drugs;
6. Related to patient care.

### **RECOMMENDED TEXTBOOKS**

1. Ann Burgess (2005). *Guide de Nutrition Familiale*. Rome: Food and Agricultural Organisation, FAO.
2. Auvinet, E., Hirschauer, C. et Meunier, A-L. (2014). *Alimentations, Nutrition et Régimes: Connaissances, Outils et Applications*. Levallois-Perret (Paris). Éditions Studyrama. ISBN-10: 2759019586; ISBN-13: 9782759019588.
3. Dos-Santos, H. A. et Damon, M. (1987). *Manuel de Nutrition Africaine: Éléments de base appliqués*. Paris: Éditions Karthala.
4. João F. Pinto (2010). *Nutraceuticos e Alimentos Funcionais*. Lisboa (Lisbon): Editora Lidel (Lidel Edições Técnicas Lda). (ISBN: 9789727576241).
5. Jose G. P Moura (2011). *Nutrientes e Terapeutica*, 3<sup>a</sup> edição. Rio de Janeiro: Proprio Autor Editora. ISBN-10: 8590658023; ISBN-13: 9788590658023
6. Mann, J. and Truswell, S. (2012). *Essentials of Human Nutrition*, 4th ed. Oxford: Oxford University Press. 978-0-19-956634-1.
7. McCabe-Sellers, B.J., Frankel, E.H. and Wolfe, J.J., eds. (2003). *Handbook of Food-Drug Interactions*. Boca Raton (FL): CRC Press. ISBN: 9780849315312.
8. Rolfes, S.R., Pinna, K. and Whitney, E. (2009). *Understanding Nutrition*, 8th edn. Belmont (CA): Wadsworth.
9. VASSON Marie-Paule et JARDEL Alain (2005). *Principes de nutrition pour le pharmacien*. Paris : Éditions TEC et DOC / Lavoisier.

10. Wolinsky, Ira and Williams, Louis, eds. (2002). Nutrition in Pharmacy Practice. Washington D,C.: American Pharmacists Association. ISBN: 1582120234.

### **NURS 1492: Nursing (Nursing Care)**

#### **Objectives:**

1. To introduce the student to methods of correct noting of vital signs and interpretation of their recorded results.
2. To introduce to the student techniques of proper administration of injections employed in medical routines.

#### **Content:**

1. Techniques of blood pressure, pulse and body temperature measurement and urine collection;
2. Techniques of plotting results of collected clinical vital signs;
3. Analysis and interpretation of plot of the data on the noted vital signs;
4. Techniques of proper administration of injections.

### **RECOMMENDED TEXTBOOKS**

1. Ackley, B. J. and Ladwig, G. B. (2013). Nursing Diagnosis Handbook: *An Evidence-based Guide to Planning Care*, 10th edn. Maryland Heights (MO) : Mosby. ISBN-10: 0323085490; ISBN-13: 978-0323085496.
2. Bradnam Vicky (2011). Handbook of Drug Administration via Enteral Feeding Tubes, 2<sup>a</sup> edição. London: The Pharmaceutical Press. ISBN-10: 0853699283/ISBN-13: 9780853699286.
3. Dunphy, L.M., Winland-Brown, J.E., Porter, B.O. and Thomas, D.J. (2011). Primary Care: *Art and Science of Advanced Practice Nursing*, 3rd edn. Philadelphia: F.A. Davis Company. ISBN-10: 0803622554; ISBN-13: 978-0803622555.
4. Gulanick, M. and Myers, J. L. (2013). Nursing Care Plans: Nursing Diagnosis and Intervention - *Nursing Diagnoses and Intervention*, 8th edn. Amsterdam: Elsevier Health Science. ISBN: ISBN-10: 0323091377; ISBN-13: 978-0323091374.
5. Smith, J. and Roberts, R. (2011). Vital Signs for Nurses: *An Introduction to Clinical Observations*, 1st edn. Hoboken (NJ): Wiley-Blackwell. ISBN-10: 1405190388; ISBN-13: 978-1405190381.
6. Stora Denis (2011). Pharmacie et surveillance infirmière UE 2.11, 6ème édn. Rueil-Malmaison: Éditions Lamarre.

### **TECH 1252: Technology (Laboratory Technology)**

**Objective:** To introduce students to good laboratory practice

#### **Content:**

1. General Technology ( glassware, energy, fluids, Production , regulation and control of temperature , chemical products, laboratory plastic materials )
2. Applied Technology materials (Study of analytical procedures, automation in medical laboratory service, primary maintenance level)
3. Good Laboratory Practice
4. Occupational Health and Safety Laboratory
5. Quality control
6. Laboratory animals ( Breeding , Reproduction, Use).

## RECOMMENDED TEXTBOOKS

1. Bourget, É. et Augé, C. (2008). Les Techniques de Laboratoire : *Chimie - purification et analyse des composés organiques*. Paris: Éditions Ellipses. ISBN-10: 2729838716; ISBN-13: 9782729838713.
2. Gazengel, J-M. et Orecchioni, A-M. (2013). Le Préparateur en Pharmacie: *Guide théorique et pratique*. Paris: Éditions TEC et DOC / Lavoisier. ISBN-10: 2743013710; ISBN-13: 9782743013714.
3. Jacques Béraud (2014). Le Technicien d'Analyses Biomédicales: *Guide théorique et pratique*, 2ème édn. Paris: Éditions TEC et DOC / Lavoisier. ISBN-10: 2743012994; ISBN-13: 9782743012991
4. Jahangir Moini. (2009). Laboratory Procedures for Pharmacy Technicians, 1st edn. Boston: Cengage Learning, Inc. ISBN-10: 1418073946; ISBN: 9781418073947.
5. Estridge, B.H. and Reynolds, A.P. (2011). Basic Clinical Laboratory Techniques , 6th edn. ISBN-10: 9781111138363; ISBN-13: 978-1111138363.
6. Estridge, B.H. e Reynolds, A. P. (2011). Técnicas Básicas de Laboratório Clínico, 5a edição. Rio de Janeiro: Editora Artmed. ISBN: 9788536324364.
7. Roberto de Almeida Moura e cols. (2002). Técnicas de Laboratório, Edição 3. Rio de Janeiro: Editora Atheneu Ltda. ISBN-13: 9788573791136.

## ANAT/PHSY 1471: Anatomy / Physiology-I

**Objectives:** The course aims to introduce students to organize the various functions of the human body.

### Contents:

1. The musculoskeletal system;
2. Cardiovascular system;
3. Nervous system;
4. Respiratory system;
5. Digestive tract;



6. The urogenital tract;
7. Sense organs (ENT, eye, skin, etc.). etc.

## RECOMMENDED TEXTBOOKS

1. Bruno Anselme (2013). Le corps humain : *Retenir l'essentiel*. Paris : Éditions Nathan.
2. Daniel John Cunningham (2010). Cunningham's Manual of Practical Anatomy, Vol. 3. Cambridge: Cambridge Scholars Publishing. ISBN-13: 9781152856769; ISBN-10: 1152856766.
3. Derrickson, B. e Tortora, G. J. (2010). Princípios de Anatomia e Fisiologia, 2ª edição. Rio de Janeiro: Editora Guanabara Koogan.
4. Elaine N. Marieb (2014). Anatomie et physiologie humaines , 9e édn. Upper Saddle River (NJ): Pearson Education. ISBN: 2761369327; EAN: 978-2761369329.
5. Jahangir Moini (2011). Anatomy and Physiology for Health Professionals. Sudbury (MA): Jones and Bartlett Publishers. ISBN-10: 1449632297; ISBN: 9781449632298
6. J. H. Green (1978). Basic Clinical Physiology, 3rd edn. Oxford: Oxford University Press. ISBN: 978-0-19-263331-6 .
7. Norris, M. and Siegfried, D.R. (2011 ). Anatomy and Physiology For Dummies, 2nd edn. ISBN-10: 0470923261; ISBN-13: 978-0470923269. Hoboken (NJ): John Wiley & Sons, Inc.
8. Patrick GEPNER (2009). Le Corps humain Pour les nuls. Paris: Éditions First (Éditions Editis/Planeta). ISBN-10: 2754011218; ISBN-13: 978-2754011211.
9. Pocock , G., Richards, C.D. and Richards, R. (2013). Human Physiology, 4th edn. ISBN: 978-0-19-957493-3.
10. Ward, J. e Linden, R. (2014). Fisiologia Básica: *Guia Ilustrado de Conceitos Fundamentais*, 2ª edição. Barueri (São Paulo): Editora Manole. ISBN: 9788520436318

## PATH 2223: Pathophysiology/Semiology (Medical and Surgical)

**Objective:** Knowing the most common medical and surgical pathology with emphasis on their therapeutic management; Prevention and counseling (orientation).

### Contents:

1. Infectious diseases (parasitic, bacterial, viral and fungal);
2. Pathologies
  - Respiratory,
  - Dermatological
  - Digestive
  - Cardiovascular;
3. Allergic immune;
4. Dentistry and Dental Diseases;

5. Disorders
  - Eye and ENT;
6. Psychiatric disorders;
7. Addiction;
8. Endocrine and metabolic diseases;
9. Blood diseases, etc.

## RECOMMENDED TEXTBOOKS

1. BLENKINSOPP, A., PAXTON, P. and BLENKINSOPP, J. (2005). *Symptoms in the Pharmacy: A Guide to the Management of Common Illness*, 5th edn. Malden, MA: Blackwell. ISBN: 1405122226.
2. Ch. PRUDHOMME et A. MILLE (2010). *Pathologies à l'usage du préparateur en pharmacie : Préparation au brevet professionnel*. Paris: Éditions Maloine.
3. Emmanuel FOURNIER (2013). *Sémiologie EMG élémentaire*. Paris : Médecine Sciences Publications / Lavoisier.
4. Faucia *et al.* (2008). *Harrison's Principles of Internal Medicine*, Vol. 2, 7th edn. New York : McGraw-Hill. ISBN: 0071476911, 9780071476911.
5. Francisco Leydson F. Feitosa (2014). *Semiologia Veterinária: A Arte do Diagnóstico*, 3a edição. Curitiba (Paraná State) : Editora Roca. ISBN: 9788541203999.
6. HARRISON (2013). *Principes de Médecine Interne*, 18ème éd. Paris: Médecine Sciences Publications / Lavoisier.
7. Huether, S.E. and McCance, K.L. (2011). *Understanding Pathophysiology*, 5th edn. Maryland Heights (MO): Mosby. ISBN-10: 0323078915; ISBN-13: 000-0323078915.
8. Jahangir Moini (2012). *Introduction to Pathology for the Physical Therapist Assistant*. Sudbury (MA): Jones and Bartlett Publishers. ISBN-10: 1449630588; ISBN: 9781449630584.
9. Martin M. Zdanowicz (2003). *Essentials of Pathophysiology for Pharmacy*. Boca Raton: CRC Press. ISBN: 1-58716-036-1.
10. Rose Mary Ferreira Lisboa da Silva (2014). *Tratado de Semiologia Médica*, 1ª edição. Rio de Janeiro: Editora Guanabara Koogan. ISBN: 9788527725835.

