THE REPUBLIC OF UGANDA

Ministry of Education and Sports

BUSINESS, TECHNICAL,
VOCATIONAL EDUCATION AND
TRAINING (BTVET) SUB-SECTOR

CURRICULUM

FOR DIPLOMA IN

PHARMACY

Contents

Foreword

The Ministry of Education and Sports (MoES) in co-operation with the private sector and other stakeholders have embarked on reforming Business, Technical, Vocational Education and Training (BTVET) in Uganda, based on Competence-Based Education and Training (CBET) principles.

The advantages of CBET include improved access, equity and relevance of BTVET; reduced unit costs of training; recognition of prior learning (or on-the-job- training), among others.

As the Ministry executes its obligation of ensuring quality in training standards, the public-private partnership is being strengthened to improve occupational competence of the country's workforce without gender bias.

Any health training provider and/or those who wish to present themselves for Occupational Assessment and Certification in Pharmacy at Diploma level will use this competence-based curriculum.

Herewith, the Ministry of Education and Sports (MoES) presents the revised edition of the competence-based curriculum for training, assessing and certifying students pursuing a Diploma in Pharmacy.

Finally, I thank all individuals, organisations and development partners who have contributed and/or participated in the development of this competence-based curriculum.

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Acknowledgement

The Ministry of Education and Sports (MoES) wishes to sincerely acknowledge the valuable contributions to the development of this competence-based curriculum by the following teams from institutions and organisations:

- Ministry of Education and Sports
- Ministry of Health
- Uganda Allied Health Examinations Board
- National Curriculum Development Centre
- Directorate of Education Standards
- Uganda Allied Health Professionals Council
- Pharmaceutical Society of Uganda
- Pharmacy Training Institutions (Gulu University, Pharmacy Programmes, Uganda Institute of Allied Health and Management Sciences - Mulago, Soroti Pharmaceutical Training College, and St. Elizabeth's Institute of Health Professionals - Mukono)
- The pharmacy practitioners
- Resource persons involved in guiding the practitioners' panels in their development activities
- The USAID-funded Strengthening Human Resources for Health Activity, implemented by IntraHealth International
- Skills Initiative Uganda, Ltd (SIU) for the technical support

Abbreviations and Acronyms

BTVET	Business, Technical, Vocational Education and Training
CBA	Competence Based Assessment
CBET	Competence Based Education and Training
DACUM	Develop a Curriculum
DES	Directorate of Education Standards
FEFO	First Expiry First Out
FIFO	First In First Out
LWA	Learning-Working Assignment
MoES	Ministry of Education and Sports
MoH	Ministry of Health
NCDC	National Curriculum Development Centre
NDP	National Development Plan
NCHE	National Council for Higher Education
OSCE	Objectively Structured Clinical Examination
OSPE	Objectively Structured Practical Examination
PEX	Practical Exercise
SHRH	Strengthening Human Resource for Health
SIU	Skills Initiative Uganda
TMD	Training Modules Development
UAHEB	Uganda Allied Health Examinations Board
USAID	United States Agency for International Development

Executive Summary

Background

Uganda's Business, Technical, Vocational, Education and Training (BTVET) sub-sector has undergone many reforms in effort to meet the National Development Plan's objectives for skilling Uganda's human resources and for Uganda Vision 2040. The reforms include, among others, the review of curricula at all levels of BTVET to make them competence-based and relevant to the needs of the population that the graduates are to serve.

Currently, Uganda has four training institutions that offer diplomas in Pharmacy with an annual output of 70 graduates. This output, however, cannot meet the country's demand for holders of Diploma in Pharmacy, thus calling for significant increase in the numbers trained at this level. Additionally, pre-service curriculum for Diploma in Pharmacy has not been updated in 15 years to keep abreast with emerging issues and technological advances.

The BTVET subsector, with support from the USAID-funded Strengthening Human Resources for Health (SHRH) Activity implemented by IntraHealth International, spearheaded the review of Diploma in Pharmacy curricula. The major focus of the review was a competence-based approach to improve the knowledge and skill outcomes of the graduates. This curriculum review involved stakeholders from training institutions, the BTVET Department of the Ministry of Education and Sports, Ministry of Health, Human Resources Directorate, professional bodies, and practitioners from the private sector.

Approach to the Review

A stakeholders' consultative meeting was held during which members discussed the academic progression of pharmacy professionals (i.e. certificate – diploma – degree) and pharmacy cadres' scope of work. This, however, still requires policy clarification. It was noted that the existing titles of pharmacy cadres was based on MoPS' service structure but there are other pharmacy cadres that are not recognized in that structure. Further discussions with the concerned professional bodies are on-going.

The DACUM (Develop a Curriculum) concept was adopted in the review process. In this approach, both practitioners and teachers were engaged in a workshop setting to outline the key competences and skills in form of duties and tasks expected of a graduate of Diploma in Pharmacy. The DACUM workshop highlighted six main duties performed by a Diploma in Pharmacy graduate as follows:

1. Maintaining a pharmaceutical Unit
2. Managing pharmaceutical stocks
3. Compound pharmaceutical products
4. Dispensing drugs
5. Assessing quality of pharmaceutical products

6. Performing administrative tasks.

The workshop output was then used to guide the training strategy as well as inform the development of the assessment instruments.

Based on the output of the DACUM workshop, training modules with learning working assignments were mapped out to guide the systematic delivery of the key competences expected of a skilled graduate of the Diploma in Pharmacy. This curriculum is composed of ten training modules to be taught in three years under a semester system. The training modules include:

1. Fundamental Sciences
2. Conducting Primary Health Care Activities
3. Compounding Pharmaceutical Products
4. Providing Pharmaceutical Care
5. Performing Analytical Procedures
6. Managing Medicines and Supply Chain
7. Extracting and Standardising Crude Drugs
8. Conducting Operational Research
9. Managing a Pharmaceutical Unit
10. Starting a Pharmaceutical Enterprise

Students will be required to undergo field attachment to enhance their competences. Field Attachment will be monitored and assessed.

To enhance competence-based assessment, which emphasises objectivity, relevance, comprehensiveness and flexibility, sample assessment instruments (both performance and written) were developed. Assessment instruments measure HOW and/or HOW WELL activities/assignments are done.

A workshop was held to validate and enhance the quality of the curriculum. The validation workshop considered completeness, accuracy, clarity, comprehensiveness, grammar and appropriateness of the curriculum content. There is need to revise and align the continuous professional development logbook to match the revised curriculum.

For effective roll-out and uniform delivery of this revised curriculum, 15 tutors/clinical instructors of Pharmacy schools were oriented in its implementation in February 2016. A teacher's guide will be developed to enhance teaching and teaching preparations.

This curriculum shall be periodically revised to match the dynamic trends in the occupation.

Part 1: General Curriculum Guidelines

Introduction

Globally, the philosophy of pharmacy practice and the role of pharmacy professionals is fast shifting from a product-centred to a more patient-centred approach. This new approach requires that a pharmacy practitioner balance aspects of drug product, therapy, pharmacy, bedside, dispensing, and giving care. This curriculum is therefore meant to produce diploma graduates in pharmacy with "hands-on" skills.

The shift in the work requirements for a graduate with a diploma in pharmacy demands strategic interventions in the delivery of training to effectively cater for what is anticipated in the field.Given the constraints of time, cost, and efficiency, a comprehensive hands-on approach is necessary to enable the graduates perform effectively in the world of work.

Justification for the Diploma in Pharmacy

Currently, the country has a shortage of trained and qualified pharmacy professionals at diploma level. In addition, the health sector is experiencing task shifting in roles, which has created an increased demand for graduates of diploma in pharmacy at different levels of operation. It has also been noted that there is an increased number of pharmaceutical product outlets, which requires trained and qualified pharmacy cadres. Absence of such cadres in the world of work will greatly hamper the provision of pharmaceutical services at the different levels of health care facilities. Training for the diploma in pharmacy produces a type of cadre that is key for compounding pharmaceutical products.

Justification for a Competence-Based Curriculum for Diploma in Pharmacy

The existing curriculum for the Diploma in Pharmacy emphasizes mainly cognitive competence rather than psychomotor, for which the graduates have been found deficient of as anticipated of a frontline service provider. It was therefore necessary to make it competence-based to suit the current market demands. Tasks that used to be assigned to pharmacists (degree holders) and other higher cadre health professionals at specific health facilities have shifted and are now being demanded at lower levels as well, which puts pressure on the already thin supply of higher cadres. It is also increasingly common in the rural and hard-to-reach areas of the country to find other cadres at health facilities performing roles that they would not normally fill. Using a competence-based approach to train pharmacy professionals at Diploma level to work alongside other health professionals would narrow the gap in the delivery of health services in these facilities.

Competence -Based Education and Training (CBET) philosophy provides for students to acquire job-specific competences that are required in the world of work module by module.The modular approach is flexible, shorter, cost effective, and can be implemented both on-the-job and in training institutions.Each module is composed of a module title, purpose, training duration, prerequisite module, learning-working assignments, practical exercises, relevant knowledge, required training materials, tools and equipment and other important information.

A competence-based curriculum puts more emphasis on acquisition of hands-on competences. It is for this reason that Learning-Working Assignments (LWAs) that are similar or equivalent to real work environment constitute part of this curriculum. The training modules are based on implementation of LWAs, which result in a service or the production of a product as is done in the real world of work hence enhancing the competence and relevance of the students. LWAs result in strong student activation, motivation, experimental learning and discovery learning. LWAs are divided into practical exercises, which are performance-dominated and allow more time for practical repetitions and practice for the key skills to be acquired.

Objective of Pharmacy Professional Production

The overall training objective of the Diploma in Pharmacy is to equip learners with competences necessary to prepare and manage pharmaceuticals in both stand-alone community-based and facility-based pharmaceutical settings. The specific objective is to equip leaners with competences to be able to:

1. Conduct primary health care activities
2. Compound pharmaceutical products
3. Provide pharmaceutical care
4. Perform analytical procedures
5. Manage medicines and supply chain
6. Extract and standardise crude drugs
7. Conduct operational research
8. Manage a pharmaceutical unit
9. Establish a pharmaceutical enterprise

The Diploma Programme

Programme Description

The programme is designed to raise a health worker whose main responsibilities are to manage, prepare and dispense pharmaceutical products.The programme will be run and managed in schools of pharmacy or their equivalent in accordance with the relevant laws and regulations of the National Council for Higher Education, Ministry of Education and Sports, Ministry of Health and Allied Health Professional Council.

Regulations for the Programme

The regulations below shall guide the training leading to the award of a Diploma in Pharmacy.

Name of the Award

The award will be Diploma in Pharmacy

Minimum Entry Requirements

I. **Direct entrants:** Applicants shall be required to have at least one principal pass in chemistry and a subsidiary in biology and any related subject such as physics, mathematics, subsidiary mathematics or physical science at A-level.

II. **Certificate holders**: A certificate holder may apply for admission if he/she holds a certificate in pharmacy with an outstanding performance record.
III. **Diploma/ Degree entrants**: One may apply for admission if he/she holds a diploma or a basic degree in a health science related discipline.

Duration of the Diploma Programme

The Diploma programme duration shall be three (3) years, full time.

Justification for a Three-Year Academic Programme

As a matter of policy, diploma programmes run for three years. The diploma in pharmacy is a practical programme, demanding ample time of practice in order to produce competent graduates. At the same time, the programme is a multi-modular.

Academic Years

An academic year shall consist of two semesters. A semester shall be seventeen (17) weeks; fifteen (15) weeks of teaching and learning; and two (2) for examinations. There will be two recess terms during which students will be attached to approved training sites for placement.

Registrations of Students

Both fresh and continuing students should register at the academic registrar's office within the first two weeks of the semester. No time shall be exclusively set aside for registration.

Training Modules

A module is a unit of learning and on completion, it carries credit unit(s) towards the fulfilment of the requirements of the Diploma award.

Size of a Module

The smallest module shall be two (2) credit units. Practical Hours (PH)/Tutorial Hours (TH) will include time for demonstrations and practical sessions conducted in the laboratory and industrial/hospital practice.

Contact Hours

A contact hour shall be equivalent to one (1) lecture hour or two hours of practical/ tutorial/fieldwork.

Credit Units

A credit unit shall be equivalent to fifteen (15) contact hours of theory or (30) contact hours of practical.

Academic Programme Load

The Academic Programme shall be a set of modules a candidate registers for and completes for the award of diploma in pharmacy.

Normal Semester Load

A maximum semester load will be twenty eight (28) credit units. In general, the normal semester load shall range from 15 to 25 credit units. This is to cater for students who have to re-take courses or would not be able to complete the requirements for the award of the diploma within the stipulated duration.

Assessment

Each module shall be assessed in two parts basing on 100 marks in total.

I. Coursework 30% and final examination 70%. Coursework shall consist of progressive/continuous assessment (test and take home assignments), with each component assessment at 15%. A minimum of one coursework per module shall be required.
II. Summative examinations shall contribute 70% of the total marks. It may consist of all or any of the following; written type questions, multiple choice, short answer/structured, matching, and work sequence questions.
III. Practical examinations, where applicable, will be conducted at the end of Semester II of Year I and of each semester for years II and III.

Final Paper Examinations Format

Final paper examinations per semester will be composed of written (theory) and performance (practical) questions. For the practical examinations, objectively structured clinical examination (OSCE)/ objectively, structured, practical examination (OSPE) assessment methodology will be employed where applicable. The written questions will be composed of a combination of multiple-choice questions, short answer questions, matching questions and work sequence questions in a ratio and marks determined by the examination body.The total duration of written and practical examinations shall be three (3) hours each.

End of Semester Examinations Grading

Overall marks obtained in each module/part of module offered shall be graded out of a maximum of 100 marks and assigned a letter grade and grade points as follows:

Range of Marks	80-100	75-79	70-74	65-69	60-64	55-59	50-54	≤49
Letter Grade	A	B+	B	B-	C+	C	C-	F
Points	5.0	4.5	4.0	3.5	3.0	2.5	2.0	0.0

A student may be condoned if he/she fails only one paper. The score obtained in the failed paper should not be less than 45 marks for a theory paper, and not less than 48 for a practical paper. Marks for condoning shall be removed from a related paper.

Absence from Examination

If a student was absent from final examination due to justifiable reason, a letter grade ABS shall be assigned. The student shall only sit for the examinations during the next examination season. The student may request the Examination Board for a special examination.

Re-taking a Module

A student may re-take any module when it is next offered in order to:

I. Pass it if the student had failed it before
II. Improve the grade if the first pass grade was low. A student who has failed to obtain the pass mark (50%) during the second assessment in the same module shall receive a written warning.

A student who fails any module unit(s) by scoring below 50% shall re-take the module unit. No credit unit shall be awarded for any module a student fails.

Projects

By the end of semester two of year three, each student shall be required to submit a research project report in partial fulfilment of the requirements for the award of a Diploma in Pharmacy. The project will be marked out of 100%.

Field Attachment/Placement

As a requirement, every student shall participate in field attachment/placement at the end of Year One and Year Two, (Semester Two) and Year Three, Semester One. The competences to be acquired by the students, which shall be monitored/assessed during industrial attachment/placement includes among others:

- Dispensing skills
- Organizing pharmaceutical unit
- Record keeping
- Adherence to work ethics
- Compounding
- Administering first aid
- Patient care
- Communication skills

A report shall be presented at the end of the field attachment/placement (practicum) at the start of the semester following this activity. The practicum will contribute 10% of the coursework assessment.

Progression

Progression through the programme shall be assessed in three ways:

I. **Normal progression**: A student who passes all module units with a minimum of 50% progresses normally.
II. **Probationary progression:** A student who scores below 2 grade points or below 50% is put on probationary progress. At this stage, a student will be warned regarding the module unit(s) that requires attention.
III. **Non-progress**: A student shall not be allowed to progress if he/she fails half of the semester load or has accumulated at least three (3) retakes.

Certificate of Due Performance

A Certificate of Due Performance will only be provided to a student who has been performing well (a minimum of 2 course works for any given module unit scoring an average of 60%) and has attended minimum of 70% of all lessons in each module taught. A student who has no Certificate of Due Performance will not be allowed to sit for examinations.

If the Examination Board finds out that a student has no justifiable reason for being absent from a particular examination, such a student shall receive a fail (F). The module in which a fail was awarded shall not count in calculation of CGPA.

Professional Practice Experience (PPE) is a requirement for Pharmacy students. As implied above, the PPE programme consists of three field attachments. Each attachment is at least one month in a selected pharmaceutical setting. This would be in a community, hospital/clinic or industry. At each of these, a Logbook indicating exposure to practice in certain work situations shall be filled with ratings of the student's performance by selected qualified preceptors

Discontinuation

A student shall be discontinued on any one of the following grounds:

I. Obtaining less than 50% on the third probation assessment on the same module unit
II. Failing to complete the module within five years
III. When found guilty of any commission or omission in regard to this curriculum

Withdraw from the Programme

A student shall apply for a temporary withdrawal (Dead Year) from studies with permission granted by the Academic Board for the programme. A student shall be allowed only a maximum of two withdrawals and a maximum of one academic year of each withdrawal.

Calculation of the Cumulative Grade Point Average

The cumulative grade point average at a given time shall be obtained as follows:

1. To arrive at the weighted score for the module, the grade point obtained in each module will be multiplied by the credit units assigned to the module
2. Derive together the weighted scores for the modules offered up to that time
3. Divide the total weighted score by the total number of module units taken up to that time.

Approval of Examination Results and Appeals

Uganda Allied Health Examinations Board (UAHEB) will approve results. A candidate grieved by decisions of UAHEB may appeal.

Publications of Results

UAHEB shall publish the examination results.

Awarding Board

UAHEB, upon satisfaction that the candidate has attained the standard requirements under relevant regulations, may award a Diploma in Pharmacy. The Diploma award shall not be classified.

Curriculum Alignment Matrix

Relating duties to key learning competences/training modules

Duties Performed by a Pharmacy Technician	Key Competencies (Training Modules)
Maintain pharmaceutical unit	Manage pharmaceutical unit
Manage pharmaceutical stocks	Manage medicines and supply chain
Compound pharmaceutical products	Compound pharmaceutical products Extract and standardise crude drugs
Dispense Drugs	Provide pharmaceutical care Foundation Sciences Conduct primary healthcare activities
Assess quality of pharmaceutical products	Perform analytical procedures
Perform administrative tasks	Establish a pharmaceutical enterprise

Minimum Resource Requirements

Minimum Qualification Requirement for a Principal/Tutor

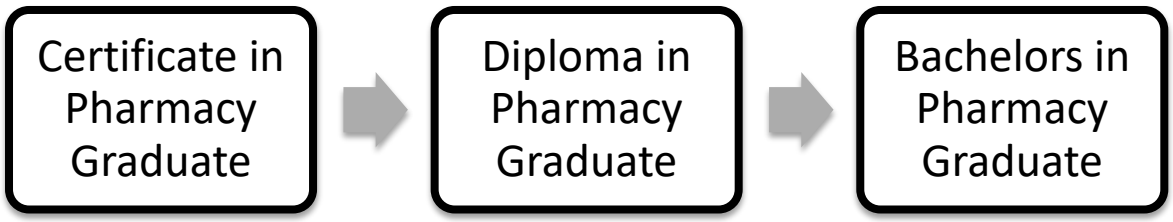
As a minimum, a Principal/Tutor teaching a diploma in pharmacy shall be expected to have a diploma in either pharmacy or medical education and a degree in pharmacy or medical education. A minimum of 5 years of work experience will be considered. It is recommended that Principal Tutors and the Tutors attend re-tooling sessions every semester.

Minimum Infrastructure Requirements

The minimum infrastructure requirement to run a Diploma in Pharmacy shall be as per the standards set by Ministry of Education and Sports.

Academic Progress of Pharmacy Cadres

The current academic progress of Pharmacy cadres is indicated in the graphic below.



The graduate of Diploma in Pharmacy may opt to further their skills and education by joining any health related degree programme.