## BCHE 2473: Biochemistry (General Biochemistry)

**Objective:** To introduce the student to the general principles of biochemistry applicable to the Pharmacy.

**Contents:**

1. Definition of Biochemistry
2. Basic biochemistry:
  - Definitions, classification, concepts of food science, the thermodynamic enzymology

- (courses on enzymes and coenzymes, enzyme kinetics and correlation of their deficiencies and / or inhibition and anomalies in relation to disease states)
- Introduction to the application of the use of enzymes in the production of medicines and other useful products (fermentation).

### **RECOMMENDED TEXTBOOKS**

1. Berg, J. M., Stryer, L. and Tymoczko, J. L. (2011). Biochemistry. Basingstoke (UK): W.H. Freeman & Co. Ltd. ISBN: 9781429276351.
2. Bettelheim, F.A., Brown, W.H., Campbell, M.K. e Farrel, S.O. (2011). Introdução à Química Geral, Orgânica e Bioquímica, Edição 1. Boston: Cengage Learning Editora.
3. Campbell, P.N. and Smith, A. D. (2002). Biochimie Illustrée. Paris: Éditions Maloine. ISBN: 9782224027131.
4. Charles P. Woodbury (2011). Biochemistry for the Pharmaceutical Sciences. Sudbury (MA): Jones and Bartlett Publishers. ISBN-10: 0763763845 ISBN-13: 978-0763763848.
5. Christian Moussard (2006). Biochimie structurale et métabolique, 3e édn. Bruxelles: De Boeck. ISBN-10: 2804152367; ISBN-13: 978-2804152369.
6. Harvey, R.A. e Ferrier, D.R. (2012). Bioquímica Ilustrada, Edição 5. Rio de Janeiro: Editora Artmed. ISBN: 9788536326252.
7. J. H. WEIL (2005) Biochimie générale, 10ème édn. Paris: Éditions Dunod.
8. Nelson, D. L. and Cox, M. M. (2013). Lehninger Principles of Biochemistry, 6th edn. New York: W. H. Freeman & Co. ISBN-10: 1-4292-3414-8 ; ISBN-13: 978-1429234146.
9. Nelson, D. L. e Cox, M.M. (2011). Princípios de Bioquímica de Lehninger, Edição 5. Rio de Janeiro: Editora Artmed /Sarver. ISBN: 9788536324180.
10. Stryer, L., Berg, J.M., Tymoczko, J. L. e Gatto, Jr. , C.G.J. (2014). Bioquímica, 7ª edição. Rio de Janeiro: Editora Guanabara Koogan. ISBN: 9788527723619.
11. STRYER, L.,BERG, J.M. et TYMOCZKO, J.L. (2013). Biochimie, 7ème édn. Paris: Médecine Sciences Publications / Lavoisier.

### **BIOL 1481: Biology-I (Human Cell Biology)**

**Objective:** To introduce students to the fundamentals of human biology.

#### **Contents:**

1. General:
  - Definition, tissues and equipment
2. Cells (anatomy and structure, nucleoprotein, lipoprotein membrane);
3. Cell Biology (exchange membrane)

4. Molecular Genetics
5. Cell disruption and cancer.

## RECOMMENDED TEXTBOOKS

1. Abraham L. Kierszenbaum (.2006). Histologie et biologie cellulaire : *Une introduction à l'anatomie pathologique*. Paris: Éditions De Boeck. ISBN-10: 2804149102; ISBN-13: 978-2804149109.
2. Bruce Alberts *et al.*(2012). L'essentiel de la biologie cellulaire, 3ème édn. Paris: Éditions Médecine Sciences Publications / Lavoisier. ISBN-10: 2257204026; ISBN-13: 978-2257204028.
3. Bruce Alberts e cols. (2011). Fundamentos da Biologia Celular , 3ª Edição. Rio de Janeiro: Editora Artmed. ISBN-10: 8536324430; ISBN-13: 978-8536324432.
4. Gerald C. Karp ( 2010). Biologie cellulaire et moléculaire, 3e édn. Paris: Éditions De Boeck. ISBN-10: 2804160114; ISBN-13: 978-2804160111.
5. John K. Young (2010). Introduction to Cell Biology. Singapore: World Scientific Publishing Co Pte. Ltd. ISBN-10: 9814307327; ISBN-13: 9789814307321.
6. Kierszenbaum, A.L. and Tres, L.L. (2015). Histology and Cell Biology: *An Introduction to Pathology*, 4th edn. Philadelphia: Saunders. ISBN-10: 0323313302; ISBN-13: 978-0323313308.
7. Kierszenbaum, A.L. e Tres, L. L. (2012). Histologia e Biologia Celular: *Uma Introdução à Patologia*, 3ª Edição. Rio de Janeiro: Editora Elsevier. ISBN-13: 9788535247374.
8. Maria de L. T. Polizeli Polizeli. (2008). Manual Pratico de Biologia Celular, 2ª edição. Rio de Janeiro: Holos Editora Ltda EPP. ISBN-10: 8586699616; ISBN-13: 9788586699610.
9. Nalini Chandar (2011). Biologia Celular e Molecular Ilustrada. 1ª edição. Rio de Janeiro: Artmed Editora Ltda. ISBN-10: 8536324449; ISBN-13: 9788536324449.
10. Uchôa, L. C. e Carneiro, J. (2005). Biologia Celular e Molecular, 8ª edição. Lisboa: Editora Nova Guanabara, Lda. ISBN-13: 9788527710459.

## BIOL 1472: Biology-II (Microbiology / Virology)

### Objectives:

1. This course aims to introduce students to the major groups of micro-organisms (eukaryotes and prokaryotes, viruses) and their relationship to humans and animals and their health.
2. The importance of micro-organisms in drug development will be emphasized.

### Contents:

1. Morphology of micro-organisms;
2. The classification of viruses, rickettsiae, bacteria, fungi;
3. Reproductive patterns of viruses, rickettsiae, bacteria, fungi, and aseptic control of viruses

- and microbial agents and their economic importance to the health and other utility;
4. Class of prions (proteins of infection).

### **RECOMMENDED TEXTBOOKS**

1. Baudry, C. et Brezelle, C. (2006). Microbiologie immunologie: *Exercices d'application*, 2ème edn. Philadelphia: Wolters Kluwer. ISBN-10:2915585261; ISBN-13: 9782915585261.
2. Denyer, S. P., Hodges, N., Gorman, S.P. and Gilmore, B. F., eds. (2011). Hugo and Russell's Pharmaceutical Microbiology, 8th edn. Hoboken (NJ): Wiley - Blackwell. ISBN: 9781444330632.
3. Johnston, M. and Gricar, J.(2010). Sterile Products and Aseptic Techniques for the Pharmacy Technician, 2nd edn. Upper Saddle River (NJ): Prentice Hall.
4. Lisa McCartney (2012). Sterile Compounding and Aseptic Technique: *Concepts Training and Assessment for Pharmacy Technicians*. St. Paul (MN): EMC Paradigm. ISBN-10: 0763840831 ; ISBN-13: 978-0763840839.
5. Mahon, C.R., Lehman, D.C. and Manuselis Jr., G. (2010). Textbook of Diagnostic Microbiology, 4th edn. (Mahon, Textbook of Diagnostic Microbiology). Philadelphia: Saunders. ISBN-10: 1416061657; ISBN-13: 978-1416061656.
6. Rolland, X. e Rolland, L. (2000). Bacterias, Virus e Fungos, Edição 1. Lisboa: Instituto Piaget Editora. ISBN: 9727712606; ISBN-13: 9789727712601.

### **BIOL 2463: Biology-III (Parasitology / Mycology)**

#### **Objective:**

Introduce students to the study of parasitic currents and parasitic infections and their treatment

#### **Contents:**

1. Introduction to Parasitology;
2. Different types of parasites:
  - Protozoa (rhizopods, flagellates, sporozoites, ciliates)
  - The metazoans: helminths (trematodes, cestodes, nematodes), molluscs, arthropods (arachnids, crustaceans, insects)
  - Mushrooms
3. Parasitic diseases, fungal infections and treatment.

### **RECOMMENDED TEXTBOOKS**

1. Cimerman, B. e Franco, M.A. (2012). Atlas de Parasitologia Humana - *Com a Descrição e Imagens de Artrópodes, Protozoários, Helminths e Moluscos*, 2ª edição. São Paulo Atheneu Editora. ISBN:9788538802587.
2. David Pereira Neves (2008). Atlas Didático de Parasitologia, 2ª edição. São Paulo Atheneu Editora. ISBN: 9788538800019
3. David Pereira Neves e cols. (2011). Parasitologia Humana, 12ª edição. São Paulo Atheneu Editora. ISBN: 9788538802204

4. Hélène Fournié (2013). Parasitoses et mycoses: *des régions tempérées et tropicales*. Issy-les-Moulineaux : Éditions Elsevier/ Masson. ASIN: B00FT9SWLQ
5. Leventhal, R. and Cheadle, R.F. (2012). *Medical Parasitology: A Self-Instructional Text*, 6th edn. ISBN-10: 080362543X; ISBN-13: 978-0803625433.
6. Neves, D.P. e Filippis, T.de. (2012). *Parasitologia Básica*, 3ª edição. São Paulo Atheneu Editora. ISBN: 9788538804833.
7. Sandro Rogério De Almeida (2008). *Micologia*, 1ª edição. Rio de Janeiro: Editora Guanabara Koogan: ISBN: 9788527714037.
8. Viviane GUILLAUME (2009). *Mycologie*. Paris: De Boeck. ISBN 10: 2804150283; ISBN 13: 9782804150280. ISBN 10: 9782804150280.

### **BIOL 2483: Biology-IV (Immunology)**

**Objective:** To introduce the student to:

1. Basic principles of human immune system;
2. Common immune disorders.

#### **Contents:**

1. Definition and classification of immunity;
2. General principles of natural immunity;
3. Definitions of various terms in immunity
  - Antigens,
  - Antibodies
  - Phagocytosis,
  - Antigen-antibody reactions
  - Endotoxin and exotoxin,
4. Methods for determining antibodies (CD4, T cell, B cell, etc..).

### **RECOMMENDED TEXTBOOKS**

1. Abul K. Abbas *et al.* (2013). *Les bases de l'immunologie fondamentale et clinique*, 4ème édn. Issy-les-Moulineaux: Éditions Elsevier /Masson. ASIN: B00EFFS1UW.
2. Abbas, A.K., Lichtman, H.H. and Pillai, S. (2012). *Basic Immunology: Functions and Disorders of the Immune System*, 4e. Philadelphia: Saunders. ISBN-10: 1455707074; ISBN-13: 978-1455707072.
3. Abul Abbas, A. e Lightman, A.H. (2011). *Imunologia Básica: Funções e Distúrbios Do Sistema Imunológico*. Rio de Janeiro: Editora Elsevier Editora Ltda. ASIN: B0058H56Y0.
4. Aymeric , J-L. et Lefranc, G. (2011). *Immunologie humaine*, 1e édn. Paris: Éditions De Boeck Supérieur. ASIN: B00BJ3I5D6.

5. Coico Richard (2010). *Imunologia*, 6ª edição. Rio de Janeiro: Editora Guanabara Koogan S.A. ISBN-10: 8527716631; ISBN-13: 9788527716635.
6. D Flaherty (2011). *Immunology for Pharmacy*, 1st edn. Maryland Heights (St. Louis) /Philadelphia : Elsevier-Mosby. ISBN: 9780323069472.

### **BIOL 2493: Biology-V (Hematology)**

**Objective:** To introduce the student to the study of blood and its components and their applications in diagnosis.

#### **Contents:**

1. Definitions and terminology in hematology;
2. The ABO system, rhesus system;
3. Blood cells (erythrocytes, leukocytes, platelets);
4. Plasma
5. Hemoglobin,
6. Erythropoiesis
7. Granulopoiesis,
8. Homeostasis
9. Blood diseases,
10. Blood transfusion and transfusion complications.

### **RECOMMENDED TEXTBOOKS**

1. Denise M. Harmening (2008). *Clinical Hematology and Fundamentals of Hemostasis*, 5th edn. Philadelphia: F.A. Davies Company. ISBN-10: 0803617321; ISBN-13: 978-0803617322.
2. Garban, F. et Barro, C. (2003). *Guide Pratique D'Hémtologie*. Issy-les-Moulineaux: Éditions Elsevier Masson. ISBN:9782294010392.
3. Hoffbrand, A.V. e Moss, P.A.H. (2013). *Fundamentos em Hematologia*, 6ª Edição. Rio de Janeiro: Editora Artmed. ISBN: 9788565852296.
4. Hoffbrand, V. and Moss, P. (2011). *Essential Haematology, Includes Desktop Edition*, 6th edn. Hoboken: Wiley - Blackwell. ISBN-10: 1405198907; ISBN-13: 978-1405198905.
5. Keohane, E., Smith, L. and Walenga, J. (2015). *Rodak's Hematology: Clinical Principles and Applications*, 5th edn. Philadelphia: Saunders. ISBN-10: 0323239064; ISBN-13: 978-0323239066.
6. L. CAMOIN-JAU (2013). *Hématologie*. Paris: Vernazobres Grego Éditeur. ISBN 10: 2818307996; ISBN 13: 9782818307991.
7. Moore, G., Knight, G and Blann, A. (2010). *Haematology: Fundamentals of Biomedical Science Series*, 1st edn. Oxford: Oxford University Press. ISBN-10: 0199568839; ISBN-13: 978-0199568833.
8. Robert Hillman, R., Ault, K. A. et Rinder, H. M. (2007). *Hématologie en pratique clinique: Guide de diagnostic et de traitement*. Paris: Médecine Sciences Publications.

ISBN-10: 2257108337; ISBN-13: 978-2257108333.

9. Ronald Hoffmann *et al.* (2013). *Hematology: Basic Principles and Practice*, 6th edn. Edinburg: Churchill Livingstone. ISBN-10: 1437729282; ISBN: 9781437729283.
10. SFH (2011). *Hématologie*. Issy-les-Moulineaux: Elsevier-Masson. ISBN-10: 2294712234; ISBN-13: 978-2294712234.
11. Therezinha F. Lorenzi e cols. (2003). *Manual de Hematologia - Propedêutica e Clínica*, 3ª Edição. Rio de Janeiro. Editora Guanabara Koogan.

### **MEDE 1482: Medicine (First Aid / Emergency Medical Response)**

**Objective:** To provide the Pharmacy technician, as a rescuer, the knowledge and skills that are needed to provide first aid to an injured or a subject in a medical emergency, so as to avoid complications.

#### **Contents:**

1. General principles of first aid;
2. Behavior to adopt in the event of
  - Respiratory distress;
  - Circulatory distress;
3. On the achievement of higher nervous functions;
4. From food poisoning or ingestion of chemicals or objects;
5. In skeletal involvement;
6. Of asthma or epilepsy;
7. Clearance and handling injuries.

### **RECOMMENDED TEXTBOOKS**

1. Alton L. Thygerson, A.L. and Steven M. Thygerson, S. M., AAOS and ACEP. (2011). *CPR and AED Advanced First Aid*, 6th edn. Burlington: Jones & Bartlett Learning International. ISBN-10: 1449635059; ISBN-13: 978-1449635053.
2. M. Acaire - P. et Axine - L. Doni (2011). *Secourisme*. Paris : Éditions Vernazobres-Grego. ISBN: 978-2-8183-0255-2.
3. NSC. (2006). *Basic Life Support: Healthcare and Professional Rescuers*, 6th edn. New York: McGraw-Hill Publishing Company. ISBN13: 978-0073296906; ISBN10: 0073296902.
4. NSC. (2004). *Basic First Aid*, 5th edn. New York: McGraw-Hill Publishing Company. ISBN13: 978-0073016733.
5. William E. Prentice. (2012). *Essentials of Athletic-Injury Management*, 9th edn. New York: McGraw-Hill Higher Education. ISBN-13: 9780078022616.

### **6.5 Management And Administrative Sciences**

#### **MANG 2554: Management-I (General Management)**

**Objective:** Introduce the pharmacy technician to the basics of management.



## Contents:

1. Definition and scope of management;
2. Management process:
  - Planning,
  - Conduct
  - Time management, material and human resources (focus on the different types of organizational structures, operational procedures);
3. Leadership styles of leaderships (e.g. democratic, autocratic, etc.).
4. Notion of behavior;
5. Conflict management;
6. Delegation and supervision;
7. Motivation;
8. Performance Evaluation

## RECOMMENDED TEXTBOOKS

1. Alain Rusterholtz (2009). *Bonnes pratiques de management : Applicables à l'industrie pharmaceutique*. Puteaux La Défense: Blouse Blanche.
2. Clezio Saldanha Dos Santos. (2006). *Introdução à gestão pública*, Edição 1. São Paulo: Editora Saraiva. ISBN: 8502055305.
3. Desselle, S. P. and Zgarrick, D.P. (2005). *Pharmacy Management: Essentials for All Practice Settings*. Chicago: McGraw-Hill Medical Publishing Division. (ISBN: 0-07-141869-5).
4. F.MOREDDU. (2012). *Guide du Management à l'Officine*. Courbevoie: Éditions le Moniteur des pharmacies. ISBN-10: ; ISBN-13:1090018363; ISBN-13: 9791090018365.
5. François Cocula (2014). *Introduction générale à la gestion*, 5e édn. Paris: Éditions Dunod. ISBN-10: 2100708600; ISBN-13: 978-2100708604.
6. Jérôme Sirot (2010). *Comptabilité et Instruments de Gestion*, 4ème édn. Courbevoie: Éditions le Moniteur des pharmacies.
7. John R. Schermerhorn (2009). *Introduction to Management*, 10th edn. Hoboken: John Wiley & Sons ISBN-10: 0470418877; ISBN-13: 978-0470418871.
8. Lisboa, J., Coelho, A., Coelho, F. e Almeida , F.(2013). *Introdução à Gestão de Organizações*, 3ª edição. Porto: Vida Económica-editorial Sa. ASIN: B00FXRI27S.
9. Lynette R. Bradley-Baker (2011). *Getting Started as a Pharmacy Manager*, 1st edn. Washington: American Pharmacists Association. ASIN: B00A9XLHNC.
10. Muriel Fabrègues (2012). *Introduction à la gestion*, 2e édn.: *Connaissance du droit*. Paris: Éditions Dalloz. ISBN-10: 2247120474; ISBN-13: 978-2247120475.
11. Norman V. Carroll (2012). *Financial Management for Pharmacists: A Decision-making Approach*, 3rd edn. Philadelphia: Lippincott Williams & Wilkins. ASIN: B009LQH926.
12. R.N. Xavier (2013). *Gestão em Farmácia* . São Paulo: Digital Books Editora Ltda.

ASIN: B00EAY5E2G.

13. Schermerhorn , J.R. and Bachrach , D.G. (2015). Introduction to Management (*International Student Version*), 13th edn. Hoboken: Wiley. ISBN: 978-1118951187
14. Sousa, Antonio de. ( 2014). Introdução à Gestão : *Uma Abordagem Sistémica António de Sousa*. Lisboa: Editora Verbo. ISBN: 9789722213028
15. Titus De Silva (2013). Essential Management Skills for Pharmacy and Business Managers. Oxon ( OX): Productivity Press - *A Taylor & Francis Group* . ISBN: 9781466582583.
16. Vecina MALIK. (2011). Gestao em Saude, 1ª edição. Rio de Janeiro: Editora Guanabara Koogan S.A. ISBN-10: 8527717085; ISBN-13: 9788527717083.

### **MANG/MARK 3566: Management-II (Pharmaceutical Marketing)**

**Objective:** To introduce the students to the concepts, approaches and methods of marketing

**Content:**

1. Fundamentals of Marketing;
2. Environment and issues of the pharmaceutical industry;
3. Management of credit portfolio;
4. Strategies techniques of marketing;
5. Market Survey and analysis;
6. Resources and sales forces
7. Market Promotion and Communication;
8. Competition consideration

### **RECOMMENDED TEXTBOOKS**

1. Alain Olivier *et al.* (2008). Le marketing du médicament en question (s). Paris: Éditions Vuibert. ISBN-10: 2711769399 ; ISBN-13: 978-2711769391.
2. Benjamin F. Banahan (2000). Marketing to Pharmacists: *Understanding Their Role and Influence*. Boca Raton: CRC Press - A Taylor & Francis Group. ISBN: 9780789010094.
3. C. Harboun (2000). Le marketing pharmaceutique . Paris: Éditions ESKA. ISBN-10: 2869112467; ISBN-13: 978-2869112469.
4. Churchill, Jr., G.A., Brown, T.J e Suter, T.A. (2012). Pesquisa Básica de Marketing, 1ª edição. São Paulo: Cengage Learning. ISBN: 9788522111367.
5. David A. Holdford (2007). Marketing for Pharmacists, 2nd edn. Washington, D.C.: APhA. ISBN-10: 1582121060 ; ISBN-13: 978-1582121062.
6. Kotler, P., Armstrong, G., Le Nagard, E, et Lardinoit, T. (2013). Principes de marketing, 11e édn. Montreuil: Éditions Pearson France. ISBN-10: 2744076694 ; ISBN-13: 978-2744076695.
7. Mickey Smith, ed. (2004). Principles of Pharmaceutical Marketing, 3rd edn. New Delhi: CBS Publishers & Distributors. ISBN: 9788123908182.