Comparison of Duties Performed by Graduates at Degree, Diploma and Certificate Levels

The table below shows the general duties performed by graduates at degree, diploma and certificate qualification levels.

Cadre	General Duties
Degree in Pharmacy Graduate	• Supervisory role • Creation of new formulations and protocols • Design of clinical trials • Veterinary pharmacy • Agro pharmacy • Radio-pharmacy • Clinical pharmacy • Conduct operational research among others
Diploma in Pharmacy Graduate	• Maintain pharmaceutical unit • Manage pharmaceutical stocks • Compound pharmaceutical products • Dispense drugs • Assess quality of pharmaceutical products • Perform administrative tasks
Certificate in Pharmacy Graduate	• Dispense medicine (limited range) • Generate and maintain records • Maintain pharmacy unit (cleaning, arranging)

Diploma Programme Structure

Description of Content

In this programme, students will be equipped with knowledge, skills and attitudes to prepare and manage quality pharmaceuticals, ensuring rational medicine use. The modules will be split across the entire training duration as shown in the following tables.

Hours/Credit Units abbreviations

LH Lecture Hours
PH Practical Hours
TH Tutorial Hours
CH Contact Hours
CU Credit Units
(Note: 1 CH = 1 LH = 2 PH = 2 TH = 1 CH = 15 CH)

Coding Nomenclature

PHA Programme Code
1st Digit Year of Study
2nd Digit Semester
3rd Digit Module Number
4th Digit Module Part Number
Example: PHA1253 = Programme of Diploma in Pharmacy, year one, semester two, module five, module part three.

Year One							
	Code	**Modules**	**LH**	**PH**	**TH**	**CH**	**CU**
Semester 1	PHA - 1111	Foundation Sciences (I)	165	120	120	285	19
	TOTAL					**285**	**19**
Semester 2	PHA - 1212	Foundation Sciences (II)	90	-	60	120	8
	PHA - 1221	Conducting PHC Activities	45	30	-	60	4
	PHA - 1231	Compounding Pharmaceutical Products (I)	30	30	30	60	4
	PHA - 1251	Performing Analytical Procedures (I)	30	30	30	60	4
	TOTAL					**300**	**20**
Field Attachment	PHA - 12	Field Attachment (Hospital/Community)	-	120	-	60	4
	TOTAL					**60**	**4**

Year Two							
	Code	**Modules**	**LH**	**PH**	**TH**	**CH**	**CU**
Semester 1	PHA - 2113	Foundation Sciences (III)	30	-	-	30	2
	PHA - 2132	Compounding Pharmaceutical Products (II)	60	60	-	90	6
	PHA - 2141	Providing Pharmaceutical Care (I)	30	-	-	30	2
	PHA - 2152	Performing Analytical Procedures (II)	30	30	30	60	4
	PHA - 2171	Extracting and Standardizing Crude Drugs (I)	30	30	30	60	4
	PHA - 2181	Conducting Operational Research (I)	30	-	-	30	2
	TOTAL					**300**	**20**
Semester 2	PHA - 2233	Compounding Pharmaceutical Products (III)	45	60	30	90	6
	PHA - 2242	Providing Pharmaceutical Care (II)	90	60	60	150	10
	PHA - 2253	Performing Analytical Procedures (III)	30	30	-	45	3
	PHA - 2272	Extracting and Standardizing Crude Drugs (II)	30	30	-	45	3
	TOTAL					**330**	**22**
Field Attachment	PHA - 22	Field Attachment (Industrial/Hospital)	-	120	-	60	4
	TOTAL					**60**	**4**

Year Three							
	Code	**Modules**	**LH**	**PH**	**TH**	**CH**	**CU**
Semester 1	PHA - 3134	Compounding Pharmaceutical Products (V)	45	60	30	90	6
	PHA - 3143	Providing Pharmaceutical Care (III)	75	30	60	120	8
	PHA - 3161	Managing Medicines and Supply Chain	30	30		45	3
	PHA - 3173	Extracting and Standardizing Crude Drugs (III)	30	30	30	60	4
	PHA - 3191	Managing Pharmaceutical Unit (I)	15	30		30	2
	TOTAL					**345**	**23**
Semester 2	PHA - 3244	Providing Pharmaceutical Care (V)	90	30	60	135	9
	PHA - 3292	Managing Pharmaceutical Unit (II)	75	60	30	120	8
	PHA - 3282	Conducting Operational Research (II)	30			30	2
	PHA - 32101	Establishing a Pharmaceutical Enterprise	30	30		45	3
	TOTAL					**330**	**22**

Module Unit Structure

Coding Nomenclature

PHA Programme Code
1st Digit Year of Study
2nd Digit Semester
3rd /4th Digit Module Unit Number/Paper Number
Example: PHA-1201 = Programme of Diploma in Pharmacy, Year 1, Semester 2, module unit/paper #1

Year One							
	Module Code Unit	**Module Unit**	**LH**	**PH**	**TH**	**CH**	**CU**
Semester 1	PHA - 1101	Anatomy and Physiology (I)	30		60	60	4
	PHA - 1102	Medical Microbiology and Parasitology (I)	30	30		45	3
	PHA - 1103	Biochemistry (I)	30		30	45	3
	PHA - 1104	First Aid and Nursing Care	30	60		60	4
	PHA - 1105	Medical Psychology	30		30	45	3
	PHA - 1106	ICT	15	30		30	2
	TOTAL					**285**	**19**
Semester 2	PHA - 1201	Anatomy and Physiology (II)	30		30	45	3
	PHA - 1202	Medical Microbiology and Parasitology (II)	30			30	2
	PHA - 1203	Biochemistry (II)	30		30	45	3
	PHA - 1204	PHC	45	30		60	4
	PHA - 1205	Pharmaceutics (I)	30	30	30	60	4
	PHA - 1206	Pharmaceutical Chemistry (I)	30	30	30	60	4
	TOTAL					**30**	**20**
Field Attachment	PHA - 12	Field Attachment (Hospital/Community)	-	120	-	60	4
	TOTAL					**60**	**4**

Year Two							
	Module Code Unit	**Module Unit**	**LH**	**PH**	**TH**	**CH**	**CU**
Semester 1	PHA - 2101	Biostatistics	30			30	2
	PHA - 2102	Pharmaceutics (II)	60	60		90	6
	PHA - 2103	Pharmacology (I)	30			30	2
	PHA - 2104	Pharmaceutical Chemistry (II)	30	30	30	60	4
	PHA - 2105	Pharmacognosy (I)	30	30	30	60	4
	PHA - 2106	Research Methodology	30			30	2
	TOTAL					**300**	**20**
Semester 2	PHA - 2201	Pharmaceutics (III)	45	60	30	90	6
	PHA - 2202	Therapeutics (I)	30			30	2
	PHA - 2203	Pharmacy Practice (I)	45	30	30	75	5
	PHA - 2204	Pharmacology (II)	15	30	30	45	3
	PHA - 2205	Pharmaceutical Chemistry (III)	30	30		45	3
	PHA - 2206	Pharmacognosy (II)	30	30		45	3
	TOTAL					**330**	**22**
Field Attachment	PHA - 22	Field Attachment (Industrial/Hospital)		120		60	4
	TOTAL					**60**	**4**

Year Three							
	Module Code Unit	**Module Unit**	**LH**	**PH**	**TH**	**CH**	**CU**
Semester 1	PHA - 3101	Pharmaceutics (IV)	45	60	30	90	6
	PHA - 3102	Therapeutics (II)	45		30	60	4
	PHA - 3103	Pharmacology (III)	30	30	30	60	4
	PHA - 3104	Pharmacy Practice (II)	30	30		45	3
	PHA - 3105	Pharmacognosy (III)	30	30	30	60	4
	PHA - 3106	General Pharmacy Management	15	30		30	2
	TOTAL					**345**	**23**
Field Attachment	PHA - 31	Field attachment (Research Report)		120		60	4
	TOTAL					**60**	**4**
Semester 2	PHA - 3201	Therapeutics (III)	45		30	60	4
	PHA - 3202	Pharmacology (IV)	45	30	30	75	5
	PHA - 3203	Pharmacy Practice (III)	45	30	30	75	5
	PHA - 3204	Pharmacy Laws and Regulations	30	30		45	3
	PHA - 3205	Research Report	30			30	2
	PHA - 3206	Entrepreneurship	30	30		45	3
	TOTAL					**330**	**22**

Correlation of the Competence-Based Curriculum with Existing Curricula

The developed competence-based curriculum 2016 was correlated with the existing one (Curriculum for Diploma in Pharmacy, 2014). Below is the comparison:

No	Revised Competence-Based Curriculum of 2016	Correlation with Curriculum Content of 2014
1	Foundation Science	Human Anatomy, Physiology, Microbiology, Principles of Pharmacology, Biostatistics, ICT
2	Conducting Primary Health Care (PHC) Activities	First Aid and Nursing, Psychology
3	Compounding Pharmaceutical Products	Pharmaceutics, Pharmacy Laboratory Practice
4	Providing Pharmaceutical Care	Therapeutics, Pharmacy Practice, Pharmacovigilance, Pharmacology, Psychology
5	Performing Analytical Procedures	Pharmaceutical Chemistry
6	Managing Medicines and Supply Chain	Pharmacy Practice
7	Extracting and Standardizing Crude Drugs	Pharmacognosy
8	Conducting Operational Research	Research Methodology
9	Managing Pharmaceutical Unit	Pharmacy Law, Regulations, Medical Ethics, General Management, Psychology
10	Establishing a Pharmaceutical Enterprise	Entrepreneurship

Part 2: Job Profile for a Diploma in Pharmacy Graduate

A graduate of Diploma in Pharmacy is expected to perform the following duties and tasks in the while on the job in Uganda.

Duties	Tasks
Manage Pharmaceutical Units	Develop Standard Operating Procedures (SOP)
	Inspect pharmaceutical unit
	Prepare drug procurement plan
	Develop equipment service schedule
	Participate in evaluating departmental performance
Manage Pharmaceutical Stocks	Review drug list
	Update pharmaceutical records
	Participate in pharmaceuticals/health supplies selection
	Conduct stock taking
	Determine required pharmaceuticals/health supplies quantities
	Reconcile drug needs against available resources (e.g. funds)
	Requisition pharmaceuticals/health supplies
	Arrange pharmaceutical supplies i.e. first in first out (FIFO), first expiry first out (FEFO)
	Store pharmaceutical products (e.g. narcotics)
	Label shelves/cabins (i.e. type, dosage, use)
	Monitor drug storage conditions (i.e. temperature, humidity, light)
	Distribute pharmaceuticals/health supplies
	Identify expired pharmaceuticals and health supplies
	Initiate and recommend disposal of expired pharmaceuticals and health supplies
Compound Pharmaceutical Products	Clean the workplace
	Observe personal hygiene
	Control work environment (i.e. lighting, ventilation, temperature, water flow)
	Clean the equipment/tools
	Set up equipment
	Validate equipment
	Prepare working formulae
	Weigh/measure ingredients
	Prepare pharmaceutical products from natural sources e.g. animals, plants
	Prepare pharmaceutical products for external use (e.g. ointments, suspensions, nasal drops)
	Prepare pharmaceutical products for parenteral administration
	Pack pharmaceutical products
	Label pharmaceutical products
	Participate in pharmaceutical quality audits
Dispense Pharmaceuticals and Health Supplies	Validate prescriptions
	Participate in patient management on medicine matters
	Reconstitute pharmaceuticals (e.g. powder, tablets, crystals)
	Dilute pharmaceutical products (e.g. powders, creams, lotions)
	Pack prescribed medicines
	Counsel clients/patients
	Advise clients on health matters (e.g. nutrition, cleanliness)
	Educate clients on health matters (e.g. patients, attendants, community)
	Issue prescribed medicines
	Record dispensed pharmaceuticals and health supplies

Duties	Tasks
	Offer first aid for simple illnesses
Assess Quality of Pharmaceutical Products	Assess quality of pharmaceutical products (i.e. smell, colour, form)
	Participate in sampling of pharmaceutical products
	Identify adverse drug reactions
	Participate in testing pharmaceutical products
	Participate in recalling of pharmaceutical products
	Report adverse drug reactions
Perform Administrative Tasks	Participate in technical meetings
	Participate in staff recruitment
	Appraise staff
	Allocate duties/tasks
	Conduct support supervisions (e.g. cadre, performance, drug management)
	Participate in formulation of pharmaceutical policies/guidelines
	Supervise pharmacy staff
	Participate in continuous professional development (CPD)
	Generate pharmaceutical reports (e.g. consumption report, out of stock report, budget performance report)
	Orient stakeholders (e.g. staff, students)
	Provide technical feedback to stakeholders (e.g. supervisors, colleagues, patients)
	Participate in conducting pharmaceutical operational research
	Mentor/coach students, staff, interns
	Facilitate technical workshops
	Consult stakeholders on technical matters

Part 3: Training Modules for Diploma in Pharmacy

Code	Training Modules	Average Training Duration	
		Hours (Total)	Credit Units
PHA 1.0	Foundation Science	435	29
PHA 2.0	Conducting Primary Health Care (PHC) Activities	60	4
PHA 3.0	Compounding Pharmaceutical Products	330	22
PHA 4.0	Providing Pharmaceutical Care	435	29
PHA 5.0	Performing Analytical Procedures	165	11
PHA 6.0	Managing Medicines and Supply Chain	45	3
PHA 7.0	Extracting and Standardizing Crude Drugs	165	11
PHA 8.0	Conducting Operational Research	60	4
PHA 9.0	Managing Pharmaceutical Unit	150	10
PHA 10.0	Establishing a Pharmaceutical Enterprise	45	3
Summation	**10 Training Modules (Covered in 3 Years)**	**1890**	**126**

Note: It is understood that contact time is learning time under a teacher's guidance. 5 days (each day an average of 6 contact hours) make 1 week of training and 15 weeks make 1 semester of training.

Qualification Level: Diploma

Occupation Description

A graduate of Diploma in Pharmacy is a person who is able to compound and analyse pharmaceutical products, extract and standardise crude drugs and manage medicines and supply chain. She/he is also able to provide pharmaceutical care, participate in primary health care activities as well as establish and run pharmaceutical enterprises within his/her jurisdiction.

Year One, Semester I

PHA – 1111: Foundation Sciences (I)

Credit Units: 19

ModuleUnit Code	Module Unit	Contact Hours
PHA-1101	Anatomy and Physiology	60
PHA-1102	Medical Microbiology and Parasitology	45
PHA-1103	Biochemistry	45
PHA-1104	First Aid and Nursing Care	60
PHA-1105	Medical Psychology	45
PHA-1106	ICT	30
	Total	**285**

Module Description

This Module covers the Anatomy and Physiology of the human body, and provides a functional understanding of the different physiological systems of the body. Microbiology and Parasitology will focus on the generic microbiological organisms as well as the principles and application of sterilisation and disinfection. Conducting drug sensitivity tests shall also be covered under this module. Focus shall be put on biochemistry of the essential elements as applied to medicine and drugs. This part of the Module shall comprise components of anatomy and physiology, medical microbiology and parasitology, components of biochemistry, first aid and nursing care as well as health psychology including ICT

Learning Outcomes

By the end of this module, the student should be able to apply understanding of anatomy, physiology, medicalmicrobiology, parasitology, biochemistry, medical psychology, first-aid and nursing. The student should also be able to produce quality documents using different computer applications.*[Note: This module is more theoretical; hence some LWAs will be delivered as topics]*.

Underpinning Knowledge/Theory

For occupational theory suggested for instruction/ demonstration, the teacher is not limited to the outline given. In any case, underpinning knowledge/ theory may be obtained from various recognized reference materials as appropriate.

Suggestions on Organisation of Learning

The acquisition of the competences described in this module may take place at a Pharmacy training institution or its equivalent provided all equipment and materials required for training are in place. Delivery modes may include theory instruction (lectures), hands-on practice (practical) and tutorials (discussions).

Occupational Health, Safety and Environmental Concerns to be Observed

- Laws and regulations
- Safety precautions
- Putting on of protective gear
- Waste management and disposal
- Work environment
- Maintaining personal hygiene

- Use of recommended tools/equipment
- Administering first aid
- Cleaning/sanitizing tools and equipment

Work Behavior/Attitudes to be Instilled and Observed during Training

- Responsible
- Willing to learn
- Committed to the programme
- Possesses team spirit
- Hard working
- Accurate
- Social
- Industrious
- Time conscious
- Cooperative
- Ethical
- Smart
- Accountable
- Trustworthy
- Results-oriented
- Honest
- Courteous
- Humble

Reading Materials

The Teacher is advised to make reference to relevant and applicable reading materials that could be in form of textbooks, publications, video clips/demonstrations, authenticated Internet sites, and any other.

Module Unit PHA-1101: Anatomy and Physiology (I)

1.1 Learning-Working Assignment: Anatomy and Physiology

Sub-topic 1.1.1: Introduction to anatomy and physiology
Sub-topic 1.1.2: The cell and levels of structuralorganisation
Sub-topic 1.1.3: Anatomy and physiology of membranes
Sub-topic 1.1.4: Anatomy and physiology of excitable tissue
Sub-topic 1.1.5: Anatomy and physiology ofmusculoskeletal systems
Sub-topic 1.1.6: Anatomy and physiology of the nervoussystems
Sub-topic 1.1.7: Anatomy and physiology of the endocrine system
Sub-topic 1.1.8: Anatomy and physiology of blood and body fluids

Additional Reading Materials

- Tortora, G. J. and Derrickson, B. (2014). Principles of Anatomy and Physiology, 14th Ed., John Wiley and Sons, New York
- Elaine, N. M. and Katja, H. *Human Anatomy and Physiology*

Minimum Required Teaching/Learning Resources

- Reference materials (textbooks, DVDs, CDs, etc)
- Patients
- Stationery
- Audio/DVD equipment

Module UnitPHA-1102: Medical Microbiology and Parasitology (I)

1.2 Learning-Working Assignment: Medical Microbiology and Parasitology

Sub-topic 1.2.1: Introduction to Microbiology
Sub-topic 1.2.2: Bacteriology

Sub-topic 1.2.3: Virology
Sub-topic 1.2.4: Mycology

Additional Reading Materials

- Mackie and McCartney. *Practical Medical Microbiology 3rd Ed.*, Churchill Livingstone, Edinburgh, London, Melbourne, and New York
- Lippincott, W. and Wilkins (2007). *Schaechter's Mechanisms of Microbial Disease*. 4th Ed.