8. Patrick Gabriel et al. (2014). Marketing des services . Paris : Éditions Dunod. EAN13 : 9782100715527
9. Philip Kotler (2010).Marketing 3.0: *As Forças que Estão Definindo o Novo Marketing Centrado no Ser Humano*, 1ª edição. Rio de Janeiro: Elsevier. ISBN: 9788535238693.
10. Serre, M-P. et Wallet-Wodka, D. (2014). Marketing des produits de santé , 2e édn: *Stratégies d'accès au marché , Médicaments remboursables, selfcare, cosmétiques et aliments santé*. Paris: Éditions Dunod . ISBN-10: 2100708171; ISBN-13: 978-2100708178.
11. Taylor, K.M. G. and Harding, G. (2001).Pharmacy Practice. Boca Raton: CRC Press - A Taylor & Francis Group. ISBN: 9780415271592.

### **MANG 2564/LOGM: Management-III (Logistics Management of Medicines)**

#### **Objective:**

This course is designed to introduce students in most other areas of management practices: inventory management and procurement procedures in Pharmacy ,focusing on hospital and community practice.

#### **Contents:**

1. Inventory management practices in hospital and community pharmacies;
2. Procurement procedures and other relevant areas of management (e.g. planning, managing third tender for contracts for nursing home care, e-commerce and organizing clinic days patients);
3. Introduction to Logistics Management;
4. The system of logistics management information;
5. The assessment of the status of stocks;
6. Systems of maximum-minimum inventory control;
7. Notions of quantification, forecasting, receiving and storage;
8. Inventory;
9. Management tools in stock;
10. Regulatory requirements for effective management of medicines;
11. Managing the cold chain;
12. Study of some management software;
13. Procedures
  - Withdrawal of batches of drugs
  - Complaint
  - Removal of expired drugs
  - Destruction of expired drugs.

### **RECOMMENDED TEXTBOOKS**

1. Barbieri, J. e Machline, C. (2012). Logística Hospitalar: *Teoria e Prática*, Edição 2. São Paulo - SP: Editora Saraiva.ISBN-10: 8502082566 ; ISBN: 9788502082564.
2. C.D.J. Waters ( 2003). Logistics: *An Introduction to Supply Chain Management*, 1st edn. Basingstoke (UK) : Palgrave Macmillan . ISBN-10: 0333963695; ISBN: 9780333963692.

3. Crandall, R.E., Crandall, W.R. and Chen, C.C. (2014). Principles of Supply Chain Management, 2nd edn. Boca Raton: CRC Press - A Taylor & Francis Group. ISBN 9781482212020
4. Fonteneau, Jean-Marie et Liozon, S. (2014). Législation Gestion. Courbevoie: Les Éditions Porphyre. ISBN: 9782362920172.
5. Gilles Lasnier (2004). Gestion des approvisionnements et des stocks dans la chaîne logistique. Lyon : Hermes Science Publications. ISBN-10: 2746209896; ISBN-13: 978-2746209893
6. Jaffeux, C. and Wieser, P.( 2012). Essentials of Logistics and Management, 3e edn. Boca Raton: CRC Press - Taylor & Francis Group. ISBN: 9781466573086.
7. Martha Embrey *et al.*, eds. (2011). Managing Access to Medicines and Health Technologies, MDS-3. Sterling (VA): Kumarian Press - Stylus Publishing. ISBN: 9781565495876.
8. Miani, P. et Venturelli, N. (2014). Transport Logistique, 8ème éd. Chambéry: Le Génie des Glaciers Éditeur
9. Michel Massal (2007). La Gestion du Médicament en Établissement Médico-social: *Guide de Bonnes Pratiques Professionnelles*. Paris : Éditions Seli Arslan.
10. Pimor, Y. et Fender, M. (2013). Logistique et Supply Chain, 6ème éd. Paris: Éditions Dunod. ISBN-10: 2100577344; ISBN-13: 9782100577347.
11. Schlegel, G.L. and Trent, R. J.(2014). Supply Chain Risk Management: *An Emerging Discipline*. Boca Raton: CRC Press - A Taylor & Francis Group. ISBN: ISBN 9781482205978.
12. Tarcísio Tito Salgado (2014). Logística: *Práticas, Técnicas e Processos de Melhorias*, 1ª Edição. São Paulo - SP: Editora Senac São Paulo. ISBN-10: 8539604396; ISBN: 9788539604395.

### **MANG/MAHS 3576: Management-IV (Health Services Management)**

**Objective:** To introduce the student to health service management.

#### **Content:**

1. Basic concepts and principles
2. Staffing
3. Job description
4. Delegation of responsibilities
5. Work schedule / plan
6. Material management
7. Development of action plan
8. Implementation of activities
9. Evaluation of activities
10. Problem Solving Process (PSP).

## RECOMMENDED TEXTBOOKS

1. Aristides Almeida Rocha. (2013). Saúde Pública Bases Conceituais, 2ª edição. São Paulo: Editora Atheneu Ltda. ISBN-10: 8538803182; ISBN-13: 9788538803188.
2. Bergoignan-Esper, C. et Dupont, M. (2014). Droit hospitalier, 9ème édn. Paris: Éditions Dalloz. ISBN-10: 2247136885; ISBN-13: 978-2247136889.
3. Bruno Palier (2015). La réforme des systèmes de santé, 7ème édn. Paris: Presses Universitaires de France (PUF). ISBN-10: 2130635156; ISBN-13: 978-2130635154.
4. Daniel B. McLaughlin (2015). The Guide to Healthcare Reform: *Readings and Commentary*. Chicago: AUPHA/HAP Publications. ISBN: 9781567936940.
5. Eduardo Santiago Spiller e cols. (2009). Gestão dos Serviços em Saúde, Edição 1. Goiânia (Brz): FGB Livraria e Editora Ltda. ISBN-10: 8522507600; ISBN-13: 978-8522507603.
6. Fonteneau, Jean-Marie et Liozon, S. (2014). Législation Gestion. Courbevoie: Les Éditions Porphyre. ISBN: 9782362920172.
7. Goodwin, N., Gruen, R. and LLes, V. (2005). Managing Health Services, 2nd edn. Milton Keynes : Open University Press. ISBN-10:0335218520 ; ISBN-13: 978-0335218523.
8. Kovner, A. R., McAlearney, A.S. and Neuhauser, D. (2009). Health Services Management: *Readings, Cases, and Commentary*, 9th edn. Chicago: Health Administration Press (HAP). ISBN-10: 1567933246; ISBN-13: 978-1567933246.
9. Longest, Jr., B. B. and Darr, K.D. (2014). Managing Health Services Organizations and Systems, 6th edn. Baltimore (MD): Health Professions Press. ISBN-10: ISBN-10: 193887000X; ISBN-13: 978-1938870002.
10. Mary G. Harris, ed. (2005). Managing Health Services: *Concepts and Practice*, 2nd edn. Edinburgh : Churchill Livingstone. ISBN-10: 0729537595; ISBN-13: 978-0729537599.
11. Peter C. Olden (2015). Management of Healthcare Organizations: *An Introduction*, 2nd edn. Chicago: ACHE/HAP Publications . ISBN: 9781567936902.
12. Rakich, J. and Longest, Jr., B., eds. (2010). Cases in Health Services Management, 5th edn. Baltimore (MD): Health Professions Press. ISBN-10: 1932529594; ISBN-13: 978-1932529593.
13. Renee Acosta (2011). Fundamentos de Farmacologia para Técnico em Farmácia. Lisboa: Editora Nova Guanabara. ISBN: 9788527718417.
14. Robert Holcman (2013). Management hospitalier: *Manuel de gouvernance et de droit hospitalier*. Paris: Éditions Dunod. ISBN-10: 2100589067; ISBN-13: 9782100589067.
15. Sébastien Damart (2013). Innovations managériales en établissements de santé : *Vers un management intégratif*. Cormelles-le-Royal: Éditions EMS. ISBN-10: 2847695214; ISBN-13: 978-2847695212.

16. Souza, A.F. (2010). *Gestão de Manutenção em Serviços de Saúde*. São Paulo : Edgard Blucher Editora.
17. Vissers, J. and Beech, R. (2005). *Health Operations Management: Patient Flow Logistics in Health Care*. London: Routledge. ISBN-10: 0415323967; ISBN: 9780415323963.

### **MANG 3556: Management-V (Administrative Writing)**

**Objective:** To introduce the student to the techniques of correspondence.

#### **Contents:**

1. General introduction to business writing;
2. Writing techniques;
3. The different types of administrative correspondence;
4. Technical report writing, reporting, the minutes;
5. Technical drafting various types of documents (CV, cover letter, etc.).

### **RECOMMENDED TEXTBOOKS**

1. Anne Vervier (2012). *Rédaction claire : 40 bonnes pratiques pour rendre vos écrits professionnels clairs et conviviaux*. Liège (Belgique): Éditions Edipro. ISBN-10: 2874961531; ISBN-13: 978-2874961533.
2. Annick Lelli (2008). *Les écrits professionnels : La méthode des 7C*, 2ème éd. Paris: Éditions Dunod. ISBN-10: 2100521179; ISBN-13: 978-2100521173.
3. Bullock, R., Goggin, M.D. and Weinberg, F. (2013). *The Norton Field Guide to Writing, with Readings and Handbook*, 3rd edn. New York : W. W. Norton & Company. ISBN-10: 0393919595; ISBN-13: 978-0393919592.
4. Cristina Northleat Albuquerque (2009). *Dicionário de Termos Farmacêuticos*, 1ª edição. Rio de Janeiro: Editora Guanabara Koogan: ISBN: 9788527715508.
5. Eds. Amer. Heritage Dictionaries/Eds. Houghton Mifflin (2001). *The New Office Professional's Handbook: How to Survive and Thrive in Today's Office Environment*, 4th edn. New York: Houghton Mifflin. ISBN-10: 0618036083 ; ISBN-13: 978-0618036080.
6. Élisabeth MONTAGNAC. (2014). *Commentaires techniques écrits*, 3ème edn. Rueil-Malmaison: Wolters Kluwer. ISBN-10: 2362920194; ISBN-13: 9782362920196.
7. João Bosco Medeiros. (2010). *Redação Empresarial*, 7ª edição. Ribeirão Preto: Editora Atlas. ISBN: 9788522458943.
8. Kadyss, R. et Nishimata (2013). *Rédiger avec succès lettres, e-mail et documents administratifs*, 6ème éd. Issy-les-Moulineaux: GUALINO Éditions-Lextenso Éditions. ISBN-10: 2297038283; ISBN-13: 978-2297038287.
9. Locker, K. and Kienzler, D. (2009). *Business and Administrative Communication*, 9th edn. ISBN-10: 0073377805; ISBN-13: 978-0073377803.

10. Maria Deosdédite Giaretta Chaves (2011). Manual prático de redação empresarial, 2ª edição. São Paulo/SP: ABEU - Associação Brasileira das Editoras Universitárias. ISBN: 9788598366395.
11. Meyer, V., Sebranek, P. and Rys, J. V. (2010). Write for Business, 2nd edn. Akron (OH) : UpWrite Press. ISBN-10: 1932436324; ISBN-13: 978-1932436327.
12. Miriam Díaz-Gilbert (2009). English for Pharmacy Writing and Oral Communication. Philadelphia: Lippincott Williams & Wilkins. ISBN: 0781774322.
13. Miriam Gold (2010). Redação Empresarial, 4ª edição. São Paulo - SP: Pearson Education do Brasil Ltda. ISBN-10: 8576056828; ISBN-13: 978-8576056829.
14. Pierre Verdier (2008). Guide pratique de la correspondance administrative, 8ème édn. Paris: Éditions Berger-Levrault. ISBN-10: 2701316065; ISBN-13: 978-2701316062.
15. Runion, M. and Fenner, S. (2011). Perfect Phrases for Office Professionals: *Hundreds of ready-to-use phrases for getting respect, recognition, and results in today's workplace*, 1st edn. New York: McGraw-Hill. ISBN-10: 007176674X; ISBN-13: 978-0071766746.
16. Stroman, J. , Wilson, K. and Wauson, J. (2011). Administrative Assistant's and Secretary's Handbook, 4th edn. Maidenhead: AMACOM (C/o McGraw-Hill Book Co). ISBN-10: 0814417604; ISBN-13: 978-0814417607.
17. Yolande Ferrandis (2009). La rédaction administrative en pratique, 3ème édn. Paris: Éditions (Groupe) Eyrolles. ISBN-10: 2212544960; ISBN-13: 978-2212544961.

#### **ACCT 2574: Accounting (Introduction to Accounting)**

**Objective:** To introduce students to:

1. The Basics of Accounting
2. Accounting application to various business organizations;
3. Emphasis on tariffs on medicines and related items in the management settings pharmaceutical stores.

**Content:**

1. Definition of accounting and branch accounting.
2. Annual Accounts (Financial Record for example, profit and loss, balance sheet, representing different business entities, etc.).
3. Management accounting (e.g. cost base, pricing based on cost, budget control, etc., focusing on pricing prescription.)
4. Management of public finances (e.g. the cost of capital, working capital management, etc.).

#### **RECOMMENDED TEXTBOOKS**

1. Clovis Luis Padoveze (2006). Introdução À Contabilidade Com Abordagem Para Não-Contadores. São Paulo: Cengage Learning. ISBN-10: 8522104662; ISBN-13: 978-8522104666 .
2. Edison Castilho e cols. (2010). Contabilidade Introdutória (Livro-Texto), 11ª edição. Ribeirao Preto: Editora Atlas. ISBN: 9788522458158.

3. F.MOREDDU. (2012). Guide du Management à l'Officine. Courbevoie: Éditions le Moniteur des pharmacies. ISBN-10: ; ISBN-13:1090018363; ISBN-13: 9791090018365.
4. Hoss, O., Casagrande, L.F., Dal Vesco, D. G. e Metzner, C. M. (2014 ). Introdução à Contabilidade : *Ensino e Decisão*. Ribeirao Preto: Editora Atlas.
5. Jérôme SIROT (2010). Comptabilité et Instruments de Gestion, 4ème édn. Courbevoie: Éditions le Moniteur des pharmacies.
6. Joëlle HERMOUET (2014). Politique de prix, 5ème édn. Courbevoie: Éditions le Moniteur des pharmacies.
7. John A. Tracy (2013). Accounting for Dummies, 5th edn. Hoboken (NJ): John Wiley & Sons Publishing company. ISBN-10: 1118482220; ISBN-13: 978-1118482223.
8. Laurence THIBAUT-LE GALLO (2014). Comptabilité Pour les Nuls, 2e edn. Paris: Édition First. ISBN-10: 2754058990; ISBN-13: 978-2754058995.
9. Marion J.C. e Ribeiro, O.M. (2014) .Introdução à Contabilidade Gerencial, 2ª edição. São Paulo: Editora Saraiva. ISBN-10: 8502619748; ISBN-13: 978-8502619746.
10. Weygandt, J.J., Kimmel, P.D. and Kieso. (2013). Accounting Principles (*International Student Version*), 11th edn. Hoboken (NJ) : John Wiley & Sons. ISBN: 978-1-118-32366-3.
11. Wayne Label (2013). Accounting for Non-Accountants, 3E: *The Fast and Easy Way to Learn the Basics* (Quick Start Your Business), 3rd edn. Naperville (IL): Sourcebooks. ISBN-10: 1402273045; ISBN-13: 978-1402273049

## 6.6. Public Health

### PUBH 1691: Public Health-I (Environmental Health)

**Objective:** To help students understand the importance of the pharmacy technician in environmental health.

#### **Contents:**

1. Definition of hygiene concepts;
2. Personal hygiene;
3. Collective health;
4. Hygienic handling;
5. Water hygiene;
6. Health and safety in the laboratory;
7. Hospital hygiene;
8. Roles of pharmacy technicians in public health;



9. Strategy for disease prevention;
10. Drugs used for contraception;
11. Role of the pharmacy technician in the promotion and health education of the population.

## RECOMMENDED TEXTBOOKS

1. Michel GÉRIN *et al.* (2003). *Environnement et santé publique : Fondements et pratiques*. Paris: Éditions Tec &Doc.
2. Paulo Roberto Barsano. (2014). *Poluição Ambiental e Saúde Pública*, 1a edição. São Paulo: Editora Érica. 9788536506128.

## PUBH 3695: Public Health-II (Community Health)

**Objective:** To help students understand the importance of the pharmacy technician in community health.

### Content:

1. Notions of IEC / BCC;
2. Basic concepts of epidemiology;
3. Epidemiological strategy;
4. The influence of health interventions;
5. Concepts of health, disease, mortality;
6. Health indicators (prevalence, index, etc.).
7. Using statistical tests based on the difference between the observed and expected values.

## RECOMMENDED TEXTBOOKS

1. Aristides Almeida Rocha. (2013). *Saúde Publica Bases Conceituais*, 2ª edição. São Paulo: Editora Atheneu Ltda: ISBN-10: 8538803182; ISBN-13: 9788538803188.
2. Detels, S.R., Beaglehole, R., Lansang, M.A. and Gulliford, M. (2009). *Oxford Textbook of Public Health*. Oxford: Oxford University Press. ISBN: 0199218706, 9780199218707.
3. Didier TABUTEAU, ed. (2012). *Service public et santé*. Paris: Sciences Po Les Presses.
4. Frederick Murphy (2013). *Community Engagement, Organization, and Development for Public Health Practice*. New York: Springer Publishing Company. ISBN: 0826108024, 9780826108029.
5. Gisèle Carroll (2006). *Pratiques en santé communautaire*. Montréal: Éditions Chenelière Education. ISBN-10: 2765010455; ISBN-13: 978-2765010456.
6. Otuki, M.F. et Correr, C.J. (2013). *A Prática Farmacêutica na Farmácia Comunitária*. Rio de Janeiro: Artmed Editora. ISBN: 9788565852821.
7. Tessier, S., Andréys, Jean-Baptiste et Ribeiro, Marie-Adèle. (2004). *Santé publique, santé communautaire*, 2e édn. Paris: Éditions Maloine. ISBN-10: 2224028687; ISBN-13: 978-2224028688.

## **PUBH 3686: Public Health-III (Health Policy)**

**Objective:** To introduce the student to national health policy

### **Content:**

1. The national health policy (fundamentals : history, vision, goal )
2. The national health system ( administrative structures , technical structures, district Health System )
3. The Primary Health Care
4. National Health Development Plan (PNDS) and health policy
5. National programs and health projects
6. National drug / pharmaceutical policy in relation to the national health policy.

### **RECOMMENDED TEXTBOOKS**

1. Buse, K., Mays, N. and Walt, G. (2012). Making Health Policy: Understanding Public Health, 2nd edn. Milton Keynes (UK): Open University Press. ISBN-10:0335246346; ISBN-13: 978-0335246342.
2. Green, J. and Tones, K. (2010). Health Promotion: *Planning and Strategies*, 2nd edn. London/Los Angeles: SAGE Publications Ltd. ISBN-10: 1847874908; ISBN-13: 978-1847874900
3. Jourdain, A. et Bréchat, Pierre-Henri., dir. (2012). La Nouvelle Planification Sanitaire et Sociale ,2e édn. Rennes: Presses de l'EHESP. ISBN: 978-2-8109-0069-5.
4. Rayssiguier, Y., Jégu, J. et Laforcade, M., dirs.(2012). Politiques sociales et de santé : *Comprendre et agir*, 2e édn. Rennes: Presses de l'EHESP. ISBN: 978-2-8109-0071-8.
5. Rob Baggott (2010). Public Health: *Policy and Politics*, 2end edn. Basingstoke (UK) : Palgrave Macmillan. ISBN-10: 0230537936; ISBN-13: 978-0230537934.

## **STAT 26103: Public Health-IV (Statistics: Introduction to Biostatistics)**

**Objectives:** This course introduces the student to Basic Statistics and its applications.

### **Content:**

1. Introduction to Biostatistics;
2. Frequencies, mean, mode, median, standard deviation, variance, histogram, linear regression;
3. Probability and normal distribution and some applications of the foregoing;
4. Introduction to statistical software (SPSS, Excel, SAS, etc.).