Minimum Required Teaching/Learning Resources

- Reference materials (textbooks, DVDs, CDs, etc)
- Patients
- Stationery
- Audio/DVD equipment

Module Unit PHA-1103: Biochemistry (I)

1.3 Learning-Working Assignment: Biochemistry (I)

Sub-topic 1.3.1: Introduction to biochemistry
Sub-topic 1.3.2:Chemical nature of cells
Sub-topic 1.3.3: Acids, bases, pH and buffers and their biomedical importance
Sub-topic 1.3.4: Amino acids, proteins and enzymology

Additional Reading Materials

- Lieberman, M., Marks, A.D. and Smith, C. (2006). *Marks'Essentials of Medical Biochemistry. A Clinical Approach.*Lippincott Williams and Wilkins, Philadelphia, USA.
- Gilbert, H. F. (2008). *Basic Concepts in Biochemistry. A*
- *Student's Survival Guide*. McGrow-Hill Medical, USA.
- Biochemistry Textbook by Stryer
- Harper's Biochemistry by Robert K. Murray

Minimum Required Teaching/Learning Resources

- Reference materials (textbooks, DVDs, CDs, etc)
- Patients
- Stationery
- Audio/DVD equipment

Module Unit. PHA-1104: First Aid and Nursing Care

1.4 Learning-Working Assignment: First Aid and Nursing Care

Sub-topic 1.4.1: Introduction to first aid and nursing care
Sub-topic 1.4.2: First aid box and personal protective equipment
Sub-topic 1.4.3: Vital signs
Sub-topic 1.4.4: Shocks and unconsciousness
Sub-topic 1.4.5: Artificial respiration
Sub-topic 1.4.6: Poisoning
Sub-topic 1.4.7: Wounds and bleeding
Sub-topic 1.4.8: Burns and scalds
Sub-topic 1.4.9: Positioning patients

Sub-topic 1.4.10: Stings and bites
Sub-topic 1.4.11: Fractures and soft tissue injuries
Sub-topic 1.4.12: Prevention and infection control
Sub-topic 1.4.13: Hypo and hyperthermia
Sub-topic 1.4.14: Nursing positions

Minimum Required Teaching/Learning Resources

- Reference materials (textbooks, DVDs, CDs, etc)
- Patients
- Stationery
- Audio/DVD equipment

Module Unit PHA-1105: Medical Psychology

1.5 Learning-Working Assignment: Medical Psychology

Sub-topic 1.5.1: Introduction to psychology and sociology
Sub-topic 1.5.2: Stages of human growth and development
Sub-topic 1.5.3: Hierarchy of human needs
Sub-topic 1.5.4: Attitudes, beliefs, values and norms
Sub-topic 1.5.5: Social stratification
Sub-topic 1.5.6: Health and health-seeking behaviours
Sub-topic 1.5.7: Stress-experiencing, measuring, coping with, managing and moderator of the stress experience
Sub-topic 1.5.8: Patient-provider relationship and communication
Sub-topic 1.5.9: Pain-experiencing, measuring, coping with, managing
Sub-topic 1.5.10: Psychosocial issues in advancing, chronic and terminal illness
Sub-topic 1.5.11: Social influence Sub-topic 1.5.12: Counselling skills

Minimum Required Teaching/Learning Resources

- Reference materials (textbooks, DVDs, CDs, etc)
- Patients
- Stationery
- Audio/DVD equipment

Module UnitPHA-1106: ICT

1.6 Learning-Working Assignments: Process a Document using Microsoft Word

PEX 1.6.1: Type document
PEX 1.6.2: Edit document
PEX 1.6.3: Format document
PEX 1.6.4: Save document
PEX 1.6.5: Print document

The underpinning theory below will be instructed as topics:

- Editing Documents
- Formatting Documents
- Printing Documents
- Business Records
- Business Communication

Minimum required Teaching/Learning Resources

- Computer
- Computer business packages
- Stationery
- Communication tools
- Calculators
- Printer

1.7 Learning-Working Assignments: Process a Document using Microsoft Excel

PEX 1.7.1: Type document
PEX 1.7.2: Edit document
PEX 1.7.3: Format document
PEX 1.7.4: Save document
PEX 1.7.5: Print document

The underpinning theory below will be instructed as topics:

- Editing
- Documents
- Formatting Documents
- Printing Documents
- Business Records
- Business Communication

Minimum required Teaching/Learning Resources

- Computer
- Computer business packages
- Stationery
- Communication tools
- Calculators
- Printer

1.8 Learning-Working Assignments: Process a Document using PowerPoint

PEX 1.8.1: Create slides PEX 1.8.2: Type text
PEX 1.8.3: Edit and format a document PEX 1.8.4: Organise slides
PEX 1.8.5: Save slides PEX 1.8.6: Print slides
PEX 1.8.7: Up-load PowerPoint presentation
PEX 1.8.8: Download PowerPoint presentation from the Internet

The underpinning theory below will be instructed as topics:

- Editing Documents
- Formatting Documents
- Printing Documents
- Business Records
- Business Communication

Minimum required Teaching/Learning Resources

- Computer
- Computer business packages
- Stationery
- Communication tools
- Calculators
- Printer

Year One, Semester II

PHA – 1212: Foundation Sciences (II)

Credit Units: 8

ModuleUnit Code	Module Unit	Contact Hours
PHA-1201	Anatomy and Physiology II	45
PHA-1202	Medical Microbiology and Parasitology II	30
PHA-1203	Biochemistry	45
	Total	**120**

Module Description

This module comprises anatomy and physiology of the human body, providing a functional understanding of the different physiological systems of the body. Microbiology and parasitology focus on the generic microbiological organisms as well as principles and application of sterilisation and disinfection. Conducting drug sensitivity tests is also covered under this module. Focus shall also be put on biochemistry of the essential elements as applied to medicine and drugs.

Learning Outcomes

By the end of this module, the student should be able to demonstrate understanding of anatomy and physiology of different systems, medical microbiology, parasitology and biochemistry.

Suggestions on Organisation of Learning

The acquisition of the competences described in this module may take place at a pharmacy training institution or its equivalent provided all equipment and materials required fortraining are in place. Delivery modes may include theory instruction (lectures), tutorials (discussions).

Occupational Health, Safety and Environmental Concerns to be Observed

- Laws and regulations
- Safety precautions
- Putting on of protective gear
- Waste management and disposal
- Work environment
- Maintaining personal hygiene
- Use of recommended tools/equipment
- Administering first aid
- Cleaning/sanitizing tools and equipment

Work Behavior/Attitudes to be Instilled and Observed during Training

- Responsible
- Willing to learn
- Committed to the programme
- Possesses team spirit
- Hard working
- Accurate
- Social
- Industrious
- Time conscious
- Cooperative

- Ethical
- Smart
- Accountable
- Trustworthy
- Results-oriented
- Honest
- Courteous
- Humble

Reading Materials

The Teacher is advised to make reference to relevant and applicable reading materials that could be in form of textbooks, publications, video clips/demonstrations, authenticated Internet sites, and any other.

Module Unit PHA-1201: Anatomy and Physiology (II)

2.1 Learning-Working Assignment: Anatomy and Physiology (II)

Sub-topic 2.1.1: Anatomy and Physiology of Cardiovascular System
Sub-topic 2.1.2: Anatomy and Physiology of Respiratory System
Sub-topic 2.1.3: Anatomy and Physiology of Genito-Urinary System
Sub-topic 2.1.4: Anatomy and Physiology of Digestive System
Sub-topic 2.1.5: Anatomy and Physiology of Special Senses
Sub-topic 2.1.6: Anatomy and Physiology of Integumentary System

Additional Reading Materials

- Tortora, G. J. and Derrickson. B. (2014). *Principles of Anatomy and Physiology*. 14th Edition; NewYork John Wiley and Sons.
- *Medical Physiology* by A. Guyton
- Elaine, N. M. and Katja, H. *Human Anatomy and Physiology*.

Minimum Required Teaching/Learning Resources

- Reference materials (textbooks, DVDs, CDs, etc)
- Patients
- Stationery
- Audio/DVD equipment

Module Unit PHA-1202: Medical Microbiologyand Parasitology (II)

2.2 Learning-Working Assignment: Medical Microbiology and Parasitology (II)

Sub-topic 2.2.1: Parasitology
Sub-topic 2.2.2: Immunology (immunity, immunization and vaccine)
Sub-topic 2.2.3: Sterilization and Disinfection
Sub-topic 2.2.4: Drug Sensitivity Tests

Additional Reading Materials

- Mackie and Mccartney. Practical Medical Microbiology. 3rd Ed., Churchill Livingstone, Edinburgh, London, Melbourne, and New York
- Lippincott, W. and Wilkins (2007). Schaechter's Mechanisms of Microbial Disease. 4th Ed.

Minimum Required Teaching/Learning Resources

- Reference materials (textbooks, DVDs, CDs, etc)
- Patients
- Stationery
- Audio/DVD equipment

Module Unit PHA-1203: Biochemistry (II)

2.3 Learning-Working Assignment: Biochemistry (II)

Sub-topic 2.3.1: Carbohydrates
Sub-topic 2.3.2: Lipids
Sub-topic 2.3.3: Nucleic Acids
Sub-topic 2.3.4: Vitamins, Minerals and Nutrition

Additional Reading Materials

- Tortora, G.J. and Derrickson. B. (2014). *Principles of Anatomy and Physiology*. 14th Ed., John Wiley and Sons, New York
- Lieberman, M., Marks A. D. and Smith, C. (2006). *Marks' Essentials of Medical Biochemistry: A Clinical Approach*. Lippincott Williams and Wilkins, Philadelphia, USA.
- Gilbert, H. F. (2008). *Basic Concepts in Biochemistry*. A Student's Survival Guide. McGrow-Hill Medical, USA.
- Mackie and McCartney. *Practical Medical Microbiology*.3rd Ed., Churchill Livingstone, Edinburgh, London, Melbourne, and New York(2007).
- Schaechter's Mechanisms of Microbial Disease. 4thEd. Lippincott Williams and Wilkins

Minimum Required Teaching/Learning Resources

- Reference materials (textbooks, DVDs, CDs, etc)
- Patients
- Stationery
- Audio/DVD equipment

PHA – 1221: Conducting Primary Health Care Activities

Credit Units: 4

ModuleUnit Code	Module Unit	Contact Hours
PHA-1204	PHC	60
	Total	**60**

Module Description

This module covers the key aspects of Primary Health Care provision, to help the student fit within the different task descriptions of healthcare providers. A student shall be instructed in aspects of communication of pharmaceutical information, how to conduct community pharmaceutical interventions as well as promotion of Primary Health Care activities. To enhance their competences in real life situations, role-plays shall be conducted. During training, a student shall be instructed on how to conduct mobilisation activities for health care interventions as well as techniques in community sensitisation.

Learning Outcomes

By the end of this module, a student should be able to:

- Communicate pharmaceutical-related matters to the community.
- Prevent and control infections in communities.

Suggestions on Organisation of Learning

The acquisition of the competences described in this module may take place at a pharmacy training institution or its equivalent provided all equipment and materials required for training are in place. Delivery modes may include theoryinstruction (lectures), hands-on practice (practical) and tutorials (discussions).

Occupational Health, Safety and Environmental Concerns to be Observed

- Laws and regulations
- Safety precautions
- Putting on of protective gear
- Waste management and disposal
- Work environment
- Maintaining personal hygiene
- Use of recommended tools/equipment
- Administering first aid
- Cleaning/sanitizing tools and equipment

Work Behavior/Attitudes to be Instilled and Observed during Training

- Responsible
- Willing to learn
- Committed to the programme
- Possesses team spirit
- Hard working
- Accurate
- Social
- Industrious
- Time conscious
- Cooperative
- Ethical
- Smart
- Accountable
- Trustworthy
- Results-oriented
- Honest
- Courteous
- Humble

Reading Materials

The teacher is advised to make reference to relevant and applicable reading materials that could be in form of textbooks, publications, video clips/demonstrations, authenticated Internet sites, and any other.

Module Unit. PHA-1204: PHC

2.4 Learning-Working Assignment: Communicate Pharmaceutical Information and Health Related Matters

PEX 2.4.1: Verbally PEX 2.4.2: In writing
PEX 2.4.3: Non-verbally (sign language, body language, gesture)
PEX 2.4.4: Use Media e.g. radio, TV, etc to sensitise the community
PEX 2.4.5: Conduct seminars PEX 2.4.6: Conduct meetings

The underpinning theory below will be instructed as topics:

- Communication Skills
- Knowledge on Self-medication
- Knowledge on Storage of Pharmaceutical Products

- Community Diagnosis
- Community Mobilisation and Sensitisation

Minimum Required Teaching/Learning Resources

- Radio
- Funds
- Television
- Stationery
- Newspapers
- ICT
- Communication aids e.g. Drums
- Computers
- Protective gear e.g. boots
- Public address system
- Umbrella
- Banners
- Means of transport

2.5 Learning-Working Assignment: Conduct Community Pharmaceutical Interventions

PEX 2.5.1: Assess community pharmaceutical needs
PEX 2.5.2: Mobilise resources required
PEX 2.5.3: Implement community pharmaceutical interventions
PEX 2.5.4: Evaluate the impact of the interventions

The underpinning theory below will be instructed as topics:

- Communication Skills
- Knowledge on Self-medication
- Nutrition
- Water and Sanitation
- Community Diagnosis
- Community Mobilisation and Sensitisation

Minimum Required Teaching/Learning Resources

- Radio
- Television
- Newspapers
- Communication aids e.g. drums, public address system, banners
- Funds
- Stationery
- Computers
- Protective gear e.g. boots, umbrella
- Means of transport

2.6 Learning-Working Assignment: Conduct Activities Promoting Health

PEX 2.6.1: Educate the community about nutrition
PEX 2.6.2: Educate the community about sanitation
PEX 2.6.3: Educate the community on rational use of drugs (Pharmaconvigilance)

The underpinning theory below will be instructed as topics:

- Communication Skills
- Knowledge on Self-Medication
- Knowledge on Storage of Pharmaceutical Products
- Pharmacodynamics
- Quality of Drugs
- Nutrition
- Water and Sanitation
- Community Diagnosis
- Community Mobilisation and Sensitisation

Minimum Required Teaching/LearningResources

- Radio
- Television
- Newspapers
- Communication aids e.g. drums, public address system, banners
- Means of transport
- Funds
- Stationery
- Computers
- Protective gear e.g. boots, umbrella

2.7 Learning-Working Assignment: Participate in Infection Prevention and Control Activities

PEX 2.7.1: Perform hygiene precautions PEX 2.7.2: Carry out disinfection
PEX 2.7.3: Sterilize equipment/ tools/ linen/pharmaceutical products
PEX 2.7.4: Use personal protective equipment
PEX 2.7.5: Manage health care waste
PEX 2.7.6: Provide post exposure prophylaxis

The underpinning theory below will be instructed as topics:

- Communication Skills
- Knowledge on Self-Medication
- Knowledge on Storage of Pharmaceutical Products
- Pharmacodynamics
- Quality of Drugs
- Nutrition
- Water and Sanitation
- Community Diagnosis
- Community Mobilisation and Sensitisation

Minimum Required Teaching/LearningResources

- Radio
- Television
- Newspapers
- Communication aids e.g. drums, public address system, banners
- Means of transport
- Funds
- Stationery
- Computers
- Protective gear e.g. boots, umbrella

PHA-1231: Compounding Pharmaceutical Products (I)

Credit Units: 4

ModuleUnit Code	Module Unit	Contact Hours
PHA-1205	Pharmaceutics (I)	60
	Total	**60**

Module Description

Compounding pharmaceutical products is a core activity of the work-life of a Pharmacy graduate. A student shall be instructed in how to prepare oral liquid dosage forms. The dosage form will include simple and complex solutions, suspensions and emulsions.

Learning Outcome
By the end of this module, the student should be able to prepare stable oral liquid dosage forms (no coagulations, no impurities, no foreign body, with recommended colour).

Suggestions on Organisation of Learning
The acquisition of the competences described in this module may take place at a Pharmacy training institution or its equivalent provided all equipment and materials required for training are in place. Delivery modes may include theory instruction (lectures), hands-on practice (practical) and tutorials (discussions).

Occupational Health, Safety and Environmental Concerns to be Observed

- Laws and regulations
- Safety precautions
- Putting on of protective gear
- Waste management and disposal
- Work environment
- Maintaining personal hygiene
- Use of recommended tools/equipment
- Administering first aid
- Cleaning/sanitizing tools and equipment

Work Behavior/Attitudes to be Instilled and Observed during Training

- Responsible
- Willing to learn
- Committed to the programme
- Possesses team spirit
- Hard working
- Accurate
- Social
- Industrious
- Time conscious
- Cooperative
- Ethical
- Smart
- Accountable
- Trustworthy
- Results-oriented
- Honest
- Courteous
- Humble

Reading Materials
The teacher is advised to make reference to relevant and applicable reading materials that could be in form of textbooks, publications, video clips/demonstrations, authenticated Internet sites, and any other.

Module Unit PHA-1205: Pharmaceutics (I)

2.8 Learning-Working Assignment: Prepare Oral Liquid Dosage Forms

PEX 2.8.1: Prepare simple solutions
PEX 2.8.2: Prepare complex solutions
PEX 2.8.3: Prepare suspensions containing diffusible powders
PEX 2.8.4: Prepare suspensions containing indiffusible powders
PEX 2.8.5: Prepare suspensions containing precipitate-forming liquids
PEX 2.8.6: Prepare suspensions containing insolvable liquids
PEX 2.8.7: Prepare emulsions containing fixed oils
PEX 2.8.8: Prepare emulsions containing volatile oils
PEX 2.8.9: Prepare emulsions containing mineral oils

The listed underpinning theory below will be instructed as topics:

- Introduction to Preparation of Oral Liquid Dosage Forms
- Definitions
- Dosage Forms and Routes of Administration
- Prescriptions: Parts of Prescriptions, Good Prescribing Practices, Latin Abbreviations
- Referencing and Reference Books
- General Scientific Principles of Dosage Form Designs
- Pharmaceutical Calculations
- Containers and Labelling
- Drug Solubility
- Additives/Excipients
- Packaging and Labelling
- Initiators

Additional Reading Materials

- Aulton, M. E. (1988). *Pharmaceutics: The Science of Dosage Form and Design.* Churchill Livingstone, London,UK
- Ansel, H. C. (2012). *Pharmaceutical Calculations*. Springhouse Publishing Company, USA.
- Jones, D. (2008). *Pharmaceutics: Dosage Form and Design*. London, Pharmaceutical Press.
- Langely, C. and Belcher, D. (2007). *Pharmaceutical Compounding and Dispensing.* Pharmaceutical Press, London, UK.

Minimum Required Teaching/LearningResources

- Weighing scale
- Beakers
- Conical flasks
- Measuring cylinders
- Pipettes
- Stirring rods
- Porcelain mortar & pestle
- Glass mortar & pestle
- Distiller
- Hot plate
- Water bath
- Bunsen burner
- Gas cylinder
- Sintered glass filter
- Filter paper
- Containers for packaging
- Glass slab
- Spatulas
- Spoons
- Funnels
- Homogeniser
- Evaporating dish
- Thermometers
- Powder sieves
- Tabulating machine
- Trays
- Mould
- Gelatine empty capsules
- Autoclave
- Ampoule cutter
- Capping machine
- Hot air oven

PHA-1251: Performing Analytical Procedures (I)

Credit Units: 4

ModuleUnit Code	Module Unit	Contact Hours
PHA-1206	Pharmaceutical Chemistry (I)	60
	Total	**60**

Module Description

This module equips the student with the key skills to enable him/her carry out analytical procedures. In this Module, determination of organoleptic and aesthetic properties of

pharmaceutical products will be instructed. The student will be taken through how to determine and establish texture, colour, smell as well as shapes of pharmaceutical products.

Learning Outcomes

By the end of this module, the student should be able to analyse pharmaceutical products using different analytical methods as well as determine organoleptic characteristics of pharmaceutical products.

Suggestions on Organisation of Learning

The acquisition of the competences described in this module may take place at a Pharmacy training institution or its equivalent provided all equipment and materials required for training are in place. Delivery modes may include theory instruction (lectures), hands-on practice (practical) and tutorials (discussions).

Occupational Health, Safety and Environmental Concerns to be Observed

- Laws and regulations
- Safety precautions
- Putting on of protective gear
- Waste management and disposal
- Work environment
- Maintaining personal hygiene
- Use of recommended tools/equipment
- Administering first aid
- Cleaning/sanitizing tools and equipment

Work Behavior/Attitudes to be Instilled and Observed during Training

- Responsible
- Willing to learn
- Committed to the programme
- Possesses team spirit
- Hard working
- Accurate
- Social
- Industrious
- Time conscious
- Cooperative
- Ethical
- Smart
- Accountable
- Trustworthy
- Results-oriented
- Honest
- Courteous
- Humble

Reading Materials

The teacher is advised to make reference to relevant and applicable reading materials that could be in form of textbooks, publications, video clips/demonstrations, authenticated Internet sites, and any other.

Module Unit PHA-1206: Pharmaceutical Chemistry (I)

2.9 Learning-Working Assignment: Determine Laboratory and Theoretical Organoleptic Characteristics of Pharmaceutical Products

PEX 2.9.1: Determine texture of pharmaceutical products
PEX 2.9.2: Identify colour of pharmaceutical products
PEX 2.9.3: Identify smell of pharmaceutical products
PEX 2.9.4: Determine shape of pharmaceutical products

The underpinning theory below will be instructed as topics:

- Terminology
- Accuracy and Precision
- Repeatability and Reproducibility
- Standard Operating Procedure (SOP)
- Compound Random Errors
- Reporting of Results
- Qualitative Analysis of Pharmaceutical Products
- Measuring of Optical Rotation
- Partition Coefficient
- Buffers
- Calculation of pH Value of Aqueous Solutions of Strong and Weak Acids and Bases
- Acidic and Basic Strength and PKa
- Henderson-Hasselbalch Equation
- Measures of Optical Rotation
- Factors Governing Radiation in the UV/Visible Region
- Beer-Lambert's Law
- Instrumentation of uv, ir and NMR
- Principles of Chromatography
- Types of Chromatography
- Application of Chromatographic Techniques in Analysis
- Principles of Potentiomerty, Polarigraphy, Refractometry
- Specific Gravity
- Direct Acid/Base Titrations in the Aqueous Phase
- Indirect Titrations in Aqueous Phase
- Non-Aqueous Titrations
- Principles of Argentrimetric, Redox, Iodometric, Complex Metric Titrations
- Determination of Ash Value, Water Content, Extractive Value and Crude Fibre Content
- Organoleptic Characteristics

Additional Reading Materials

- House, J. E. (2012). *Inorganic Chemistry*. USA, Academic Press.
- Graham, S. T. and Fryhle, G. B. (2007). *Organic Chemistry*. USA, John Wiley and Sons.
- Quin, L. D. and Tyrel, J. A. (2010). *Fundamentals of Heterocyclic Chemistry: Importance in Nature and in the Synthesis of Pharmaceuticals*. Wiley Blackwell.

Minimum Required Teaching/LearningResources

- Spectrophotometer
- Flasks
- Colorimeter
- TLC plates
- Beakers
- Filter paper
- Pipettes
- Glassware
- Conical flasks
- HPLC machine
- Measuring cylinders
- PH meter
- Racks
- Polarimeter
- Stand
- Refractometer
- Test tubes and test tube holders
- Chromatography drums/beakers
- Bunsen burner/heating apparatus
- Weighing scale
- Inspection light
- Spatula
- Soxhlet extraction apparatus
- Slimming rods
- Funnels
- Bio-safety cabins
- Eluents
- Chemical raw material
- Fresh distilled water
- Labels
- Sonicator
- Protective gear
- Reagents

2.10 Learning-Working Assignment: Carry Out Qualitative Analysis of Pharmaceuticals

PEX 2.10.1: Qualitatively analyse pharmaceuticals containing organic drugs
PEX 2.10.2: Qualitatively analyse pharmaceuticals containing inorganic drugs

The underpinning theory below will be instructed as topics:

- Terminology
- Accuracy and Precision
- Repeatability and Reproducibility
- Standard Operating Procedure (SOP)
- Compound Random Errors
- Reporting of Results
- Qualitative Analysis of Pharmaceutical Products
- Measuring of Optical Rotation
- Partition Coefficient
- Buffers
- Calculation of pH Value of Aqueous Solutions of Strong and Weak Acids and Bases
- Acidic and Basic Strength and PKa
- Henderson-Hasselbalch Equation
- Measures of Optical Rotation
- Factors Governing Radiation in the UV/Visible Region
- Beer-Lambert's Law
- Instrumentation of uv, ir and NMR
- Principles of Chromatography
- Types of Chromatography
- Application of Chromatographic Techniques in Analysis
- Principles of Potentiomerty, Polarigraphy, Refractometry
- Specific Gravity
- Direct Acid/Base Titrations in the Aqueous Phase
- Indirect Titrations in Aqueous Phase
- Non-Aqueous Titrations
- Principles of Argentrimetric, Redox, Iodometric, Complex Metric Titrations
- Determination of Ash Value, Water Content, Extractive Value and Crude Fibre Content
- Organoleptic Characteristics

Additional Reading Materials

- House, J. E. (2012). *Inorganic Chemistry*. USA, Academic Press.Graham, S. T. W and Fryhle, G. B. (2007). Organic Chemistry. USA, John Wiley and Sons.
- Quin, L. D. and Tyrel, J. A. (2010). *Fundamentals of Heterocyclic Chemistry: Importance in Nature and in the Synthesis of Pharmaceuticals*. Wiley Blackwell.

Minimum Required Teaching/LearningResources

- Spectrophotometer
- Flasks
- Colorimeter
- TLC plates
- Beakers
- Filter paper
- Pipettes
- Glassware
- Conical flasks
- HPLC machine
- Measuring cylinders
- PH meter
- Racks
- Polarimeter
- Stand
- Refractometer
- Test tubes and test tube holders
- Chromatography drums/beakers
- Bunsen burner/heating apparatus
- Weighing scale
- Inspection light
- Spatula

- Soxhlet extraction apparatus
- Slimming rods
- Funnels
- Bio-safety cabins
- Eluents
- Chemical raw material
- Fresh distilled water
- Labels
- Sonicator
- Protective gear
- Reagents

Year Two, Semester I

PHA-2113: Foundation Sciences (III)

Credit Units: 2

ModuleUnit Code	Module Unit	Contact Hours
PHA-2101	Biostatistics	30
	Total	**30**

Module Description

This module introduces the learner to biostatistics.

Learning Outcomes

By the end of this module, the student should be able to apply understanding of fundamentals to biostatistics.[Note: This module is more theoretical; hence some LWAs will be delivered as topics].

Suggestions on Organisation of Learning

The acquisition of the competences described in this module may take place at a Pharmacy training institution or its equivalent provided all equipment and materials required for training are in place. Delivery modes may include theory instruction (lectures), hands-on practice (practical) and tutorials (discussions).

Occupational Health, Safety and Environmental Concerns to be Observed

- Laws and regulations
- Safety precautions
- Putting on of protective gear
- Waste management and disposal
- Work environment
- Maintaining personal hygiene
- Use of recommended tools/equipment
- Administering first aid
- Cleaning/sanitizing tools and equipment

Work Behavior/Attitudes to be Instilled and Observed during Training

- Responsible
- Willing to learn
- Committed to the programme
- Possesses team spirit
- Hard working
- Accurate
- Social
- Industrious
- Time conscious
- Cooperative
- Ethical
- Smart
- Accountable
- Trustworthy
- Results-oriented
- Honest
- Courteous
- Humble

Reading Materials

The teacher is advised to make reference to relevant and applicable reading materials that could be in form of textbooks, publications, video clips/demonstrations, authenticated Internet sites, and any other.

Module Unit PHA-2101: Biostatistics

3.1 Learning-Working Assignment: Biostatistics

Sub-topic 3.1.1: Introduction to Biostatistics
Sub-topic 3.1.2: Measures of Central Tendency
Sub-topic 3.1.3: Inferences from Samples
Sub-topic 3.1.4: Correlation and Regression
Sub-topic 3.1.5: Descriptive and Inferential Statistics
Sub-topic 3.1.6: Measures of Variability/Dispersion
Sub-topic 3.1.7: Hypothesis Testing
Sub-topic 3.1.8: Probability and Probability Distribution
Sub-topic 3.1.9: Permutations and Combinations
Sub-topic 3.1.10: Data Summarisation and Presentation
Sub-topic 3.1.11: Variables
Sub-topic 3.1.12: Population and Sampling

Additional Reading Materials

- Stewert, A. (2010). Basic Statistics and Epidemiology. A Practical Guide. CRC Press, Florida, USA
- Swinscow, T.D.C. and Campbell, M.J ( ) Statistics at Square One.

Minimum Required Teaching/LearningMaterials

- Textbooks
- DVDs, CDs, etc.

PHA-2132: Compounding Pharmaceutical Products (II)

Credit Units: 6

ModuleUnit Code	Module Unit	Contact Hours
PHA-2102	Pharmaceutics (I)	90
	Total	**90**

Module Description

Compounding Pharmaceutical Products is a core activity of the work life of a Pharmacy graduate. In this module, a student will be instructed in how to prepare powders for internal use. These powders include powders in single dosage form as well as powders in bulk. In addition to powders, a student will also be instructed in preparation of topical products such as ointments and gels.

Learning Outcomes

By the end of this module, the student should be able to prepare powder dosage forms for internal use and topical products.

Suggestions on Organisation of Learning

The acquisition of the competences described in this module may take place at a Pharmacy training institution or its equivalent provided all equipment and materials required for training are in place. Delivery modes may include theory instruction (lectures), hands-on practice (practical) and tutorials (discussions).

Occupational Health, Safety and Environmental Concerns to be Observed

- Laws and regulations
- Safety precautions
- Putting on of protective gear
- Waste management and disposal
- Work environment
- Maintaining personal hygiene
- Use of recommended tools/equipment
- Administering first aid
- Cleaning/sanitizing tools and equipment

Work Behavior/Attitudes to be Instilled and Observed during Training

- Responsible
- Willing to learn
- Committed to the programme
- Possesses team spirit
- Hard working
- Accurate
- Social
- Industrious
- Time conscious
- Cooperative
- Ethical
- Smart
- Accountable
- Trustworthy
- Results-oriented
- Honest
- Courteous
- Humble

Reading Materials

The teacher is advised to make reference to relevant and applicable reading materials that could be in form of textbooks, publications, video clips/demonstrations, authenticated Internet sites, and any other.

Module Unit PHA-2102: Pharmaceutics (II)

3.2 Learning-Working Assignment: Prepare Powders

PEX 3.2.1: Prepare simple powders in single dose forms
PEX 3.2.2: Prepare compound powders in bulk
PEX 3.2.3: Prepare compound powders in single doses
PEX 3.2.4: Prepare powders for external use

The underpinning theory below will be instructed as topics:

- Introduction to Preparations of Powders
- Definitions
- Dosage Forms and Routes of Administration
- Prescriptions, Parts of Prescriptions, Good Prescribing Practices, Latin Abbreviations
- Referencing and Reference Books
- General Scientific Principles of Dosage Form Designs

- Pharmaceutical Calculations
- Containers and Labelling
- General Description of Pharmaceutical Powders
- Drug Solubility
- Additives/Excipients
- Packaging and Labelling
- Powders

Additional Reading Materials

- Aulton, M. E. (1988). *Pharmaceutics: The Science of Dosage Form and Design*. London, Churchill Livinstone.
- Ansel, H. C. (2012). *Pharmaceutical Calculations*. USA, Springhouse Publishing Company.
- Jones, D. (2008). *Pharmaceutics: Dosage Form and Design*. London, Pharmaceutical Press.
- Langely, C. and Belcher, D. (2007). *Pharmaceutical Compounding and Dispensing*. London, Pharmaceutical Press.

Minimum Required Teaching/Learning Resources

- Weighing scale
- Beakers, conical flasks
- Measuring cylinders
- Pipettes
- Stirring rods
- Porcelain mortar and pestle
- Glass mortar and pestle
- Distiller
- Hot plate
- Water bath
- Bunsen burner
- Gas cylinder
- Sintered glass filter
- Filter paper
- Containers for packaging
- Glass slab
- Spatulas
- Spoons
- Funnels
- Homogenizer
- Evaporating dish
- Thermometers
- Powder sieves
- Tabulating machine
- Trays
- Mould
- Gelatine empty capsules
- Autoclave
- Ampoule cutter
- Capping machine
- Hot air oven

3.3 Learning-Working Assignment: Prepare Topical Products

PEX 3.3.1: Prepare an ointment using trituration method e.g. white field ointment
PEX 3.3.2: Prepare ointments
PEX 3.3.3: Prepare creams
PEX 3.3.4: Prepare pastes
PEX 3.3.5: Prepare gels and jellies
PEX 3.3.6: Prepare lotions
PEX 3.3.7: Prepare liniments PEX 3.3.8: Prepare paints

The underpinning theory below will be instructed as topics:

- Introduction to Preparation of Topical Products
- Definitions
- Dosage Forms and Routes of Administration
- Prescriptions, Parts of Prescriptions, Good Prescribing Practices, Latin Abbreviations
- Referencing and Reference Books
- General Scientific Principles of Dosage Form Designs

- Pharmaceutical Calculations
- Containers and Labelling
- General Description of Pharmaceutical Powders
- Drug Solubility
- Additives/Excipients
- Packaging and Labelling
- Eye/Ear Drops/Ointments
- Initiators

Additional Reading Materials

- Aulton, M. E. (1988*). Pharmaceutics: The Science of Dosage Form and Design*. London, Churchill Livingstone.
- Ansel, H. C. (2012). *Pharmaceutical Calculations*. USA, Springhouse Publishing Company
- Jones, D. (2008). *Pharmaceutics: Dosage Form and Design*. London, Pharmaceutical Press. Langely, C. and Belcher, D. (2007). Pharmaceutical Compounding and Dispensing. London, Pharmaceutical Press.

Minimum Required Teaching/Learning Resources

- Weighing scale
- Beakers, conical flasks
- Measuring cylinders
- Pipettes
- Stirring rods
- Porcelain mortar and pestle
- Glass mortar and pestle
- Distiller
- Hot plate
- Water bath
- Bunsen burner
- Gas cylinder
- Sintered glass filter
- Filter paper
- Containers for packaging
- Glass slab
- Spatulas
- Spoons
- Funnels
- Homogenizer
- Evaporating dish
- Thermometers
- Powder sieves
- Tabulating machine
- Trays
- Mould
- Gelatine empty capsules
- Autoclave
- Ampoule cutter
- Capping machine
- Hot air oven

PHA-2141: Providing Pharmaceutical Care (I)

Credit Units: 2

ModuleUnit Code	Module Unit	Contact Hours
PHA-2103	Pharmacology (I)	30
	Total	**30**

Module Description

This part of Pharmacology focuses on the principles of pharmacology and the drugs used on the different body systems. The body system will include autonomic nervous system drugs.

Learning Outcome

By the end of this of module, the student should be able to demonstrate understanding of the principles of pharmacology and provide rational drug therapy in a caring and competent manner.

Suggestions on Organisation of Learning

The acquisition of the competences described in this module may take place at a Pharmacy training institution or its equivalent provided all equipment and materials required for training are in place. Delivery modes may include theory instruction (lectures), hands-on practice (practical) and tutorials (discussions).

Occupational Health, Safety and Environmental Concerns to be Observed

- Laws and regulations
- Safety precautions
- Putting on of protective gear
- Waste management and disposal
- Work environment
- Maintaining personal hygiene
- Use of recommended tools/equipment
- Administering first aid
- Cleaning/sanitizing tools and equipment

Work Behavior/Attitudes to be Instilled and Observed during Training

- Responsible
- Willing to learn
- Committed to the programme
- Possesses team spirit
- Hard working
- Accurate
- Social
- Industrious
- Time conscious
- Cooperative
- Ethical
- Smart
- Accountable
- Trustworthy
- Results-oriented
- Honest
- Courteous
- Humble

Reading Materials

The teacher is advised to make reference to relevant and applicable reading materials that could be in form of textbooks, publications, video clips/demonstrations, authenticated Internet sites, and any other.

Module Unit PHA-2103: Pharmacology (I)

3.4 Learning-Working Assignment: Pharmacology (I)

Sub-topic 3.4.1: Principles of Pharmacology
Sub-topic 3.4.2: Autonomic Nervous System Drugs

The listed underpinning theory below will be instructed as topics:

- Rational Medicine Use
- Drug Interactions
- System Pharmacology
- Medical Ethics

Additional Reading Materials

- Katzung, B. G. (2012). *Basic and Clinical Pharmacology*.USA, McGrow-hill Medical.

- Rang, P. H. (2011). *Rang and Dale's Pharmacology*.London, Churchill Livingstone.
- Green, R. J. & Harris, N. D. (2008). *Pathology and Therapeutics for Pharmacists. A Basic of Clinical Pharmacy Practice.* London, Pharmaceutical Press.

Minimum Required Teaching/LearningResources

- Formulary manuals
- Textbooks
- BP machines
- Thermometers

PHA-2152: Performing Analytical Procedures (II)

Credit Units: 4

ModuleUnit Code	Module Unit	Contact Hours
PHA-2104	Pharmaceutical Chemistry	60
	Total	**60**

Module Description

This module equips the student with the key skills to enable him/her carry out physico-chemical analytical procedures.

Learning Outcome

By the end of this module, the student should be able to analyse pharmaceutical products using physico-chemical analytical methods.

Underpinning Knowledge

For Occupational theory suggested for instruction/ demonstration, the teacher is not limited to the outline given. In any case, underpinning knowledge/ theory may be obtained from various recognised reference materials as appropriate.

Suggestions on Organisation of Learning

The acquisition of the competences described in this module may take place at a Pharmacy training institution or its equivalent provided all equipment and materials required for training are in place. Delivery modes may include theory instruction (lectures), hands-on practice (practical) and tutorials (discussions).

Occupational Health, Safety and Environmental Concerns to be Observed

- Laws and regulations
- Safety precautions
- Putting on of protective gear
- Waste management and disposal
- Work environment
- Maintaining personal hygiene
- Use of recommended tools/equipment
- Administering first aid
- Cleaning/sanitizing tools and equipment

Work Behavior/Attitudes to be Instilled and Observed during Training

- Responsible
- Willing to learn
- Committed to the programme
- Possesses team spirit

- Hard working
- Accurate
- Social
- Industrious
- Time conscious
- Cooperative
- Ethical
- Smart
- Accountable
- Trustworthy
- Results-oriented
- Honest
- Courteous
- Humble

Reading Materials

The teacher is advised to make reference to relevant and applicable reading materials that could be in form of textbooks, publications, video clips/demonstrations, authenticated Internet sites, and any other.

Module Unit PHA-2104: Pharmaceutical Chemistry (II)

3.5 LWA: Carry out Physio-Chemical Analytical Methods on Pharmaceutical Products

PEX 3.5.1: Analyse pharmaceutical products using spectrometry
PEX 3.5.2: Analyse pharmaceutical products using chromatographic techniques
PEX 3.5.3: Analyse pharmaceutical products using PH measurements
PEX 3.5.4: Analyse pharmaceutical products using refractometry
PEX 3.5.5: Analyse pharmaceutical products using specific gravity and density

The underpinning theory below will be instructed as topics:

- Terminology
- Accuracy and Precision
- Repeatability and Reproducibility
- Standard Operating Procedures
- Compound Random Errors
- Reporting of Results
- Qualitative Analysis of Pharmaceutical Products
- Measuring of Optical Rotation
- Partition Coefficient
- Buffers
- Calculation of pH Value of Aqueous Solutions of Strong and Weak Acids and Bases
- Acidic and Basic Strength and PKa
- Henderson-Hasselbalch Equation
- Measures of Optical Rotation
- Factors Governing Radiation in the uv/Visible Region
- Beer-Lambert's Law
- Instrumentation of uv, ir and NMR
- Principles of Chromatography
- Types of Chromatography
- Application of Chromatographic Techniques in Analysis
- Principles of Potentiomerty, Polarigraphy, Refractometry
- Specific Gravity

- Direct Acid/Base Titrations in the Aqueous Phase
- Indirect Titrations in Aqueous Phase
- Non-Aqueous Titrations
- Principles of Argentrimetric, Redox, Iodometric, Complex Metric Titrations
- Determination of Ash Value, Water Content, Extractive Value and Crude Fibre Content
- Organoleptic Characteristics

Additional Reading Materials

- House, J. E. (2012). *Inorganic Chemistry*. USA, Academic Press.
- Graham, S. T. W. and Fryhle, G. B. (2007). *Organic Chemistry*. USA, John Wiley and Sons.
- Quin, L. D. and Tyrel, J. A. (2010). *Fundamentals of Heterocyclic Chemistry: Importance in Nature and in the Synthesis of Pharmaceuticals*. Wiley Blackwell.