### **RECOMMENDED TEXTBOOKS**

1. Alain Li Wan Po (1997). Statistics for Pharmacists. Wiley-Blackwell. ISBN-10: 0632048816; ISBN-13: 978-0632048816.

2. B. Burt Gerstman (2014). Basic Biostatistics: Statistics for Public Health Practice, 2nd edn. Burlington: Jones & Bartlett Learning. ISBN-10: 1284036014 ; ISBN-13: 978-1284036015.
3. Bolton, S. and Bon, C. (2004). Pharmaceutical Statistics: *Practical and Clinical Applications*, 4th ed. Revised. New York: Marcel Dekker, Inc.
4. Buncher, C.R. and Tsay, J-Y. (2005). Statistics In the Pharmaceutical Industry, 3rd edn. Boca Raton (FL) : CRC Press. ISBN:0824754697, 9780824754693
5. David S. Jones. (2009). Pharmaceutical Statistics. London: Pharmaceutical Press.
6. Derek Rowntree (2000). Statistics Without Tears: *An Introduction for Non-Mathematicians*. London: Penguin Books Ltd. (ISBN: 0-14-013632-0).
7. Gérald BAILLARGEON (2002). Probabilités et statistique avec applications en sciences de la nature, sciences administratives et sciences de la santé (Livre + CD-Rom). Trois-Rivières (QC): Les Éditions SMG.
8. J. De Muth (2006). Basic Statistics and Pharmaceutical Statistical Applications, 2nd edn. New York: Dekker. ISBN: 9780849337994.
9. Jean-Luc ROCUET (2013). Probabilités et statistiques, 4ème éd. Brest : ESTA (Édition des Sciences et Techniques Avancées).
10. Luc ADJENGUE (2014). Méthodes statistiques: concepts, applications et exercices. Montréal: Presses Internationales Polytechniques.
11. Philip Rowe (2007). Essential Statistics for the Pharmaceutical Sciences. West Sussex: John Wiley & Sons, Ltd. (ISBN: 978-0-470-03468-2).
12. Prem S. Mann (2013). Introductory Statistics, *International Student Version*, 8th edn. Hoboken (NJ) : Wiley. ISBN: 978-1118318706
13. Prem S. Mann (2013).Introductory Statistics : *Student Solutions Manual*, 8th edn. Hoboken (NJ): Wiley. ISBN-10: 1118504100; ISBN-13: 978-1118504109
14. S. Bohnenblust (2004). Basic Statistics for Health Science. New York: McGraw-Hill. ISBN: 9780072844030.

## **6.7 Practical Training : Practical Attachment / Externship**

### **EXTE 2784: Externship for Pharmacy Technicians-I**

**Objective:** This attachment period is intended to enable the student, while still continuing with her/his programme of study, to have a ‘hands-on’ training or student exposure experience in a regulatorily recognized sector such as a manufacturing industry, a laboratory, hospital dispensary, community pharmacy, Pharmacy practice regulatory body/administration or any other related sector.

**Content:** Allowing the student to be adequately knowledgeable with the functioning of a retail pharmaceutical establishment, hospital environment and with the management as well as the supply of medicines, etc., it covers the following:

1. Development and enhancement of the student's attitudes towards an outpatient setting;
2. Exposure of the student to the pharmacy's commitment to disease-based pharmaceutical management;
3. Importance of patient counseling;
4. Enabling the student to acquire the ability to communicate with patients and clients, physicians, and other health care professionals, concerning medication and related health matters;
5. Demonstration, to the student, the professional attitude necessary to the practice of Pharmacy including that of Pharmacy technicians and the roles of the pharmacist within society;
6. Inculcating into the student virtues such as empathy, respect, and concern toward diverse patient populations;
7. Familiarization of the student with the various laws governing Pharmacy practice and to demonstrate how pharmacists and technicians abide by these laws;
8. Knowledge of the promotion of the safe use of medication.

## **RECOMMENDED TEXTBOOKS**

1. Bope, E.T. and Kellerman, R.D., eds. (2015). *Conn's Current Therapy 2015*, 1st edn. Philadelphia: Saunders. ISBN-10: 1455702978; ISBN-13: 978-1455702978.
2. Brunton, L.L., Chabner, B.A. e Knollmann, B.C. (2012). *Goodman & Gilman As Bases Farmacológicas da Terapêutica*, 12ª Edição. Lisboa: McGraw-Hill. ISBN: 9788580551167.
3. Charlas, C. (2009). *Le Guide de l'Officine de Pharmacie Management*. Paris: Éditions Publibook. ISBN-10: 2748351266; ISBN-13: 9782748351262.
4. Correr Correr (2013). *Pratica Farmaceutica Na Farmacia Comunitaria*, 1ª edição. Rio de Janeiro: Artmed Editora Ltda.
5. Correr, C. J. e Otuki, M.F. (2013). *A Prática Farmacêutica Na Farmácia Comunitária*, 1ª edição. *São Paulo*: Editora Grupo A. ISBN: 9788565852821.
6. Don A. Ballington (2014). *Pharmacy Practice for Technicians*, 5th edn. St. Paul (MN): EMC/Paradigm Publishing. ISBN-10: 0763852260; ISBN-13: 978-0763852269.
7. Dunphy, L.M., Winland-Brown, J.E., Porter, B.O. and Thomas, D.J. (2011). *Primary Care: Art and Science of Advanced Practice Nursing*, 3rd edn. Philadelphia: F.A. Davis Company. ISBN-10: 0803622554; ISBN-13: 978-0803622555.
8. Durand, D.V. , Jeune, C. Le et DO., Ph.(2014). *Guide pratique des médicaments 2015*, 34ème édn. Paris: Éditions Maloine. ISBN-10: 2224033893; ISBN-13: 9782224033897.
9. Durgin, J.M. and Hanan, Z.I. (2008). *Pharmacy Practice for Technicians*, 4th edn. Boston: Cengage Learning. ISBN-10: 1428320326; ISBN-13: 978-1428320321.

10. Fabiole MOREDDU (2014). Le Conseil Pédiatrique à l'Officine, 3ème éd. Courbevoie: Éditions le Moniteur des pharmacies. ISBN-10: 1090018762; ISBN-13: 9791090018761.
11. Ferracini, F.T. e Filho, W.M. B. (2012). Teixeira Farmácia Clínica: *Segurança Na Prática Hospitalar*. São Paulo : Editora Atheneu. ISBN-10: 8538802607 ; ISBN-13: 9788538802600.
12. Florence BONTEMPS (2014). Le Conseil à l'Officine dans la Poche, 7ème éd. Courbevoie: Éditions le Moniteur des pharmacies. ISBN-10: 1090018665; ISBN-13: 9791090018662
13. François MARTIN. (2010). La vente-conseil: *Un engagement au quotidien*, 3ème éd. Courbevoie: Éditions le Moniteur des pharmacies. ISBN-10: 291558592x; ISBN-13: 9782915585926.
14. Holdford, D.A and Brown, T.R. (2010). Introduction to Hospital and Health-System Pharmacy Practice, 1st edn. Bethesda (MD): ASHP. ISBN-10: 1585282375; ISBN-13: 978-1585282371.
15. Jason Hall (2013). Pharmacy Practice : *Integrated Foundations of Pharmacy Series*. Oxford: Oxford University Press. ISBN-10: 0199655324; ISBN-13: 978-0199655328
16. Marcelo Polacow Bisson. (2010). Farmacia Hospitalar: *Um Enfoque em Sistemas de Saude*, Edição 2. Barueri (SP) : Editora Manole Ltda. ISBN-10: 8520428533; ISBN-13: 9788520428535.
17. Ministère de l'emploi et de la solidarité et Ministère de la santé (2001). Bonnes pratiques de pharmacie hospitalière. Paris: Documentation Française.
18. Roberta Joly Ferreira Braga (2014). ABC da Farmacia Hospitalar, Edição 1. São Paulo : Editora Atheneu Ltda. ISBN-10: 8538804537; ISBN-13: 9788538804536.
19. Seller, R. H. and Symons, A.B. (2011). Differential Diagnosis of Common Complaints (with Student Consult Online Access), 6th edn. Philadelphia: Saunders. ISBN-10: 1455707724; ISBN-13: 978-1455707720.
20. Taylor, K.M. G. and Harding, G., eds. (2001). Pharmacy Practice. Boca Raton: CRC Press - A Taylor & Francis Group. ISBN: 9780415271592.
21. Teresa Hopper. (2014). Mosby's Pharmacy Technician: *Principles and Practice*, 3rd edn. Philadelphia: Saunders. ISBN-10: 1437706703; ISBN-13: 978-1437706703.
22. Walker, R. and Whittlesea, eds. (2007). Clinical Pharmacy and Therapeutics, 4th edn. Edinburgh: Churchill Livingstone. ISBN: 9780443102851.
23. Wladimir Mendes Borges FILHO (2011). Farmacia Clínica: *Seguranca Na Pratica Hospitalar*, 1ª Edição. São Paulo : Editora Atheneu Ltda. ISBN-10: 8538802607; ISBN-13: 9788538802600.

## **EXTE 3795: Externship for Pharmacy Technicians-II**

**Objectives & Content:** As continuation of same, these are the same as for Externship for

Pharmacy Technicians-I.

**RECOMMENDED TEXTBOOKS**

Same as for Externship for Pharmacy Technicians-I.

**EXTE 3796: Externship for Pharmacy Technicians-III**

**Objectives & Content:** As continuation of same, these are the same as for Externship for Pharmacy Technicians-II.

**RECOMMENDED TEXTBOOKS**

Same as for Externship for Pharmacy Technicians-II.