Minimum Required Teaching/Learning Resources

- Spectrophotometer
- Measuring cylinders
- Colorimeter
- Racks
- Beakers
- Stand
- Pipettes
- Test tubes and test tube holders
- Conical flasks
- Bunsen burner/heating apparatus
- Chromatography drums beakers
- Spatula
- Weighing scale
- Slimming rods
- Inspection light
- Funnels
- Soxhlet extraction apparatus
- Flasks
- TLC plates
- Bio-safety cabins
- Filter paper
- Chemical raw material
- Glassware
- Labels
- HPLC machine
- Protective gear
- PH meter
- Eluents
- Polarimeter
- Fresh distilled water
- Refractometer
- Sonicator
- Reagents

PHA-2171: Extracting and Standardising Crude Drugs (I)

Credit Units: 4

ModuleUnit Code	Module Unit	Contact Hours
PHA-2105	Pharmacognosy (I)	60
	Total	**60**

Module Description

This module equips the learner with the skills of extracting crude drugs from both animal and plant sources. The student shall be instructed in extraction of wax and gelatine from animal sources as well as crude drugs from plants by applying various methods such as maceration,

distillation and decoction. Percolation and soxhlet methods shall also be covered. The student shall be taught how to standardize all crude extracts.

Learning Outcome
By the end of this module, the student should be able to extract and standardise crude drugs from plants and animals.

Underpinning Knowledge
For occupational theory suggested for instruction/demonstration, the teacher is not limited to the outline given. In any case, underpinning knowledge/ theory may be obtained from various recognised reference materials as appropriate

Suggestions on Organisation of Learning
The acquisition of the competences described in this module may take place at a Pharmacy training institution or its equivalent provided all equipment and materials required for training are in place. Delivery modes may include theory instruction (lectures), hands-on practice (practical) and tutorials (discussions).

Occupational Health, Safety and Environmental Concerns to be Observed
- Laws and regulations
- Safety precautions
- Putting on of protective gear
- Waste management and disposal
- Work environment
- Maintaining personal hygiene
- Use of recommended tools/equipment
- Administering first aid
- Cleaning/sanitizing tools and equipment

Work Behavior/Attitudes to be Instilled and Observed during Training
- Responsible
- Willing to learn
- Committed to the programme
- Possesses team spirit
- Hard working
- Accurate
- Social
- Industrious
- Time conscious
- Cooperative
- Ethical
- Smart
- Accountable
- Trustworthy
- Results-oriented
- Honest
- Courteous
- Humble

Reading Materials
The teacher is advised to make reference to relevant and applicable reading materials that could be in form of textbooks, publications, video clips/demonstrations, authenticated Internet sites, and any other.

Module Unit PHA-2105: Pharmacognosy (I)
3.6 LWA: Extract and Standardise Crude Drugs from Animals
PEX 3.6.1: Extract wax

PEX 3.6.2: Extract gelatine
PEX 3.6.3: Standardise extracts

The underpinning theory below will be instructed as topics

- Introduction to Extraction of Crude Drugs
- Physco-Chemical Investigation of Herbal Products e.g. Metabolic Pathway
- Metabolic Pathways of Drugs
- Sources of Crude Drugs (Animal)
- Storage of Crude Products
- Quality Assurance
- Dilutions
- Recording Pharmaceutical Products
- Equipment for Extraction of Crude Drugs
- Standardisation Methods of Crude Drugs
- Crude Drugs Extraction Methods

Additional Reading Materials

- Evans, W. C. (2009). Trease and Evans.*Pharmacognosy*. USA, Saunders Ltd. Philadelphia.
- Houghton, P. and Mukherjee, P. K. (2009). *Evaluation of Herbal Medicinal Products*. London, Pharmaceutical Press.

Minimum Required Teaching/Learning Resources

- Pipettes
- Mortars
- Pestles
- Spatula
- Jars
- Measuring cylinder
- Furniture
- Shelves
- Cabins
- Pallets
- Fire extinguishers
- Stock containers
- Protective gear
- Soxhlet
- Microwave
- Flasks
- Evaporating dishes
- Conical flasks
- Funnels
- Filters
- Slabs
- Hot water bath
- Distiller
- Filter equipment
- Calculators
- Hot plate
- Weighing scale
- Computers
- Printer (ordinary, label)
- Thermometer
- Refrigerator
- Bio-safety cabin
- Inspection light
- Percolator
- Capping machine
- Mixers

3.7 Learning-Working Assignment: Extract Crude Drugs from Plants using:

PEX 3.7.1: Merceration method
PEX 3.7.2: Distillation and fusion methods
PEX 3.7.3: Decoction
PEX 3.7.4: Percolation
PEX 3.7.5: Digestion
PEX 3.7.6: Soxhlet method
PEX 3.7.7: Standardize extracts

The underpinning theory below will be instructed as topics:

- Introduction to Extraction of Crude Drugs
- Physco-Chemical Investigation of Herbal Products e.g. Metabolic Pathway
- Commercial Production, Quality and Standardisation of Natural Products e.g. Plant Growth Regulators
- Morphological and Microscopic Examination of Drugs e.g. Description of Plant Morphology and Anatomy
- Metabolic Pathways of Drugs
- Sources of Crude Drugs (Plants)
- Storage of Crude Products
- Quality Assurance
- Dilutions
- Recording Pharmaceutical Products
- Equipment for Extraction of Crude Drugs
- Standardisation Methods of Crude Drugs
- Crude Drugs Extraction Methods

Additional Reading Materials

- Evans, W. C. (2009). Trease and Evans. *Pharmacognosy*. Saunders Ltd. Philadelphia, USA
- Houghton, P. and Mukherjee, P. K. (2009). *Evaluation of Herbal Medicinal Products*. London, Pharmaceutical Press.

Minimum Required Teaching/Learning Resources

- Pipettes
- Mortars
- Pestles
- Spatula
- Jars
- Measuring cylinder
- Furniture
- Shelves
- Cabins
- Pallets
- Fire extinguishers
- Stock containers
- Protective gear
- Soxhlet
- Microwave
- Flasks
- Evaporating dishes
- Conical flasks
- Funnels
- Filters
- Slabs
- Hot water bath
- Distiller
- Filter equipment
- Calculators
- Hot plate
- Weighing scale
- Computers
- Printer (ordinary, label)
- Thermometer
- Refrigerator
- Bio-safety cabin
- Inspection light
- Percolator
- Capping machine
- Mixers

PHA-2181: Conducting operational Research (I)

Credit Units: 2

ModuleUnit Code	Module Unit	Contact Hours
PHA-2106	Research Methodology	30
	Total	**30**

Module Description
This module covers identification of a research problem and writing a research proposal.

Learning Outcome
By the end of this module, the student should be able to write a research proposal.

Underpinning Knowledge
For occupational theory suggested for instruction/demonstration, the teacher is not limited to the outline given. In any case, underpinning knowledge/ theory may be obtained from various recognised reference materials as appropriate

Suggestions on Organisation of Learning
The acquisition of the competences described in this module may take place at a Pharmacy training institution or its equivalent provided all equipment and materials required for training are in place. Delivery modes may include theory instruction (lectures), hands-on practice (practical) and tutorials (discussions).

Occupational Health, Safety and Environmental Concerns to be Observed

- Laws and regulations
- Safety precautions
- Putting on of protective gear
- Waste management and disposal
- Work environment
- Maintaining personal hygiene
- Use of recommended tools/equipment
- Administering first aid
- Cleaning/sanitizing tools and equipment

Work Behavior/Attitudes to be Instilled and Observed during Training

- Responsible
- Willing to learn
- Committed to the programme
- Possesses team spirit
- Hard working
- Accurate
- Social
- Industrious
- Time conscious
- Cooperative
- Ethical
- Smart
- Accountable
- Trustworthy
- Results-oriented
- Honest
- Courteous
- Humble

Reading Materials
The teacher is advised to make reference to relevant and applicable reading materials that could be in form of textbooks, publications, video clips/demonstrations, authenticated Internet sites, and any other.

Module Unit PHA-2106: Research Methodology

3.8 LWA: Develop an Operational Research Proposal

PEX 3.8.1: Identify research topic

PEX 3.8.2: Develop research proposal
PEX 3.8.3: Collect data
PEX 3.8.4: Analyse data

The underpinning theory below will be instructed as topics:

- Literature Review
- Introduction to Research
- Types of Research
- Identifying a Research Problem/Topic
- Research Design
- Statement of the Research Problem
- Sampling Techniques
- Data Collection Methods and Techniques
- Data analysis procedures
- Interpretation of research findings

Additional Reading Materials

- ESTC-EPHA/CDC PROJECT. (2004). *Training Modules on Health Research*.
- Mathers, Nigel, Howe, Amanda, and Hunn Amanda, (1998). *Trend Focus for Research and Development in Primary Health Care*. Ethical Considerations in Research.

Minimum Required Teaching/Learning Resources

- Calculators
- Computers
- Printers
- Stationery
- Reference materials (textbooks, DVDs, CDs, etc)

Year Two, Semester II

PHA-2233: Compounding Pharmaceutical Products (III)

Credit Units: 6

ModuleUnit Code	Module Unit	Contact Hours
PHA-2201	Pharmaceutics (III)	90
	Total	**90**

Module Description

Compounding pharmaceutical products is a core activity of the work life of a Pharmacy graduate. In this module, the student shall be instructed in preparation of oral solid dosage forms and topical products in form of pessaries and suppositories.

Learning Outcome

By the end of this module, the student should be able to prepare pessaries, suppositories and oral solid dosage forms.

Underpinning Knowledge

For occupational theory suggested for instruction/demonstration, the teacher is not limited to the outline given. In any case, underpinning knowledge/ theory may be obtained from various recognised reference materials as appropriate

Suggestions on Organisation of Learning

The acquisition of the competences described in this module may take place at a Pharmacy training institution or its equivalent provided all equipment and materials required for training are in place. Delivery modes may include theory instruction (lectures), hands-on practice (practical) and tutorials (discussions).

Occupational Health, Safety and Environmental Concerns to be Observed

- Laws and regulations
- Safety precautions
- Putting on of protective gear
- Waste management and disposal
- Work environment
- Maintaining personal hygiene
- Use of recommended tools/equipment
- Administering first aid
- Cleaning/sanitizing tools and equipment

Work Behavior/Attitudes to be Instilled and Observed during Training

- Responsible
- Willing to learn
- Committed to the programme
- Possesses team spirit
- Hard working
- Accurate
- Social
- Industrious
- Time conscious
- Cooperative
- Ethical
- Smart
- Accountable
- Trustworthy

- Results-oriented
- Honest
- Courteous
- Humble

Reading Materials

The teacher is advised to make reference to relevant and applicable reading materials that could be in form of textbooks, publications, video clips/demonstrations, authenticated Internet sites, and any other.

Module Unit PHA-2201: Pharmaceutics (III)

4.1 LWA: Prepare Topical Products

PEX 4.1.1: Prepare pessaries and suppositories

The underpinning theory below will be instructed as topics.

- Introduction to Preparation of Topical Products
- Definitions
- Dosage Forms and Routes of Administration
- Prescriptions, Parts of Prescriptions, Good Prescribing Practices, Latin Abbreviations
- Referencing and Reference Books
- General Scientific Principles of Dosage Form Designs
- Pharmaceutical Calculations
- Drug Solubility
- Additives/Excipients
- Methods of Preparing Solutions
- Packaging and Labelling
- Physical Stability of Pharmaceutical Suspensions
- Topical Pharmaceutical Products
- Pessaries and Suppositories
- Initiators

Additional Reading Materials

- Aulton, M. E., (1988). *Pharmaceutics: The Science of Dosage Form and Design*. London, Churchill Livinstone.
- Ansel, H. C. (2012). *Pharmaceutical Calculations*. USA, Springhouse Publishing Company.
- Jones, D. (2008). *Pharmaceutics: Dosage Form and Design*. London Pharmaceutical Press.
- Langely, C. and Belcher, D. (2007). *Pharmaceutical Compounding and Dispensing*. London, Pharmaceutical Press.

Minimum Required Teaching/Learning Resources

- Weighing scale
- Beakers
- Conical flasks
- Measuring cylinders
- Pipettes
- Stirring rods
- Porcelain mortar and pestle
- Glass mortar and pestle
- Distiller
- Hot plate
- Water bath
- Bunsen burner
- Gas cylinder
- Sintered glass filter
- Filter paper

- Containers for packaging
- Glass slab
- Spatulas
- Spoons
- Funnels
- Homogenizer
- Evaporating dish
- Thermometers
- Powder sieves
- Tabulating machine
- Trays
- Mould
- Gelatine
- Empty capsules
- Autoclave
- Ampoule cutter
- Capping machine
- Hot air oven

4.2LWA: Prepare Oral Solid Dosage Forms

PEX 4.2.1: Prepare tablets using direct compression method
PEX 4.2.2: Prepare tablets using dry granulation method
PEX 4.2.3: Prepare lozenges
PEX 4.2.4: Prepare hard gelatine capsules
PEX 4.2.5: Prepare soft gelatine capsules
PEX 4.2.6: Prepare tablets using wet granulation method

The underpinning theory below will be instructed as topics

- Introduction to Preparation of Oral Solid Dosage Forms
- Definitions
- Dosage Forms and Routes of Administration
- Prescriptions Parts of Prescriptions, Good Prescribing Practices, Latin Abbreviations
- Referencing and Reference Books
- General Scientific Principles of Dosage Form Designs
- Pharmaceutical Calculations
- Drug Solubility
- Additives/Excipients
- Methods of Preparing Oral Dosage Forms
- Packaging and Labelling
- Physical Stability of Pharmaceutical Oral Dosage Forms
- Initiators
- Oral Solid Dosage

Additional Reading Materials

- Aulton, M. E. (1988). *Pharmaceutics: The Science of Dosage Form and Design*. London, Churchill Livingstone.
- Ansel, H. C. (2012). *Pharmaceutical Calculations*. USA, Springhouse Publishing Company.
- Jones, D. (2008). *Pharmaceutics: Dosage Form and Design*. London, Pharmaceutical Press.
- Langely, C. and Belcher, D. (2007). *Pharmaceutical Compounding and Dispensing*. London, Pharmaceutical Press

Minimum Required Teaching/Learning Resources

- Weighing scale
- Beakers
- Conical flasks
- Measuring cylinders
- Pipettes
- Stirring rods
- Porcelain mortar and pestle

- Glass mortar and pestle
- Distiller
- Hot plate
- Water bath
- Bunsen burner
- Gas cylinder
- Sintered glass filter
- Filter paper
- Containers for packaging
- Glass slab
- Spatulas
- Spoons
- Funnels
- Homogenizer
- Evaporating dish
- Thermometers
- Powder sieves
- Tabulating machine
- Trays
- Mould
- Gelatine
- Empty capsules
- Autoclave
- Ampoule cutter
- Capping machine
- Hot air oven

PHA-2242: Providing Pharmaceutical Care (II)

Credit Units: 10

ModuleUnit Code	Module Unit	Contact Hours
PHA-2202	Therapeutics (I)	30
PHA-2203	Pharmacy Practice (I)	75
PHA-2204	Pharmacology (II)	45
	Total	**150**

Module Description

This module covers pharmacology of cardiovascular, renal, respiratory, central nervous and GIT system drugs, therapeutics, specifically management of musculoskeletal, GIT and skin diseases. It also covers dispensing of medicines, liaison with prescribers, patient counselling on medication use as well as management of simple and self-limiting conditions.

Learning Outcome

By the end of this module, the student should be able to provide rational drug therapy in a caring and competent manner.

Underpinning Knowledge

For occupational theory suggested for instruction/demonstration, the teacher is not limited to the outline given. In any case, underpinning knowledge/ theory may be obtained from various recognised reference materials as appropriate

Suggestions on Organisation of Learning

The acquisition of the competences described in this module may take place at a Pharmacy training institution or its equivalent provided all equipment and materials required for training are in place. Delivery modes may include theory instruction (lectures), hands-on practice (practical) and tutorials (discussions).

Occupational Health, Safety and Environmental Concerns to be Observed

- Laws and regulations
- Safety precautions
- Putting on of protective gear
- Waste management and disposal
- Work environment
- Maintaining personal hygiene

- Use of recommended tools/equipment
- Administering first aid
- Cleaning/sanitizing tools and equipment

Work Behavior/Attitudes to be Instilled and Observed during Training

- Responsible
- Willing to learn
- Committed to the programme
- Possesses team spirit
- Hard working
- Accurate
- Social
- Industrious
- Time conscious
- Cooperative
- Ethical
- Smart
- Accountable
- Trustworthy
- Results-oriented
- Honest
- Courteous
- Humble

Reading Materials

The teacher is advised to make reference to relevant and applicable reading materials that could be in form of textbooks, publications, video clips/demonstrations, authenticated Internet sites, and any other.

Module Unit PHA-2202: Therapeutics (I)

4.3 LWA: Therapeutics (I)

Sub-topic 4.3.1: Management of Musculoskeletal Diseases
Sub-topic 4.3.2: Management of GIT Diseases
Sub-topic 4.3.3: Management of Skin Diseases

The underpinning theory below will be instructed as topics

- Rational Medicine Use
- Human Body Structure
- Drug Interactions
- Management of Diseases (Pathophysiology of Diseases)
- Clinical Manifestations of Diseases
- Diagnosis of Diseases
- Infectious Diseases
- System Pharmacology
- Normal Functioning of Body Systems and Diseases e.g. GIT, respiratory system, cardiovascular system, renal system, central nervous system, endocrine system, reproductive system, autonomic nervous system, ear, nose and throat (ENT), dermatological conditions
- Basic Principles of Toxicology
- Etiology and Epidemiology of Diseases
- Management of Diseases (treatment, prevention)

Additional Reading Materials

- Katzung, B. G. (2012). *Basic and Clinical Pharmacology*. USA, McGrow-hill Medical.
- Rang, P. H. (2011). *Rang and Dale's Pharmacology*. London, Churchill Livingstone.

- Green, R. J. and Harris, N. D. (2008). *Pathology and Therapeutics for Pharmacists*. A Basic of Clinical Pharmacy Practice. London, Pharmaceutical Press.

Minimum Required Teaching/LearningResources

- Formulary manuals
- Textbooks
- BP machines
- Thermometers

Module UnitPHA-2203: Pharmacy Practice (I)

4.4 LWA: Introduction to Pharmacy Practice

Sub-topic 4.4.1: History of Pharmacy Practice in Uganda
Sub-topic 4.4.2: Trends in Pharmacy Practice
Sub-topic 4.4.3: Challenges in Pharmacy Practice
Sub-topic 4.4.4: Medical Ethics
Sub-topic 4.4.5: Work Environment (Pharmaceutical)
Sub-topic 4.4.6: Drug and Pharmaceutical Industry

Additional Reading Materials

- Winfred, A.J. and Richards, M.E. (2005). *Pharmaceutical Practice*. 3rd Ed.
- Stone, P. and Curtis. J.S. (1989). *Pharmacy Practice.*

Minimum Required Teaching and Learning Resources

- Textbooks
- DVDs, CDs, etc.
- Patients
- Stationery

4.5. Learning-Working Assignment: Dispense Medicines

PEX 4.5.1: Receive prescription
PEX 4.5.2: Validate prescription
PEX 4.5.3: Prepare medicines for issue
PEX 4.5.4: Pack medicines
PEX 4.5.5: Label medicines
PEX 4.5.6: Record medicines
PEX 4.5.7: Issue medicines with appropriate information

The underpinning theory below will be instructed as topics.

- Rational Medicine Use
- Dispensing Process
- Prescription
- Packaging and Labelling
- Medical Ethics
- Chemotherapeutic Drugs
- Basic Principles of Toxicology

Additional Reading Materials

- Management Sciences for Health (2013). *Managing Access to Medicines and Health Technologies*. USA, Kumarian Press.

Minimum Required Teaching/Learning Resources

- Formulary manuals
- Textbooks
- BP machines
- Thermometers

4.6 Learning-Working Assignment: Liaise with Prescribers and other Members of the Health Care Team

PEX 4.6.1: Discuss the roles of the different healthcare professionals
PEX 4.6.2: Share drug information with the prescribers
PEX 4.6.3: Share drug information with nurses
PEX 4.6.4: Refer client

The underpinning theory below will be instructed as topics:

- Rational Medicine Use
- Medical Ethics

Additional Reading Materials

- Management Sciences for Health (2013). *Managing Access to Medicines and Health Technologies*. USA, Kumarian Press.

Minimum Required Teaching/Learning Resources

- Formulary manuals
- Textbooks
- BP machines
- Thermometers

4.7 Learning-Working Assignment: Counsel Patients on Medication Use

PEX 4.7.1: Provide information on drug interactions
PEX 4.7.2: Provide information on adverse drug effects
PEX 4.7.3: Provide information in order to promote adherence to treatment
PEX 4.7.4: Provide information on proper medication storage

The underpinning theory below will be instructed as topics:

- Rational Medicine Use
- Medical Ethics

Additional Reading Materials

- Management Sciences for Health (2013). *Managing Access to Medicines and Health Technologies*. USA, Kumarian Press.

Minimum Required Teaching/Learning Resources

- Formulary manuals
- Textbooks
- BP machines
- Thermometers

4.8 Learning-Working Assignment: Manage Simple and Self-limiting conditions

PEX 4.8.1: Evaluate signs and symptoms of self-limiting conditions
PEX 4.8.2: Treat simple self-limiting conditions
PEX 4.8.3: Supply medication
PEX 4.8.4: Provide first aid to clients
PEX 4.8.5: Perform simple tests (malaria, HCG, BP, RBS)

The underpinning theory below will be instructed as topics:

- Rational Medicine Use
- Medical Ethics

Additional Reading Materials

- Management Sciences for Health (2013). *Managing Access to Medicines and Health Technologies*. USA, Kumarian Press.

Minimum Required Teaching/Learning Resources

- Formulary manuals
- Textbooks
- BP machines
- Thermometers

Module Unit PHA-2204: Pharmacology (II)

4.9 Learning-Working Assignment: Pharmacology (II)

Sub-topic 4.9.1: Cardiovascular and Renal Drugs
Sub-topic 4.9.2: Respiratory Drugs
Sub-topic 4.9.3: Central Nervous System Drugs
Sub-topic 4.9.4: GIT Pharmacology

The underpinning theory below will be instructed as a topic:

- System Pharmacology

Additional Reading Materials

- Katzung, B. G. (2012). *Basic and Clinical Pharmacology*. USA, McGrow-hill Medical.
- Rang, P. H. (2011). *Rang and Dale's Pharmacology*. London, Churchill Livingstone.
- Green, R. J. & Harris, N. D. (2008). *Pathology and Therapeutics for Pharmacists. A Basic of Clinical Pharmacy Practice*. London, Pharmaceutical Press.

Minimum Required Teaching/Learning Resources

- Formulary manuals
- Textbooks e.g. Lippincott
- BP machines
- Thermometers

PHA-2253: Performing Analytical Procedures (III)

Credit Units: 3

ModuleUnit Code	Module Unit	Contact Hours
PHA-2205	Pharmaceutical Chemistry	45
	Total	**45**

Module Description

This module equips the student with the key skills to enable him/her carry out chemical analytical procedures. Different types of titrations shall be handled in this module.

Learning Outcome

By the end of this module, the student should be able to analyse pharmaceutical products using chemical analytical methods.

Underpinning Knowledge
For occupational theory suggested for instruction/demonstration, the teacher is not limited to the outline given. In any case, underpinning knowledge/ theory may be obtained from various recognised reference materials as appropriate

Suggestions on Organisation of Learning
The acquisition of the competences described in this module may take place at a Pharmacy training institution or its equivalent provided all equipment and materials required for training are in place. Delivery modes may include theory instruction (lectures), hands-on practice (practical) and tutorials (discussions).

Occupational Health, Safety and Environmental Concerns to be Observed

- Laws and regulations
- Safety precautions
- Putting on of protective gear
- Waste management and disposal
- Work environment
- Maintaining personal hygiene
- Use of recommended tools/equipment
- Administering first aid
- Cleaning/sanitizing tools and equipment

Work Behavior/Attitudes to be Instilled and Observed during Training

- Responsible
- Willing to learn
- Committed to the programme
- Possesses team spirit
- Hard working
- Accurate
- Social
- Industrious
- Time conscious
- Cooperative
- Ethical
- Smart
- Accountable
- Trustworthy
- Results-oriented
- Honest
- Courteous
- Humble

Reading Materials
The teacher is advised to make reference to relevant and applicable reading materials that could be in form of textbooks, publications, video clips/demonstrations, authenticated Internet sites, and any other.

Module Unit.PHA-2205: Pharmaceutical Chemistry (III)

4.10 LWA: Carry Out Chemical Methods of Analysis on Pharmaceutical Products

PEX 4.10.1: Analyse pharmaceutical products using argentimetric titrations
PEX 4.10.2: Analyse pharmaceutical products using redox titrations
PEX 4.10.3: Analyse pharmaceutical products using iodometric titrations
PEX 4.10.4: Analyse pharmaceutical products using complexiметric titrations

PEX 4.10.5: Analyse pharmaceutical products using non-aqueous titrations

The underpinning theory below will be instructed as topics

- Terminology
- Accuracy and Precision
- Repeatability and Reproducibility
- Sops
- Compound Random Errors
- Reporting of Results
- Qualitative Analysis of Pharmaceutical Products
- Measuring of Optical Rotation
- Partition Coefficient
- Buffers
- Calculation of pH Value of Aqueous Solutions of Strong and Weak Acids and Bases
- Acidic and Basic Strength and PKa
- Henderson-Hasselbalch Equation
- Factors Governing Radiation in the Uv/Visible Region
- Beer-Lambert's Law
- Instrumentation of uv, ir and NMR
- Principles of Chromatography
- Types of Chromatography
- Application of Chromatographic Techniques in Analysis
- Principles of Potentiomerty, Polarigraphy, Refractometry
- Specific Gravity
- Direct Acid/Base Titrations in the Aqueous Phase
- Indirect Titrations in Aqueous Phase
- Non-Aqueous Titrations
- Principles of Argentrimetric, Redox, Iodometric, Complex Metric Titrations
- Determination of Ash Value, Water Content, Extractive Value and Crude Fibre Content
- Organoleptic Characteristics
- Measures of Optional Rotation

Additional Reading Materials

- House, J. E. (2012). *Inorganic Chemistry*. USA, Academic Press, Cambridge.
- Graham, S. T. W and Fryhle, G. B. (2007). *Organic Chemistry*. USA, John Wiley and Sons.
- Quin, L. D. and Tyrel, J. A. (2010). *Fundamentals of Heterocyclic Chemistry: Importance in Nature and in the Synthesis of Pharmaceuticals*. Wiley Blackwell.

Minimum Required Teaching/Learning Resources

- Spectrophotometer
- Colorimeter
- Beakers
- Pipettes
- Test tubes and test tube holders
- Bunsen burner/heating apparatus
- Spatula
- Slimming rods
- Funnels
- Flasks
- TLC plates
- Filter paper
- Glassware
- HPLC machine
- PH meter
- Polarimeter
- Refractometer
- Conical flasks
- Measuring cylinders

- Racks
- Stand
- Chromatography drums/beakers
- Weighing scale
- Inspection light
- Soxhlet extraction apparatus
- Bio-safety cabins
- Chemical raw material
- Labels
- Protective gear
- Eluents
- Fresh distilled water
- Sonicator
- Reagents

PHA-2272: Extracting and Standardising Crude Drugs (II)

Credit Units: 3

ModuleUnit Code	Module Unit	Contact Hours
PHA-2206	Pharmacognosy (II)	45
	Total	**45**

Module Description

This Module covers the extraction and standardisation of volatile oils. The module emphasises enfluerage, sporge extraction, ecuelle a piquer, cold expression and machine abrasion techniques.

Learning Outcome

By the end of this part of module, the student should be able to extract volatile oils.

Underpinning Knowledge

For occupational theory suggested for instruction/demonstration, the teacher is not limited to the outline given. In any case, underpinning knowledge/ theory may be obtained from various recognised reference materials as appropriate

Suggestions on Organisation of Learning

The acquisition of the competences described in this module may take place at a Pharmacy training institution or its equivalent provided all equipment and materials required for training are in place. Delivery modes may include theory instruction (lectures), hands-on practice (practical) and tutorials (discussions).

Occupational Health, Safety and Environmental Concerns to be Observed

- Laws and regulations
- Safety precautions
- Putting on of protective gear
- Waste management and disposal
- Work environment
- Maintaining personal hygiene
- Use of recommended tools/equipment
- Administering first aid
- Cleaning/sanitizing tools and equipment

Work Behavior/Attitudes to be Instilled and Observed during Training

- Responsible
- Willing to learn
- Committed to the programme
- Possesses team spirit
- Hard working
- Accurate

- Social
- Industrious
- Time conscious
- Cooperative
- Ethical
- Smart
- Accountable
- Trustworthy
- Results-oriented
- Honest
- Courteous
- Humble

Reading Materials

The teacher is advised to make reference to relevant and applicable reading materials that could be in form of textbooks, publications, video clips/demonstrations, authenticated Internet sites, and any other.

Module UnitPHA-2206: Pharmacognosy (II)

4.11 Learning- Working Assignment: Extraction of Volatile Oils using:

PEX 4.11.1: Steam distillation
PEX 4.11.2: Enfluerage
PEX 4.11.3: Sporge extraction
PEX 4.11.4: Cold expression
PEX 4.11.5: Ecuelle a piquer
PEX 4.11.6: Machine abrasion
PEX 4.11.7: Standardised extracts

The underpinning theory below will be instructed as topics:

Introduction to Extraction of Crude Drugs
Metabolic Pathways of Drugs
Sources of Crude Drugs (Minerals)
Storage of Crude Products
Quality Assurance
Dilutions
Recording Pharmaceutical Products
Equipment for Extraction of Crude Drugs
Standardisation Methods of Crude Drugs
Crude Drugs Extraction Methods

Additional Reading Materials

- Evans, W. C. (2009). *Trease and Evans Pharmacognosy*. USA, Saunders Ltd.
- Houghton, P. and Mukherjee, P. K. (2009). *Evaluation of Herbal Medicinal Products*. London, Pharmaceutical Press.

Minimum Required Teaching/Learning Resources

- Pipettes
- Mortars
- Pestles
- Spatula
- Jars
- Measuring cylinder
- Furniture
- Shelves
- Cabins
- Pallets
- Fire extinguishers
- Stock containers
- Protective gear
- Soxhlet
- Microwave

- Flasks
- Evaporating dishes
- Conical flasks
- Funnels
- Filters
- Slabs
- Hot water bath
- Distiller
- Filter equipment
- Calculators
- Hot plate
- Weighing scale
- Computers
- Printer (ordinary, label)
- Thermometer
- Refrigerator
- Bio-safety cabin
- Inspection light
- Percolator
- Capping machine
- Mixers

Year Three, Semester I

PHA-3134: Compounding Pharmaceutical Products (IV)

Credit Units:

ModuleUnit Code	Module Unit	Contact Hours
PHA-3101	Pharmaceutics (IV)	90
	Total	**90**

Module Description

Compounding Pharmaceutical Products is a core activity of the work life of a Pharmacy graduate. In this module, the student will be instructed in preparation of topical products (eye, ear, nasal drops, eye ointments and inhalations), and parenteral products applying different techniques.

Learning Outcome

By the end of this module, the student should be able to prepare dosage forms that include topical products (eye, ear, nasal drops, eye ointments and inhalations), and parenteral products.

Underpinning Knowledge

For occupational theory suggested for instruction/demonstration, the teacher is not limited to the outline given. In any case, underpinning knowledge/ theory may be obtained from various recognised reference materials as appropriate

Suggestions on Organisation of Learning

The acquisition of the competences described in this module may take place at a Pharmacy training institution or its equivalent provided all equipment and materials required for training are in place. Delivery modes may include theory instruction (lectures), hands-on practice (practical) and tutorials (discussions).

Occupational Health, Safety and Environmental Concerns to be Observed

- Laws and regulations
- Safety precautions
- Putting on of protective gear
- Waste management and disposal
- Work environment
- Maintaining personal hygiene
- Use of recommended tools/equipment
- Administering first aid
- Cleaning/sanitizing tools and equipment

Work Behavior/Attitudes to be Instilled and Observed during Training

- Responsible
- Willing to learn
- Committed to the programme
- Possesses team spirit
- Hard working
- Accurate
- Social
- Industrious
- Time conscious
- Cooperative
- Ethical
- Smart

- Accountable
- Trustworthy
- Results-oriented
- Honest
- Courteous
- Humble

Reading Materials

The teacher is advised to make reference to relevant and applicable reading materials that could be in form of textbooks, publications, video clips/demonstrations, authenticated Internet sites, and any other.

Module Unit PHA-3101: Pharmaceutics (IV)

5.1 Learning-Working Assignment: Prepare Topical Products

PEX 5.1.1: Prepare eye, ear and nasal drops
PEX 5.1.2: Prepare eye ointments
PEX 5.1.3: Prepare inhalations

The underpinning theory below will be instructed as topics.

- Introduction to Preparation of Topical Products
- Definitions
- Dosage Forms and Routes of Administration
- Prescriptions, Parts of Prescriptions, Good Prescribing Practices, Latin Abbreviations
- Referencing and Reference Books
- General Scientific Principles of Dosage Form Designs
- Pharmaceutical Calculations
- Containers and Labelling
- General Description of Pharmaceutical Topical Products
- Drug Solubility
- Additives/Excipients
- Packaging and Labelling
- Eye/Ear Drops/Ointments
- Initiators

Additional Reading Materials

- Aulton, M. E. (1988). *Pharmaceutics: The Science of Dosage Form and Design*. London, Churchill Livinstone.
- Ansel, H. C. (2012). *Pharmaceutical Calculations*. USA, Springhouse Publishing Company.
- Jones, D. (2008). *Pharmaceutics: Dosage Form and Design.* London, Pharmaceutical Press.
- Langely, C. and Belcher, D. (2007). *Pharmaceutical Compounding and Dispensing*. London, Pharmaceutical Press.

Minimum Required Teaching/Learning Resources

- Weighing scale
- Beakers
- Conical flasks
- Measuring cylinders
- Pipettes
- Stirring rods
- Porcelain mortar and pestle
- Glass mortar and pestle
- Distiller
- Hot plate
- Water bath
- Bunsen burner
- Gas cylinder
- Sintered glass filter
- Filter paper

- Containers for packaging
- Oven
- Glass slab
- Spatulas
- Spoons
- Funnels
- Homogenizer
- Evaporating dish
- Thermometers
- Powder sieves
- Tabulating machine
- Trays
- Mould
- Gelatine empty capsules
- Autoclave
- Ampoule cutter
- Capping machine
- Hot air

5.2 Learning-Working Assignment: Prepare Parenteral Products

PEX 5.2.1: Sterilised by moist heat
PEX 5.2.2: Sterilised by filtration method
PEX 5.2.3: Using aseptic techniques

The underpinning theory below will be instructed as topics

- Introduction to Preparation of Parenteral Products
- Definitions
- Dosage Forms and Routes of Administration
- Prescriptions Parts of Prescriptions, Good Prescribing Practices, Latin Abbreviations
- Referencing and Reference Books
- General Scientific Principles of Dosage Form Designs
- Pharmaceutical Calculations
- Containers and Labelling
- General Description of Parenteral Pharmaceutical Products
- Drug Solubility
- Additives/Excipients
- Packaging and Labelling

Additional Reading Materials

- Aulton, M. E. (1988). *Pharmaceutics: The Science of Dosage Form and Design*. Churchill Livinstone, London, UK
- Ansel, H. C. (2012). *Pharmaceutical Calculations*. Springhouse Publishing Company, USA
- Jones, D. (2008). *Pharmaceutics: Dosage Form and Design*. Pharmaceutical Press, London, UK
- Langely, C. and Belcher, D. (2007). *Pharmaceutical Compounding and Dispensing*. Pharmaceutical Press, London, UK.

Minimum Required Teaching/Learning Resources

- Weighing scale
- Beakers
- Conical flasks
- Measuring cylinders
- Pipettes
- Stirring rods
- Porcelain mortar & pestle
- Glass mortar & pestle
- Distiller
- Hot plate
- Water bath
- Bunsen burner
- Gas cylinder
- Sintered glass filter
- Filter paper
- Containers for packaging
- Glass slab
- Spatulas
- Spoons
- Funnels
- Homogenizer
- Evaporating dish
- Thermometers
- Powder sieves
- Tabulating machine
- Trays
- Mould

- Gelatine empty capsules
- Autoclave
- Ampoule cutter
- Capping machine
- Hot air oven

PHA-3134: Providing Pharmaceutical Care (III)

Credit Units: 8

ModuleUnit Code	Module Unit	Contact Hours
PHA-3102	Therapeutics (II)	60
PHA-3103	Pharmacology (III)	60
	Total	**120**

Module Description

This module covers therapeutics of the nervous system, respiratory system diseases and blood disorders as well as chemotherapy.

Learning Outcome

By the end of this module, the student should be able to manage diseases of nervous system, respiratory system and blood disorders as well as chemotherapy.

Underpinning Knowledge

For occupational theory suggested for instruction/demonstration, the teacher is not limited to the outline given. In any case, underpinning knowledge/ theory may be obtained from various recognised reference materials as appropriate

Suggestions on Organisation of Learning

The acquisition of the competences described in this module may take place at a Pharmacy training institution or its equivalent provided all equipment and materials required for training are in place. Delivery modes may include theory instruction (lectures), hands-on practice (practical) and tutorials (discussions).

Occupational Health, Safety and Environmental Concerns to be Observed

- Laws and regulations
- Safety precautions
- Putting on of protective gear
- Waste management and disposal
- Work environment
- Maintaining personal hygiene
- Use of recommended tools/equipment
- Administering first aid
- Cleaning/sanitizing tools and equipment

Work Behavior/Attitudes to be Instilled and Observed during Training

- Responsible
- Willing to learn
- Committed to the programme
- Possesses team spirit
- Hard working
- Accurate
- Social
- Industrious
- Time conscious
- Cooperative

- Ethical
- Smart
- Accountable
- Trustworthy
- Results-oriented
- Honest
- Courteous
- Humble

Reading Materials

The teacher is advised to make reference to relevant and applicable reading materials that could be in form of textbooks, publications, video clips/demonstrations, authenticated Internet sites, and any other.

Module Unit PHA-3102: Therapeutics (II)

5.3 Learning -Working Assignment: Therapeutics (II)

Sub-topic 5.3.1: Management of Diseases of the Nervous System
Sub-topic 5.3.2: Management of Respiratory System Diseases
Sub-topic 5.3.3: Management of Blood Disorders
Sub-topic 5.3.4: Management of Infectious Diseases

The underpinning theory below will be instructed as topics:

- Rational Medicine Use
- Human Body Structure
- Drug Interactions
- Management of Diseases (Pathophysiology of Diseases)
- Clinical Manifestations of Diseases
- Diagnosis of Diseases
- Medical Ethics
- Chemotherapeutic Drugs
- Normal Functioning of Body System and Diseases e.g. Respiratory System, Nervous System
- Etiology and Epidemiology of Diseases
- Management of Diseases (Treatment, Prevention)

Additional Reading Materials

- Katzung, B. G. (2012). *Basic and Clinical Pharmacology*. McGrow-hill Medical, USA
- Rang, P. H. (2011). *Rang and Dale's Pharmacology*. Churchill Livingstone. London. UK.
- Green, R. J. and Harris, N. D. (2008). *Pathology and Therapeutics for Pharmacists. A Basic of Clinical Pharmacy Practice.* Pharmaceutical Press. London. UK

Minimum Required Teaching/Learning Resources

- Formulary manuals
- Textbooks
- BP machines
- Thermometers

Module Unit.PHA-3103: Pharmacology (III)

5.4 Learning-Working Assignment: Pharmacology (III)

Sub-topic 5.4.1: Chemotherapy (anti-infectives and anti-neoplastics)

The underpinning theory listed below will be instructed as topics:

- System Pharmacology
- Inflammation
- Chemotherapeutic Drugs

Additional Reading Materials

- Katzung, B. G. (2012). *Basic and Clinical Pharmacology*. McGrow-hill Medical, USA
- Rang, P. H. (2011). *Rang and Dale's Pharmacology*. Churchill Livingstone. London. UK.
- Green, R. J. and Harris, N. D. (2008). *Pathology and Therapeutics for Pharmacists. A Basic of Clinical Pharmacy Practice*. Pharmaceutical Press. London. UK

Minimum Required Teaching/Learning Resources

- Formulary manuals
- Textbooks
- BP machines
- Thermometers

PHA-3161: Managing Medicines and Supplies Chain

Credit Units: 3

ModuleUnit Code	Module Unit	Contact Hours
PHA-3104	Pharmacy Practice (II)	45
	Total	**45**

Module Description

This module is intended to equip the student with skills to manage supplies as well as be able to participate in different roles of the supply chain. Procurement procedures of medicines and supplies shall be outlined in detail and specific roles at the different nodes of the supply chain shall be discussed. These include receiving medicines and supplies, distribution of medicines and medical supplies, maintenance of medical supply records as well as disposal of pharmaceutical waste. Selection of medicines using either treatment guidelines, essential drugs list as well as using formulary manuals shall be covered.