**PART VII:**  
**LIST OF COURSES FOR THE HARMONIZED PHARMACYTECHNICIAN**  
**TRAINING PROGRAMME IN THE ECOWAS REGION**

**Courses for the Harmonized Pharmacy Technician Training Programme**

<b>Course Code</b>		<b>General Title</b>	<b>Full Descriptive Title</b>
<b>Litr. Desgn.</b>	<b>Numr. Desgn.</b>		
ACCT	2574	Accounting	Accounting: Introduction to Accounting
ANAT / PHSY	1471	Anatomy/Physiology	Anatomy/Physiology-I
ANAT / PHSY	1462	Anatomy/Physiology	Anatomy/Physiology-II
BCHE	2473	Biochemistry	Biochemistry : General Biochemistry
BIOL	1481	Biology	Biology I : Human Biology (cellular)
BIOL	1472	Biology	Biology II : Microbiology / Virology
BIOL	2463	Biology	Biology III : Parasitology / Mycology
BIOL	2483	Biology	Biology IV : Immunology
BIOL	2493	Biology	Biology V : Haematology
BOTA	2213	Botany	Botany: Fundamentals of Botany
CHEM	1241	Chemistry	Chemistry I : General Chemistry
CHEM	1232	Chemistry	Chemistry II : Inorganic or Mineral Chemistry
CHEM	2224	Chemistry	Chemistry III : Organic Chemistry
CHEM / PCHE	3326	Chemistry	Chemistry IV: Pharmaceutical Chemistry
CQPH	3335	Quality Control	Quality Control: Pharmaceutical Quality Control
EXTE	2784	Externship	Externship I: Pharmacy Technician Exernship-I
EXTE	3795	Externship	Externship II: Pharmacy Technician Exernship II
EXTE	3796	Externship	Externship III: Pharmacy Technician Exernship-III
INFM	1251	Informatics	Informatics – I : Computers Basics
INFM	1242	Informatics	Informatics II : Pharmacy Software
LANG (ENGL/ FREN/ /PORT)	1121	Foreign Language	Language (English/French/Portuguese) – I
LANG (ENGL/FREN/ /PORT)	1122	Foreign Language	Language (English/French/Portuguese) – II
MANG	2554	Management	Management I : General Management
MANG / MARK	3566	Management	Management II: Pharmaceutical Marketing
MANG/LOGM	2564	Management	Management III : Pharmaceutical Logistics Management (Logistic Management of Drugs)
MANG/MAHS	3576	Management	Management IV : Health Services Management
MANG/AMWR	3556	Management	Management V : Administrative/Business Writing
MATH	1111	Mathematics	Mathematics I : Basic Mathematics
MATH	1112	Mathematics	Mathematics II : Applied Mathematics (in Pharmacy)
MEDE	1482	Medicine	Medicine : First Aid / Emergency Medical Intervention/Emergency Medical Response
NURS	1492	Nursing	Nursing Care
NUTR	3216	Nutrition	Nutrition : Nutrition and Dietetics
PATH	2223	Pathophysiology	Pathopyhsiology: Medical & Surgical Pathophysiology/ Semiology

### Courses for the Harmonized Pharmacy Technician Training Programme

Course Code		General Title	Full Descriptive Title
Litr. Desgn.	Numr. Desgn.		
PHAR	1361	Pharmacy	Pharmacy I: Introduction to the Pharmacy profession
PHAR / CALP	3345	Pharmacy	Pharmacy II : Pharmaceutical Calculations
PHAR / METR	3355	Pharmacy	Pharmacy III : Metrology
PHAR / PCOM	3385	Pharmacy	Pharmacy IV : Community Pharmacy
PHAR / PHOS	3365	Pharmacy	Pharmacy V: Hospital Pharmacy
PHAR / PINS	3375	Pharmacy	Pharmacy VI : Institutional Pharmacy
PHAR / PLEG	3336	Pharmacy	Pharmacy VII : Pharmacy Legislation (Pharmacy Law)
PHCG	2344	Pharmacognosy	Pharmacognosy
PHCO	2333	Pharmacology	Pharmacology I : General Pharmacology
PHCO	2334	Pharmacology	Pharmacology II : Systemic Pharmacology I
PHCO	3325	Pharmacology	Pharmacology III : Systemic Pharmacology II
PHCT	2343	Pharmaceutics	Pharmaceutics I: Pharmaceutics/Pharmaceutical Technology (Galenic Pharmacy)-I
PHCT	3346	Pharmaceutics	Pharmaceutics II: Pharmaceutics/Pharmaceutical Technology (Galenic Pharmacy)-II
PUBH	1691	Public Health	Public Health I : Environmental Health
PUBH	3685	Public Health	Public Health II : Community Health
PUBH	3686	Public Health	Public Health III : Health Policy
PHYS	1231	Physics	Physics : Theories and Concepts in Physics
RECH	2214	Research	Research : Introduction to Research-I
STAT	26103	Statistics	Statistics: Introduction to Biostatistics
TECH	1252	Technology	Technology : Laboratory Technology
TXCL	2353	Toxicology	Toxicology: General Toxicology



**VIII:**  
**PHARMACY TECHNICIAN TRAINING COURSES**  
**Courses Sequencing and their Assigned Credits**  
**per Academic Term**

### Courses and their Assigned Credits: Harmonized Pharmacy Technician Training Programme

FIRST YEAR (1st Semester, S1)		Teaching Method				Student	Total Workload		
		Lectures	Practicals	Tutorials	Subtotal	Student's Input	Total Hours	Coeff.	Credits
Code									
Litr. Desgn.	Numr. Desgn.								
<b>AREA 1: GENERAL STUDIES</b>									
MATH	1111	10	0	10	20	20	40		2
LANG	1121	10	0	10	20	20	40		2
<b>Subtotal</b>		<b>20</b>	<b>0</b>	<b>20</b>	<b>40</b>	<b>40</b>	<b>80</b>		<b>4</b>
<b>AREA 2: BASIC SCIENCES</b>									
PHYS	1231	10	10	10	30	30	60		3
CHEM	1241	20	20	10	50	50	100		5
INFM	1251	15	15	10	40	40	80		4
<b>Subtotal</b>		<b>45</b>	<b>45</b>	<b>30</b>	<b>120</b>	<b>120</b>	<b>240</b>		<b>12</b>
<b>AREA 3: PHARMACEUTICAL SCIENCES</b>									
PHAR	1361	20	0	0	20	20	40		2
<b>Subtotal</b>		<b>20</b>	<b>0</b>	<b>0</b>	<b>20</b>	<b>20</b>	<b>40</b>		<b>2</b>
<b>AREA 4: BIOMEDICAL SCIENCES</b>									
ANAT / PHSY	1471	20	20	10	50	50	100		5
BIOL	1481	20	0	10	30	30	60		3
<b>Subtotal</b>		<b>40</b>	<b>20</b>	<b>20</b>	<b>80</b>	<b>80</b>	<b>160</b>		<b>8</b>
<b>AREA 6 : PUBLIC HEALTH</b>									
PUBH	1691	30	0	10	40	40	80		4
<b>Subtotal</b>		<b>30</b>	<b>0</b>	<b>10</b>	<b>40</b>	<b>40</b>	<b>80</b>		<b>4</b>
<b>TOTAL (S1)</b>		<b>155</b>	<b>65</b>	<b>80</b>	<b>300</b>	<b>300</b>	<b>600</b>		<b>30</b>



**Courses and their Assigned Credits: Harmonized Pharmacy Technician Training Programme**

<b>FIRST YEAR (2nd Semester, S2)</b>		<b>Teaching Method</b>				<b>Student</b>	<b>Total Workload</b>		
		<b>Lectures</b>	<b>Practicals</b>	<b>Tutorials</b>	<b>Subtotal</b>	<b>Student's Input</b>	<b>Total Hours</b>	<b>Coeff.</b>	<b>Credits</b>
<b>Code</b>									
<b>Litr. Desgn.</b>	<b>Numr. Desgn.</b>								
<b>AREA 1: GENERAL STUDIES</b>									
MATH	1112	15	0	15	30	30	60		3
LANG	1122	15	0	15	30	30	60		3
<b>Subtotal</b>		<b>30</b>	<b>0</b>	<b>30</b>	<b>60</b>	<b>60</b>	<b>120</b>		<b>6</b>
<b>AREA 2: BASIC SCIENCES</b>									
CHEM	1232	20	20	10	50	50	100		5
INFM	1242	10	20	10	40	40	80		4
TECH	1252	10	10	0	20	20	40		2
<b>Subtotal</b>		<b>40</b>	<b>50</b>	<b>20</b>	<b>110</b>	<b>110</b>	<b>220</b>		<b>11</b>
<b>AREA 4: BIOMEDICAL SCIENCES</b>									
ANAT / PHSY	1462	20	20	10	50	50	100		5
BIOL	1472	20	10	0	30	30	60		3
PUBH/MEDE	1482	10	10	0	20	20	40		2
NURS	1492	10	20	0	30	30	60		3
<b>Subtotal</b>		<b>60</b>	<b>60</b>	<b>10</b>	<b>130</b>	<b>130</b>	<b>260</b>		<b>13</b>
<b>TOTAL (S2)</b>		<b>130</b>	<b>110</b>	<b>60</b>	<b>300</b>	<b>300</b>	<b>600</b>		<b>30</b>
<b>TOTAL HOURS, FIRST YEAR (S1 + S2)</b>		<b>285</b>	<b>175</b>	<b>140</b>	<b>600</b>	<b>600</b>	<b>1200</b>		<b>60</b>



**Courses and their Assigned Credits: Harmonized Pharmacy Technician Training Programme**

SECOND YEAR (3rd Sem., S3)		Teaching Method				Student	Total Workload		
		Lectures	Practicals	Tutorials	Subtotal	Student's Input	Total Hours	Coeff.	Credits
Code									
Litr. Desgn.	Litr. Desgn.								
AREA 2: BASIC SCIENCES									
BOTA	2213	20	10	10	40	40	80		4
PATH	2223	20	0	0	20	20	40		2
Subtotal		40	10	10	60	60	120		6
AREA 3: PHARMACEUTICAL SCIENCES									
PHCO	2333	30	10	10	50	50	100		5
PHCT / GPHA	2343	20	20	10	50	50	100		5
TXCL	2353	20	10	10	40	40	80		4
Subtotal		70	40	30	140	140	280		14
AREA 4: BIOMEDICAL SCIENCES									
BIOL	2463	20	10	0	30	30	60		3
BCHE	2473	10	10	0	20	20	40		2
BIOL	2483	10	0	0	10	10	20		1
BIOL	2493	20	0	0	20	20	40		2
Subtotal		60	20	0	80	80	160		8
AREA 6 : PUBLIC HEALTH									
STAT	26103	15	0	5	20	20	40		2
Subtotal		15	0	5	20	20	40		2
TOTAL (S3)		185	70	45	300	300	600		30

**Courses and their Assigned Credits: Harmonized Pharmacy Technician Training Programme**

SECOND YEAR (4th Semester, S4)		Teaching Method				Student	Total Workload		
		Lectures	Practicals	Tutorials	Subtotal	Student's Input	Total Hours	Coeff.	Credits
Code									
Litr. Desgn.	Numr. Desgn.								
AREA 2: BASIC SCIENCES									
RECH	2214	20	0	10	30	30	60		3
CHEM	2224	20	0	10	30	30	60		3
Subtotal		40	0	20	60	60	120		6
AREA 3: PHARMACEUTICAL SCIENCES									
PHCO	2334	30	10	10	50	50	100		5
PHCG	2344	30	20		50	50	100		5
Subtotal		60	30	10	100	100	200		10
AREA 5: MANAGEMENT & ADMINISTRATIVE SCIENCES									
MANG	2554	20	0	10	30	30	60		3
MANG / LOGM	2564	30	0	20	50	50	100		5
ACCT	2574	10	0	10	20	20	40		2
Subtotal		60	0	40	100	100	200		10
UE/AREA 7 : EXTENRNSHIP									
EXTE	2784	0	0	0	0	80	80		4
Subtotal		0	0	0	0	80	80		4
TOTAL (S4)		160	30	70	260	340	600		30
TOTAL HOURS SECOND YEAR (S3 + S4)		345	100	115	560	640	1200		60