Learning Outcome

By the end of this module, the student should be able to select, quantify, procure, receive, store, distribute and dispose of medicines and supplies. The student should also be able to maintain medicines and supplies records.

Underpinning Knowledge

For occupational theory suggested for instruction/demonstration, the teacher is not limited to the outline given. In any case, underpinning knowledge/ theory may be obtained from various recognised reference materials as appropriate

Suggestions on Organisation of Learning

The acquisition of the competences described in this module may take place at a Pharmacy training institution or its equivalent provided all equipment and materials required for training

are in place. Delivery modes may include theory instruction (lectures), hands-on practice (practical) and tutorials (discussions).

Occupational Health, Safety and Environmental Concerns to be Observed

- Laws and regulations
- Safety precautions
- Putting on of protective gear
- Waste management and disposal
- Work environment
- Maintaining personal hygiene
- Use of recommended tools/equipment
- Administering first aid
- Cleaning/sanitizing tools and equipment

Work Behavior/Attitudes to be Instilled and Observed during Training

- Responsible
- Willing to learn
- Committed to the programme
- Possesses team spirit
- Hard working
- Accurate
- Social
- Industrious
- Time conscious
- Cooperative
- Ethical
- Smart
- Accountable
- Trustworthy
- Results-oriented
- Honest
- Courteous
- Humble

Reading Materials

The teacher is advised to make reference to relevant and applicable reading materials that could be in form of textbooks, publications, video clips/demonstrations, authenticated Internet sites, and any other.

Module Unit PHA-3104: Pharmacy Practice (II)

5.5 Learning-Working Assignments: Select Medicines and Supplies using:

PEX 5.5.1: Treatment guidelines
PEX 5.5.2: Essential medicines list
PEX 5.5.3: Formulary manuals

The underpinning theory below will be instructed as topics:

- Computer Applications
- Kit System
- Quality Assurance in Management of Medicines and Supplies
- Inventory Management
- Storage of Medicines and Supplies
- Procurement of Medicines and Health Supplies
- Quantification of Medicines and Health Supplies
- Selection of Medicines and Health Supplies

Additional Reading Materials

- *Managing Access to Medicines and Health Technologies*. Management Sciences for Health

- Essential medicines lists
- Formulary manuals

Minimum Required Teaching/Learning Resources

- Treatment guidelines
- Formulary manuals
- Essential drug list
- Stock card
- Bin card
- Ledger books
- Kardex
- Stock book
- Patient attendance registers
- Purchase order book
- Inventory book
- Prescription book
- Classified drug book
- Batch manufacturing records and SOPs
- Computers
- Issue vouchers and requisitions
- Dispensing log

5.6 Learning-Working Assignments: Quantify Medicines and Supplies using:

PEX 5.6.1: Consumption method
PEX 5.6.2: Morbidity method
PEX 5.6.3: Adjusted consumption method
PEX 5.6.4: Service level projection of budget requirements
PEX 5.6.5: Apply Vital Essential Non-essential (VEN) system
PEX 5.6.6: Apply ABC analysis
PEX 5.6.7: Apply therapeutic category method
PEX 5.6.8: Conduct price comparison analysis

The underpinning theory below will be instructed as topics

- Computer Applications
- Quality Assurance in Management of Medicines and Supplies
- Inventory Management
- Storage of Medicines and Supplies
- Procurement of Medicines and Health Supplies
- Techniques of Cost Reduction
- Quantification of Medicines and Health Supplies
- Selection of Medicines and Health Supplies

Additional Reading Materials

- *Managing Access to Medicines and Health Technologies*. Management Sciences for Health

Minimum Required Teaching/Learning Resources

- Treatment guidelines
- Formulary manuals
- Essential drug list
- Stock card
- Bin card
- Ledger books
- Kardex
- Stock book
- Patient attendance registers
- Purchase order book
- Inventory book
- Prescription book
- Classified drug book
- Batch manufacturing records and SOPs
- Computers

- Issue vouchers and requisitions
- Dispensing log
- Textbook MSH Pt 1, Pt II & Pt III

5.7 Learning-Working Assignments: Procure Medicines and Supplies using:

PEX 5.7.1: Open tender
PEX 5.7.2: Restricted tender
PEX 5.7.3: Competitive negotiation
PEX 5.7.4: Direct procurement

The underpinning theory below will be instructed as topics:

- Computer Applications
- Kit System
- Transport Management
- Pharmaceutical Waste Management
- Quality Assurance in Management of Medicines and Supplies
- Inventory Management
- Storage of Medicines and Supplies
- Distribution Channels of Medicines and Health Supplies
- Procurement of Medicines and Health Supplies
- Techniques of Cost Reduction
- Quantification of Medicines and Health Supplies
- Selection of Medicines and Health Supplies

Additional Reading Materials

- *Managing Access to Medicines and Health Technologies*. Management Sciences for Health

Minimum Required Teaching/Learning Resources

- Treatment guidelines
- Formulary manuals
- Essential drug list
- Stock card
- Bin card
- Ledger books
- Kardex
- Stock book
- Patient attendance registers
- Purchase order book
- Inventory book
- Prescription book
- Classified drug book
- Batch manufacturing records and SOPs
- Computers
- Issue vouchers and requisitions
- Dispensing log
- Textbook MSH Pt 1, Pt II & Pt III

5.8 Learning-Working Assignments: Receive Medicines and Supplies such as

PEX 5.8.1: Tablets and capsules, oral liquid dosage topical preparations
PEX 5.8.2: Cold chain products
PEX 5.8.3: Corrosives and flammables
PEX 5.8.4: Controlled medicines, pharmaceuticals and health supplies
PEX 5.8.5: Glass wares and other equipment

The underpinning theory below will be instructed as topics.

- Computer Applications
- Kit System
- Transport Management
- Pharmaceutical Waste Management
- Quality Assurance in Management of Medicines and Supplies
- Inventory Management
- Storage of Medicines and Supplies
- Distribution Channels of Medicines and Health Supplies
- Procurement of Medicines and Health Supplies
- Techniques of Cost Reduction
- Quantification of Medicines and Health Supplies
- Selection of Medicines and Health Supplies

Additional Reading Materials

- *Managing Access to Medicines and Health Technologies*. Management Sciences for Health

Minimum Required Teaching/Learning Resources

- Treatment guidelines
- Formulary manuals
- Essential drug list
- Stock card
- Bin card
- Ledger books
- Kardex
- Stock book
- Patient attendance registers
- Purchase order book III
- Inventory book
- Prescription book
- Classified drug book
- Batch manufacturing records and SOPs
- Computers
- Issue vouchers and requisitions
- Dispensing log
- Textbook MSH Pt 1, Pt II & Pt III

5.9 Learning-Working Assignments: Store Medicines and Supplies

PEX 5.9.1: Label storage area based on use/application, type of drug/medicine
PEX 5.9.2: Store cold chain products
PEX 5.9.3: Store corrosives and flammables
PEX 5.9.4: Store controlled medicines e.g. class A and B medicines
PEX 5.9.5: Apply FIFO/FEFO on stock rotation

The underpinning theory below will be instructed as topics:

- Computer Applications
- Kit System
- Pharmaceutical Waste Management
- Quality Assurance in Management of Medicines and Supplies
- Inventory Management
- Storage of Medicines and Supplies
- Procurement of Medicines and Health Supplies

Additional Reading Materials

- *Managing Access to Medicines and Health Technologies*. Management Sciences for Health

Minimum Required Teaching/Learning Resources

- Essential drug list
- Stock card
- Bin card
- Ledger books
- Kardex
- Stock book
- Patient attendance registers
- Inventory book
- Classified drug book
- Batch manufacturing records and SOPs
- Computers
- Issue Vouchers and Requisitions
- Textbook MSH Pt 1, Pt II and Pt III

5.10 Learning-Working Assignments: Distribute Medicines and Supplies using:

PEX 5.10.1: Delivery and collection systems of transport
PEX 5.10.2: Pull system
PEX 5.10.3: Push system
PEX 5.10.4: Ward stock system
PEX 5.10.5: Individual drug orders
PEX 5.10.6: Unit dose system

The underpinning theory below will be instructed as topics:

- Computer Applications
- Kit System
- Transport Management
- Pharmaceutical Waste Management
- Quality Assurance in Management of Medicines and Supplies
- Inventory Management
- Storage of Medicines and Supplies
- Distribution Channels of Medicines and Health Supplies
- Techniques of Cost Reduction
- Selection of Medicines and Health Supplies

Additional Reading Materials

- *Managing Access to Medicines and Health Technologies*. Management Sciences for Health

Minimum Required Teaching/Learning Resources

- Treatment guidelines
- Essential drug list
- Stock card
- Bin card
- Ledger books
- Kardex
- Stock book
- Patient attendance registers
- Purchase order book, inventory book
- Prescription book
- Classified drug book
- Batch manufacturing records, SOPs
- Computers
- Issue Vouchers and Requisitions
- Dispensing log
- MSH Textbook Pts I, II, and III

5.11 Learning-Working Assignment: Maintain Medicines and Supplies Records

PEX 5.11.1: Establish and maintain stock book
PEX 5.11.2: Establish and maintain stock cards
PEX 5.11.3: Establish and maintain ledger system
PEX 5.11.4: Apply electronic inventory management system

The underpinning theory below will be instructed as topics:

- Computer Applications
- Kit System
- Quality Assurance in Management of Medicines and Supplies
- Inventory Management
- Storage of Medicines and Supplies
- Distribution Channels of Medicines and Health Supplies
- Procurement of Medicines and Health Supplies
- Techniques of Cost Reduction
- Quantification of Medicines and Health Supplies
- Selection of Medicines and Health Supplies

Additional Reading Materials

- *Managing Access to Medicines and Health Technologies*. Management Sciences for Health

Minimum Required Teaching/Learning Resources

- Treatment guidelines
- Bin card
- Ledger books
- Kardex
- Stock book
- Patient attendance registers
- Purchase order book
- Formulary manuals
- Inventory book
- Prescription book
- Classified drug book
- Batch manufacturing records and SOPS
- Essential drug list
- Stock card
- Computers
- Issue vouchers and requisitions
- Dispensing log

5.12 Learning-Working Assignment: Dispose ofPharmaceutical Waste by:

PEX 5.12.1: Incineration (combustion or burning)
PEX 5.12.2: Chemical methods
PEX 5.12.3: Landfill
PEX 5.12.4: Encapsulation
PEX 5.12.5: Soak pit
PEX 5.12.6: Recycling

The underpinning theory below will be instructed as topics:

- Computer Applications
- Transport Management

- Pharmaceutical Waste Management
- Quality Assurance in Management of Medicines and Supplies
- Storage of Medicines and Supplies

Additional Reading Materials

- *Managing Access to Medicines and Health Technologies*. Management Sciences for Health

Minimum Required Teaching/Learning Resources

- Treatment guidelines
- Formulary manuals
- Essential drug list
- Stock card
- Bin card
- Ledger books
- Kardex
- Stock book
- Patient attendance registers
- Purchase order book
- Inventory book
- Prescription book
- Classified drug book
- Batch manufacturing records and SOPS
- Computers
- Issue vouchers and requisitions

PHA-3173: Extracting and Standardising Crude Drugs (III)

Credit Units: 4

ModuleUnit Code	Module Unit	Contact Hours
PHA-3105	Pharmacognosy (III)	60
	Total	**60**

Module Description

This Module covers the extraction and standardisation of volatile oils. The module emphasises enfluerage, sporge extraction, ecuelle a piquer, cold expression and machine abrasion techniques. Analysis, packaging and labelling crude drugs shall also be taught.

Learning Outcome

By the end of this part of module, the student should be able to extract volatile oils, analyse, pack and label crude drugs.

Underpinning Knowledge

For occupational theory suggested for instruction/demonstration, the teacher is not limited to the outline given. In any case, underpinning knowledge/ theory may be obtained from various recognised reference materials as appropriate

Suggestions on Organisation of Learning

The acquisition of the competences described in this module may take place at a Pharmacy training institution or its equivalent provided all equipment and materials required for training are in place. Delivery modes may include theory instruction (lectures), hands-on practice (practical) and tutorials (discussions).

Occupational Health, Safety and Environmental Concerns to be Observed

- Laws and regulations
- Safety precautions
- Putting on of protective gear
- Waste management and disposal
- Work environment
- Maintaining personal hygiene
- Use of recommended tools/equipment
- Administering first aid
- Cleaning/sanitizing tools and equipment

Work Behavior/Attitudes to be Instilled and Observed during Training

- Responsible
- Willing to learn
- Committed to the programme
- Possesses team spirit
- Hard working
- Accurate
- Social
- Industrious
- Time conscious
- Cooperative
- Ethical
- Smart
- Accountable
- Trustworthy
- Results-oriented
- Honest
- Courteous
- Humble

Reading Materials

The teacher is advised to make reference to relevant and applicable reading materials that could be in form of textbooks, publications, video clips/demonstrations, authenticated Internet sites, and any other.

Module Unit PHA-3105: Pharmacognosy (III)

5.13 Learning- Working Assignment: Extraction of Volatile Oils using:

PEX 5.13.1: Steam distillation
PEX 5.13.2: Enfluerage
PEX 5.13.3: Sponge extraction
PEX 5.13.4: Cold expression
PEX 5.13.5: Ecuelle a piquer
PEX 5.13.6: Machine abrasion
PEX 5.13.7: Standardised extracts

The underpinning theory below will be instructed as topics:

- Introduction to Extraction of Crude Drugs
- Metabolic Pathways of Drugs
- Sources of Crude Drugs (Minerals)
- Storage of Crude Products
- Quality Assurance
- Dilutions
- Recording Pharmaceutical Products
- Equipment for Extraction of Crude Drugs
- Standardisation Methods of Crude Drugs
- Crude Drugs Extraction Methods

Additional Reading Materials

- Evans, W. C. (2009). *Trease and Evans Pharmacognosy*. USA, Saunders Ltd.
- Houghton, P. and Mukherjee, P. K. (2009). *Evaluation of Herbal Medicinal Products*. London,Pharmaceutical Press.

Minimum Required Teaching/Learning Resources

- Pipettes
- Mortars
- Pestles
- Spatula
- Jars
- Measuring cylinder
- Furniture
- Shelves
- Cabins
- Pallets
- Fire extinguishers
- Stock containers
- Protective gear
- Soxhlet
- Microwave
- Flasks
- Evaporating dishes
- Conical flasks
- Funnels
- Filters
- Slabs
- Hot water bath
- Distiller
- Filter equipment
- Calculators
- Hot plate
- Weighing scale
- Computers
- Printer (ordinary, label)
- Thermometer
- Refrigerator
- Bio-safety cabin
- Inspection light
- Percolator
- Capping machine
- Mixers

5.14 LWA: Carryout Specific Methods of Analysis on Pharmaceutical Products

PEX 5.14.1: Determine ash values of pharmaceutical products
PEX 5.14.2: Determine water content of pharmaceutical products
PEX 5.14.3: Determine extractive value
PEX 5.14.4: Determine crude fibre contents of pharmaceutical products

The underpinning theory below will be instructed as topics:

- Metabolic Pathways of Drugs
- Storage of Crude Products
- Quality Assurance
- Dilutions
- Recording Pharmaceutical Products
- Equipment for Extraction of Crude Drugs
- Standardisation Methods of Crude Drugs

Additional Reading Materials

- Evans, W. C. (2009). *Trease and Evans Pharmacognosy*. USA, Saunders Ltd.
- Houghton, P. and Mukherjee, P. K. (2009). *Evaluation of Herbal Medicinal Products*. London,Pharmaceutical Press.

Minimum Required Teaching/Learning Resources

- Pipettes
- Mortars
- Pestles
- Spatula
- Jars
- Measuring cylinder

- Furniture
- Shelves
- Cabins
- Pallets
- Fire extinguishers
- Stock containers
- Protective gear
- Soxhlet
- Microwave
- Flasks
- Evaporating dishes
- Conical flasks
- Funnels
- Filters
- Slabs
- Hot water bath
- Distiller
- Filter equipment
- Calculators
- Hot plate
- Weighing scale
- Computers
- Printer (ordinary, label)
- Thermometer
- Refrigerator
- Bio-safety cabin
- Inspection light
- Percolator
- Capping machine
- Mixers

5.15 Learning-Working Assignment: Pack and Label Crude Drugs

PEX 5.15.1: Pack and label solid crude drugs
PEX 5.15.2: Pack and label liquid crude drugs
PEX 5.15.3: Store crude drugs

The underpinning theory below will be instructed as topics:

- Sources of Crude Drugs (Minerals, Animal, Plants)
- Storage of Crude Products
- Quality Assurance
- Packaging and Labelling Crude Drugs
- Recording Pharmaceutical Products

Additional Reading Materials

- Evans, W. C. (2009). *Trease and Evans Pharmacognosy*. USA, Saunders Ltd.
- Houghton, P. and Mukherjee, P. K. (2009). *Evaluation of Herbal Medicinal Products*. London,Pharmaceutical Press.

Minimum Required Teaching/Learning Resources

- Pipettes
- Spatula
- Jars
- Measuring cylinder
- Furniture
- Shelves
- Cabins
- Pallets
- Fire extinguishers
- Stock containers
- Protective gear
- Soxhlet
- Microwave
- Flasks
- Evaporating dishes
- Conical flasks
- Funnels
- Filters
- Slabs
- Hot water bath
- Distiller
- Filter equipment
- Calculators
- Hot plate
- Weighing scale
- Computers
- Printer (ordinary, label)
- Thermometer
- Refrigerator
- Bio-safety cabin
- Inspection light
- Percolator
- Capping machine
- Mixers

PHA-3191: Managing Pharmaceutical Units (I)

Credit Units: 2

ModuleUnit Code	Module Unit	Contact Hours
PHA-3106	General Pharmacy Management	30
	Total	**30**

Module Description

In this module, the student shall be instructed in the essential elements of operating an efficient pharmaceutical unit. The module emphasises the key aspects of formulation as well as adherence to Standard Operating Procedures. It covers the guidelines in the management of pharmaceutical outlets in line with established policies and regulations. Important management functions such as development of work schedules, resource mobilisation, human resource planning (hands-on management operations) shall be handled.

Learning Outcome

By the end of this module, the student should be able to manage a pharmaceutical unit within the jurisdiction as per legal requirements.

Underpinning Knowledge

For occupational theory suggested for instruction/demonstration, the teacher is not limited to the outline given. In any case, underpinning knowledge/ theory may be obtained from various recognised reference materials as appropriate

Suggestions on Organisation of Learning

The acquisition of the competences described in this module may take place at a Pharmacy training institution or its equivalent provided all equipment and materials required for training are in place. Delivery modes may include theory instruction (lectures), hands-on practice (practical) and tutorials (discussions).