**Courses and their Assigned Credits: Harmonized Pharmacy Technician Training Programme**

THIRD YEAR (5TH Semester, S5)		Teaching Method				Student	Total Workload		
		Lectures	Practicals	Tutorials	Subtotal	Student's Input	Total Hours	Coeff.	Credits
Code									
Litr. Desgn.	Numr. Desgn.								
AREA 2: SCIENCES FONDAMENTALES									
RECH	3215	20		10	30	50	80		4
Subtotal		20		10	30	50	80		4
AREA 3: PHARMACEUTICAL SCIENCES									
PHCO	3325	30	10	10	50	30	80		4
PHQC	3335	20	30		50	30	80		4
PHAR/CALP	3345	10	0	10	20	20	40		2
PHAR/METR	3355	10	10	0	20	20	40		2
PHAR/PHOS	3365	20	0	0	20	20	40		2
PHAR/PINS	3375	20	0	0	20	20	40		2
PHAR/PCOM	3385	20	0	0	20	20	40		2
Subtotal		130	50	20	200	160	360		18
AREA 6 : PUBLIC HEALTH									
PUBH	3695	10	0	10	20	20	40		2
Subtotal		10	10	0	20	20	40		2
AREA 7 : EXTERNSHIP									
EXTE	37105	0	0	0	0	0	120		6
Subtotal		0	0	0	0	120	120		6
TOTAL (S5)		160	50	40	250	350	600		30



## PART IX: GLOSSARY

**AHM:** *Assemblies of Health Ministers*, the gathering of Health Ministers of ECOWAS member countries and including WAHO's partners which serves as the forum whereby (e.g.) actions, proposals or resolutions from WAHO are censored, adopted and eventually approved.

**A.S. (Degree) :** Associate of Science (A.S.) Degree for Pharmacy Technicians is the academic qualification awarded to one who has successfully completed a Pharmacy technician training in an Anglophone ECOWAS Country, pursuant to provisions of this curriculum.

**BAC Sc:** *Baccalauréat Scientifique (Fr)*, this is an academic qualification ( a diploma/certificate) which is awarded to students at the end of their high/actually senior secondary school (called *lycée* in French) studies and which serves most usually as the principally required document for admission to university studies in France and France-colonized or Francophone countries. Differentiated from the other types or series (*Série* or *Streams*, as referred to in French) such as the *Série économique et sociale* (ES), *Série littéraire* (L) and *baccalauréat technologique* of Baccalauréat général (General Baccalaureat) for respectively *Economics* and *Social sciences*, *Literature* and *Technology*, this is awarded to students who, as of the penultimate year of their high school studies, choose and pass science subjects such as Mathematics, Physics, Chemistry and Biology or, where required or available, engineering science subjects. Moreover, depending the discipline undertaken or chosen during their university degree studies, this qualification plus 3 - 4 years (i.e. **Bac + 3 - 4 years**) of successful studies thereafter earns the student an academic qualification that is equivalent to Anglophone countries' undergraduate (i.e. Bachelor's) degree. Or the **BAC + a qualification** of a duration of 4 - 5 years will award the student a Master's degree whereas that of (i.e. **Bac +**) a duration of at least 6 years qualifies the student for receipt of a professional Doctorate (e.g. Doctor of Pharmacy, PharmD.) degree.

**CR:** *Credit Hour*, also CH., the unit by and in which academic engagement (contact hours of lectures) is gauged. Practically, 20 contact hours of lecture time equals one credit.

**PO:** *Professional Officer*, of WAHO employee-categories, head of a program ranking above an "M" category but below a director level.

**SSSC:** Senior Secondary School (Examination) Certificate. In Anglophone ECOWAS Countries, this is a high school-leaving academic qualification that is awarded to students who sit and successfully pass the West African Senior School Certificate Examination (WASSCE) - *q.v.* WASSCE below.

**STF:** *Sous totale formateur (Fr)*, Subtotal of grade points by the trainer.

**TD:** *Travaux dirigés (Fr)*, Tutorials.

**TP:** *Travaux pratiques (Fr)*, Practicals.

**TPA:** *Travail personnels de l'apprenant/de l'auditeur (Fr.)*, Student's input.

**UE:** *Unité d'enseignement (Fr)*, Teaching Unit.

**VHT:** *Volume horaire totale (Fr)*, Total credits

**WAHO:** *West African Health Organization*, founded from the merger of erstwhile two West African subregional health organisations (i.e. Anglophone ECOWAS countries' WAHC and Francophone ECOWAS countries' OCCGE), this is the specialized institution of ECOWAS that is concerned with harmonisation of all aspects of health (e.g. harmonisation of curricula for and accreditation of training programmes of all categories of health professionals, harmonisation of codes of ethics and of regulations for the practice of all categories of health professionals, harmonisation of health policies, facilitating the enhancement of national healthcare services, etc.) within said community.

**WASSCE:** *West African Senior Secondary School Certificate Examination* (Certificate), this is a high school-leaving academic qualification that is awarded to students who sit and successfully pass the West African Senior School Certificate Examination (WASSCE), itself a standardized examination administered by the West African Examinations Council (WAEC) to senior high/secondary school students and is a compulsory required qualification for admission to universities in Anglophone West Africa. This certificate can be given upon completion of anyone of the only two types of the exams - namely the November/December-administered one which was formerly referred to as the General Certificate Examinations (GCE) or the May/June-administered WASSCE which is otherwise known as the Senior School Certificate Examinations (SSCE). Thus, in value or recognition, the West African Senior Secondary School Exam Certificate (WASSCE/WASSEC) is the same as the SSSC.

## **APPENDIX**

### ***Appendix i: References***

#### **i. Hard Copies\***

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#### **ii. Online References**

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*Appendix ii :  
List of Participants in the Process of Harmonisation of Pharmacy Technician  
Training Programmes in the ECOWAS Region*

**Benin**

Dr. CAKPO Corneille Kpékou  
Pharmacien,  
Le Chef de service des Etablissements Pharmaceutiques  
DPMED/ Ministère de la Santé du Bénin  
Ministère de la Santé du Bénin  
COTONOU  
Tél (00229) 68 15 37 12 /97151737  
Email:cakpocorneil@yahoo.fr

**Burkina Faso**

Mr. MINOUGOU Lébendé François  
Technicien supérieur en Pharmacie  
Enseignant, coordinateur de la formation des Préparateurs d'Etat en Pharmacie  
Ecole Nationale de Santé Publique Ouagadougou  
OUAGADOUGOU  
Tél. +226 70 27 11 63 / +226 79 18 18 17  
Email: francoisminougou@gmail.com

**Côte d'Ivoire**

M. KOUAT Ouégnin Ernest  
Ingénieur des Techniques sanitaires à l'INFAS d'Abidjan,  
Option Préparateur et Gestionnaire en Pharmacie  
Responsable de la filière de formation des techniciens supérieurs en pharmacie  
Enseignant de gestion logistique des médicaments  
l'INFAS d'Abidjan,  
ABIDJAN  
Tél. +225 07 45 59 65 /+225 41 19 68 62  
Email: kouat@yahoo.fr

**Gambie**

Mrs. Markieu Janneh-Kaira  
Chief Pharmacist & Head,  
Medicines Board  
Ministry  
BANJUL  
Tel. (Mobile): +220 9 950 777  
Email: markieu@yahoo.co.uk

**Ghana**

Mr. Joseph NYOAGBE  
Registrar, Ghana Pharmacy Council  
Ghana Pharmacy Council  
PO Box AV 10334  
ACCRA-NORTH  
Kodjo1959@yahoo.co.uk

Dr. George OWUSU-DAPAAH  
The Head, Dept. of Dispensing Techniques  
Faculty of Pharmaceutical Sciences,  
Kumasi Polytechnique  
KUMASI  
Ghana  
Tel. +233 271 84 36 77  
Fax: +233 322 02 23 87  
Email: geodapaah61@yahoo.com

### **Guinée**

Dr CAMARA Mohamed Kerfalla  
Chargé de cours à l'Université et  
Membre Titulaire du Conseil National de l'Ordre des Pharmaciens de Guinée  
BP 872  
CONAKRY  
Tél. +224 664 52 45 07/00224 628 29 30 46/ 00224 664 28 95 47.  
Email: lazacamara@yahoo.fr;

### **Guinée Bissau**

Dr. Jorge Oliveira Badè  
Mobil: (00245) 6854903  
E- Mail: jorgeoliveirabade@yahoo.com.br

### **Liberia**

Pharm. Joseph S. WEAH  
Registrar, Pharmacy Board of Liberia  
Camp Johnson Road  
MONROVIA  
Tel.: +231886539698 and +231777911666  
Email: josephweah19@yahoo.com

### **Niger**

Mme Ramatou BACHIR

### **Nigeria**

Pharm. Ibrahim Baba Shehu AMED  
Pharmacists Council of Nigeria  
Email: shehubiahmed@yahoo.com

Pharm. Emmanuel Onoride ODOH  
Pharmacists Council of Nigeria

### **Sénégal**

M. Saliou DIOUF  
Chef de la Section Préparateur en Pharmacie  
L'Ecole Nationale de Développement Sanitaire et Social (ENDSS)  
Email: dioufyrasak@gmail.com

**Sierra Leone**

Maj. Pharm. Thomas W. TUCKER,  
Instructor, Dept. of Pharmacy Technician studies  
Faculty of Pharmaceutical Sciences  
College of Medicine and Allied Health Sciences,  
University of Sierra Leone  
FREETOWN  
Tel. +232 76 629 298  
Email: curtagatha@yahoo.com

**Togo**

Prof. POTCHOO Yao,  
Enseignemant  
Faculté Mixte de Médecine et de Pharmacie  
Tél.: +228 90 11 34 78  
Email: ypotchoo@hotmail.com

**WAHO/OOAS**

Mr. KABLAN Effossou Jean-Jacques  
PO/Infirmiers et Sages Femmes  
Dept. of Human Resources for Health Development  
WEST AFRICAN HEALTH ORGANISATION (WAHO)  
01 BP. 153 Bobo-Dioulasso 01  
BURKINA FASO  
Tél (Office) : (+226) 20 970 100  
(Mobile): (00226) 78500594/74251525  
Fax : (+226)20 975 772

Assoc. Prof. P.Tarpowah KEAR, JR.  
PO/Pharmacy  
Dept. of Human Resources for Health Development  
WEST AFRICAN HEALTH ORGANISATION (WAHO)  
01 BP. 153 Bobo-Dioulasso 01  
BURKINA FASO  
Tél (Office) : (+226) 20 970 100 Extn.336  
(Mobile): (+226) 66 499 735; Fax : (+226)20 975 772