Occupational Health, Safety and Environmental Concerns to be Observed

- Laws and regulations
- Safety precautions
- Putting on of protective gear
- Waste management and disposal
- Work environment
- Maintaining personal hygiene
- Use of recommended tools/equipment
- Administering first aid
- Cleaning/sanitizing tools and equipment

Work Behavior/Attitudes to be Instilled and Observed during Training

- Responsible
- Willing to learn
- Committed to the programme
- Possesses team spirit
- Hard working
- Accurate
- Social
- Industrious
- Time conscious
- Cooperative
- Ethical
- Smart
- Accountable
- Trustworthy

- Results-oriented
- Honest
- Courteous
- Humble

Reading Materials

The teacher is advised to make reference to relevant and applicable reading materials that could be in form of textbooks, publications, video clips/demonstrations, authenticated Internet sites, and any other.

Module Unit PHA-3106: (General Pharmacy Management)

5.16. Learning-Working Assignment: CarryoutManagement Functions

PEX 5.16.1: Mobilise resources e.g. finances, manpower, materials, information
PEX 5.16.2: Develop work schedule
PEX 5.16.3: Organise, schedule and chair meetings
PEX 5.16.4: Schedule continued professional development (CPD)
PEX 5.16.5: Promote socialisation culture
PEX 5.16.6: Supervise staff
PEX 5.16.7: Appraise staff
PEX 5.16.8: Coach and mentor staff
PEX 5.16.9: Counsel staff PEX 5.16.10: Motivate staff

The underpinning theory below will be instructed as topics:

- Managerial Skills
- Management of Pharmaceutical Inventory
- Counselling
- Storage of Medical Supplies
- Record Keeping
- Communication Skills
- Pharmaceutical References
- Management of Pharmaceutical Stores
- Medicine Supply Chain
- Regulations Governing Pharmacy Practice
- Functions of Management
- Waste Disposal

Additional Reading Materials

- Jones, G. R. and George, J. M. (2014). *Essentials of Contemporary Management*. McGrow-Hill
- Ojaki. M. (2015). *Management- A technical Approach*. 2nd Ed. Maepo Enterprises Ltd, Kampala Uganda.

Minimum Required Teaching/LearningResources

- Calculators
- Computers
- Printers
- Cabins
- Fire extinguishers
- Protective gear
- Motivational CDs/DVDs

5.17 Learning-Working Assignment: OrganisePharmaceutical Unit

PEX 5.17.1: Clean pharmaceutical unit
PEX 5.17.2: Dispose of waste
PEX 5.17.3: Arrange pharmaceutical unit
PEX 5.17.4: Label pharmaceutical unit
PEX 5.17.5: Maintain hygiene in the pharmaceutical unit
PEX 5.17.6: Disinfect/fumigate pharmaceutical unit
PEX 5.17.7: Extinguish fire

The underpinning theory below will be instructed as topics:

- Packing and Labelling
- Management of Pharmaceutical Inventory
- Storage
- Record Keeping
- Communication Skills
- Pharmaceutical References
- Management of Pharmaceutical Stores
- Medicine Supply Chain
- Regulations Governing Pharmacy Practice
- Characteristics of Pharmaceutical Ingredients
- Prescription
- Pharmaceutical Equipment
- Waste Disposal

Additional Reading Materials

- Jones, G. R. and George, J. M. (2014). *Essentials of Contemporary Management*. McGrow-Hill
- Ojaki. M. (2015). *Management- A technical Approach*. 2nd Ed. Maepo Enterprises Ltd, Kampala Uganda.

Minimum Required Teaching/LearningResources

- Computers
- Printers
- Cabins
- Shelves
- Furniture
- Fire extinguishers
- Ointment packing materials
- Labels
- Stock containers
- Stationery
- Protective gear

5.18 Learning-Working Assignment: Develop Standard Operating Procedures (SOPs)

PEX 5.18.1: Develop SOPs on manufacturing practices
PEX 5.18.2: Develop SOPs on dispensing
PEX 5.18.3: Develop SOPs on storage of medicines and supplies
PEX 5.18.4: Develop SOPs on compounding
PEX 5.18.5: Develop SOPs on extraction

PEX 5.18.6: Develop SOPs on pharmaceutical disposal
PEX 5.18.7: Develop SOPs on receiving

The underpinning theory below will be instructed as topics:

- Storage
- Therapeutics
- Pharmaceutical Chemistry
- Record Keeping
- Communication Skills
- Compounding
- Primary Health Care
- Pharmaceutical Care
- Pharmaceutical References
- Management of Pharmaceutical Stores
- Medicine Supply Chain
- Regulations Governing Pharmacy Practice
- Characteristics of Pharmaceutical Ingredients
- Dispensing
- Prescription
- Pharmaceutical Equipment
- Functions of Management
- Waste Disposal

Additional Reading Materials

- Jones, G. R. and George, J. M. (2014). *Essentials of Contemporary Management*. McGrow-Hill

Minimum Required Teaching/LearningResources

- Computers
- Printers
- Furniture
- Fire extinguishers
- Stationery
- Protective gear

Year Three, Semester II

PHA-3244: Providing Pharmaceutical Care (IV)

Credit Units:

ModuleUnit Code	Module Unit	Contact Hours
PHA-3201	Therapeutics (II)	60
PHA-3202	Pharmacology (IV)	75
	Total	**135**

Module Description

This module covers therapeutics of cardiovascular disorders, central nervous system as well as endocrine and reproductive system diseases. Covered also is pharmacology of respiratory, blood, inflammation, gout, gastro intestinal tract (GIT), endocrine and reproductive systems.

Learning Outcome

By the end of this module, the student should be able to provide rational drug therapy in a caring and competent manner.

Underpinning Knowledge

For occupational theory suggested for instruction/demonstration, the teacher is not limited to the outline given. In any case, underpinning knowledge/ theory may be obtained from various recognised reference materials as appropriate

Suggestions on Organisation of Learning

The acquisition of the competences described in this module may take place at a Pharmacy training institution or its equivalent provided all equipment and materials required for training are in place. Delivery modes may include theory instruction (lectures), hands-on practice (practical) and tutorials (discussions).

Occupational Health, Safety and Environmental Concerns to be Observed

- Laws and regulations
- Safety precautions
- Putting on of protective gear
- Waste management and disposal
- Work environment
- Maintaining personal hygiene
- Use of recommended tools/equipment
- Administering first aid
- Cleaning/sanitizing tools and equipment

Work Behavior/Attitudes to be Instilled and Observed during Training

- Responsible
- Willing to learn
- Committed to the programme
- Possesses team spirit
- Hard working
- Accurate
- Social
- Industrious
- Time conscious
- Cooperative
- Ethical
- Smart
- Accountable
- Trustworthy

- Results-oriented
- Honest
- Courteous
- Humble

Reading Materials

The teacher is advised to make reference to relevant and applicable reading materials that could be in form of textbooks, publications, video clips/demonstrations, authenticated Internet sites, and any other.

Module Unit. PHA-3201: Therapeutics (III)

6.1. Learning-Working Assignment: Therapeutics

Sub-topic 6.1.1: Management of cardiovascular and renal diseases
Sub-topic 6.1.2: Management of central nervous system diseases
Sub-topic 6.1.3: Management of endocrine and reproductive system diseases

The underpinning theory below will be instructed as topics:

- Rational Medicine Use
- Drug Interactions
- Management of Diseases (Pathophysiology of Diseases)
- Clinical Manifestations of Diseases
- Diagnosis of Diseases
- Infectious Diseases
- Inflammation
- Medical Ethics
- Basic Principles of Toxicology
- Etiology and Epidemiology of Diseases
- Management of Diseases (Treatment, Prevention)

Additional Reading Materials

- Management Sciences for Health, 2013.*Managing Access to Medicines and Health Technologies*. USA, Kumarian Press.
- Green, R. J., Harris, N. D. (2008). *Pathology and Therapeutics for Pharmacists. A Basic of Clinical Pharmacy Practice*. London, Pharmaceutical Press.

Minimum Required Teaching/Learning Resources

- Formulary manuals
- Textbooks
- BP machines
- Thermometers

Module Unit PHA-3202: Pharmacology (IV)

6.2 Learning-Working Assignment: Pharmacology (IV)

Sub-topic 6.2.1: Blood, Inflammation and Gout Drugs
Sub-topic 6.2.2: Endocrine and Reproductive System Drugs

The underpinning theory listed below will be instructed as topics:

- System Pharmacology
- Inflammation

- Chemotherapeutic Drugs

Additional Reading Materials

- Katzung, B. G. (2012). *Basic and Clinical Pharmacology*. McGrow-hill Medical, USA
- Rang, P. H. (2011). *Rang and Dale's Pharmacology*. Churchill Livingstone. London. UK.
- Green, R. J. and Harris, N. D. (2008). *Pathology and Therapeutics for Pharmacists. A Basic of Clinical Pharmacy Practice.* Pharmaceutical Press. London. UK

Minimum Required Teaching/Learning Resources

- Formulary manuals
- Textbooks e.g. Lippincott
- BP machines
- Thermometers

PHA-3291: Managing Pharmaceutical Units (II)

Credit Units: 8

ModuleUnit Code	Module Unit	Contact Hours
PHA-32203	Pharmacy Practice (III)	75
PHA-3204	Pharmacy Laws and Regulations	45
	Total	**120**

Module Description

In this module, the student shall be instructed in the essential elements of operating an efficient pharmaceutical unit. The module emphasizes pharmacy laws and regulations. It covers the guidelines in starting and the management of pharmaceutical outlets in line with established policies and regulations including dispensing medicines extemporaneously.

Learning Outcome

By the end of this module, the student should be able to start and manage a pharmaceutical unit within the jurisdiction as per legal requirements and dispense medicines extemporaneously.

Underpinning Knowledge

For occupational theory suggested for instruction/demonstration, the teacher is not limited to the outline given. In any case, underpinning knowledge/ theory may be obtained from various recognized reference materials as appropriate

Suggestions on Organisation of Learning

The acquisition of the competences described in this module may take place at a Pharmacy training institution or its equivalent provided all equipment and materials required for training are in place. Delivery modes may include theory instruction (lectures), hands-on practice (practical) and tutorials (discussions).

Occupational Health, Safety and Environmental Concerns to be Observed

- Laws and regulations
- Safety precautions
- Putting on of protective gear
- Waste management and disposal
- Work environment
- Maintaining personal hygiene

- Use of recommended tools/equipment
- Administering first aid
- Cleaning/sanitizing tools and equipment

Reading Materials

The teacher is advised to make reference to relevant and applicable reading materials that could be in form of textbooks, publications, video clips/demonstrations, authenticated Internet sites, and any other.

Module Unit PHA-3203: (Pharmacy Practice (III)

6.3: Learning-Working Assignment: Dispense Medicines Extemporaneously

PEX 6.3.1: Receive prescription
PEX 6.3.2: Validate prescription
PEX 6.3.3: Prepare extemporaneous medicines for issue
PEX 6.3.4: Pack extemporaneous medicines
PEX 6.3.5: Label extemporaneous medicines
PEX 6.3.6: Record extemporaneous medicines
PEX 6.3.7: Issue extemporaneous medicines with appropriate information

The underpinning theory below will be instructed as topics:

- Rational Medicine Use
- Dispensing Process
- Prescription
- Packaging and Labelling
- Pharmacokinetics and Pharmacodynamics
- Drug Interactions
- System Pharmacology
- Inflammation
- Medical Ethics

Additional Reading Materials

- Management Sciences for Health (2013). *Managing Access to Medicines and Health Technologies*. USA, Kumarian Press.

Minimum Required Teaching/Learning Resources

- Dispensing log
- Prescriptions
- Formulary manuals
- BP machines
- Thermometers
- Pharmacy Act

Module Unit PHA-3204: (Pharmacy Laws and Regulations)

6.4:LWA: Manage Pharmaceutical outlet in accordance with established regulations

(PEXs may be executed in form of role-plays)

PEX 6.4.1: Introduction to pharmacy laws and regulations
PEX 6.4.2: Establishing suitability of premises and location
PEX 6.4.3: Determining scope of practice
PEX 6.4.4: Performing quality assurance
PEX 6.4.5: Generating inspection reports (post market survey, pre-inspection, staffing/qualification/licenses, numbers, drug inspection book)

The underpinning theory below will be instructed as topics:

- Pharmacy Laws and Regulations
- Management of Pharmaceutical Inventory
- Record Keeping
- Communication Skills
- Pharmaceutical References
- Management of Pharmaceutical Stores
- Medicine Supply Chain
- Regulations Governing Pharmacy Practice
- Dispensing
- Waste Disposal

Additional Reading Materials

- Jones, G. R. and George, J. M. (2014). *Essentials of Contemporary Management*. McGrow-Hill

Minimum Required Teaching/Learning Resources

- Computers
- Printers
- Furniture
- Fire extinguishers
- Stationery
- Protective gear

6.5: LWA: Start a Pharmacy Business (Project)

PEX 6.5.1: Prepare premises for a pharmacy business
PEX 6.5.2: Compile documentation for a pharmacy business
PEX 6.5.3: Stock pharmacy business
PEX 6.5.4: Serve customers in a pharmacy business
PEX 6.5.5: Offer customer feedback

The underpinning theory below will be instructed as topics:

- Business Registration
- Legal/Regulatory Requirements
- Business Principles
- Business Records
- Stock Management

Additional Reading Materials

- Shteyn, E. and Shtein, M., (2013). *Scalable Innovation: A Guide to Inventors, Entrepreneurs and IP Professionals*. USA, CRC Press.
- Ries, E., (2011). *The Lean Start-Up: How Today's Entrepreneur Uses Continuous Innovation to Create Radically Successful Businesses*. USA, Crown Business.
- Drucker, P. F., (2006). *Innovation and Entrepreneurship*. USA, Harper Business.
- Uganda National Policy and Drug Act, 1993
- Uganda Allied Health Professional Act, 1996

Minimum Required Teaching/Learning Resources

- Computer
- Computer business packages
- Books
- Pens/pencils,
- Communication tools
- Calculators
- Printer

PHA-3282: Conducting Operational Research (II)

Credit Units: 2

ModuleUnit Code	Module Unit	Contact Hours
PHA-3205	Research Report	30
	Total	**30**

Module Description

This module covers writing and presenting a research report

Learning Outcome

By the end of this module, the student should be able to write a research report.

Underpinning Knowledge

For occupational theory suggested for instruction/demonstration, the teacher is not limited to the outline given. In any case, underpinning knowledge/ theory may be obtained from various recognised reference materials as appropriate

Suggestions on Organisation of Learning

The acquisition of the competences described in this module may take place at a Pharmacy training institution or its equivalent provided all equipment and materials required for training are in place. Delivery modes may include theory instruction (lectures), hands-on practice (practical) and tutorials (discussions).

Occupational Health, Safety and Environmental Concerns to be Observed

- Laws and regulations
- Safety precautions
- Putting on of protective gear
- Waste management and disposal
- Work environment
- Maintaining personal hygiene
- Use of recommended tools/equipment
- Administering first aid
- Cleaning/sanitizing tools and equipment

Work Behavior/Attitudes to be Instilled and Observed during Training

- Responsible
- Willing to learn
- Committed to the programme
- Possesses team spirit
- Hard working
- Accurate
- Social
- Industrious
- Time conscious
- Cooperative
- Ethical
- Smart
- Accountable
- Trustworthy
- Results-oriented
- Honest
- Courteous
- Humble

Reading Materials

The teacher is advised to make reference to relevant and applicable reading materials that could be in form of textbooks, publications, video clips/demonstrations, authenticated Internet sites, and any other.

Module Unit PHA-3205: Research Report

6.6. Learning-Working Assignment: Write a Research Report

PEX 6.6.1: Write research report
PEX 6.6.2: Present/defend research report

The underpinning theory below will be instructed as topics:

- Data Presentation
- Discussion of Results
- Conclusions and Recommendations
- Referencing Methods

Additional Reading Materials

- ESTC-EPHA/CDC PROJECT. (2004*). Training Modules on Health Research*.
- Mathers, Nigel, Howe, Amanda, and Hunn Amanda (1998). *Trent Focus for Research and Development in Primary Health Care*. Ethical Considerations in Research.

Minimum Required Teaching/Learning Resources

- Calculator
- Computers
- Printers
- Stationary
- Reference materials (textbooks, DVDs, CDs, etc.)

PHA-32101: Establishing a Pharmaceutical Enterprise (Business)

Credit Units: 3

ModuleUnit Code	Module Unit	Contact Hours
PHA-3206	Entrepreneurship	45
	Total	**45**

Module Description
This module covers the development of enterprise plans, market studies as well as business communications. The student shall be taught preparation of business plans, and generation of business documents such as invoices and vouchers. The student shall be inducted in the accounting procedures of pharmaceutical enterprises and how to assess profitability to ensure business success.

Learning Outcome
By the end of this module, the student should be able to establish and run a pharmaceutical enterprise (Business) as per legal requirements.

Underpinning Knowledge
For occupational theory suggested for instruction/demonstration, the teacher is not limited to the outline given. In any case, underpinning knowledge/ theory may be obtained from various recognised reference materials as appropriate

Suggestions on Organisation of Learning
The acquisition of the competences described in this module may take place at a Pharmacy training institution or its equivalent provided all equipment and materials required for training are in place. Delivery modes may include theory instruction (lectures), hands-on practice (practical) and tutorials (discussions).

Occupational Health, Safety and Environmental Concerns to be Observed

- Laws and regulations
- Safety precautions
- Putting on of protective gear
- Waste management and disposal
- Work environment
- Maintaining personal hygiene
- Use of recommended tools/equipment
- Administering first aid
- Cleaning/sanitizing tools and equipment

Reading Materials
The teacher is advised to make reference to relevant and applicable reading materials that could be in form of textbooks, publications, video clips/demonstrations, authenticated Internet sites, and any other.

Module Unit PHA-3206: Entrepreneurship
Some PEXS will be role plays
6.7. Learning-Working Assignments: Develop Enterprise Plans
PEX 6.7.1: Develop a business plan
PEX 6.7.2: Develop a marketing plan
PEX 6.7.3: Develop a resource mobilisation plan
PEX 6.7.4: Develop a procurement plan
PEX 6.7.5: Develop a recruitment plan

The underpinning theory below will be instructed as topics:

- Business Plan
- Marketing Plan
- Resource Mobilisation Plan
- Procurement Plan
- Recruitment Plan

Additional Reading Materials

- Shteyn, E. and Shtein, M., (2013). S*calable Innovation: A Guide to Inventors, Entrepreneurs and IP Professionals*. USA, CRC Press.
- Ries, E., (2011). T*he Lean Start-Up: How Today's Entrepreneur Uses Continuous Innovation to Create Radically Successful Businesses*. USA, Crown Business.
- Drucker, P. F., (2006). *Innovation and Entrepreneurship*. USA, Harper Business.

Minimum Required Teaching/Learning Resources

- Computer
- Computer business packages
- Stationery
- Communication tools
- Calculators
- Printer

6.8. Learning-Working Assignments: Generate Financial Documents

PEX 6.8.1: Generate a budget
PEX 6.8.2: Generate books of accounts (journals, cash books)
PEX 6.8.3: Generate source documents (invoices, vouchers, receipts, LPOs, petty cash, ledgers)
PEX 6.8.4: Generate accounting statements (income statements, balance sheets, bank reconciliation)

The underpinning theory below will be instructed as topics:

- Types of Budgets
- Types of Books of Accounts
- Accounting Statements

Additional Reading Materials

- Shteyn, E. and Shtein, M., (2013). S*calable Innovation: A Guide to Inventors, Entrepreneurs and IP Professionals*. USA, CRC Press.
- Ries, E., (2011). T*he Lean Start-Up: How Today's Entrepreneur Uses Continuous Innovation to Create Radically Successful Businesses*. USA, Crown Business.
- Drucker, P. F., (2006). *Innovation and Entrepreneurship*. USA, Harper Business.

Minimum Required Teaching/Learning Resources

- Computer
- Computer business packages
- Stationery
- Communication tools
- Calculators
- Printer

6.9. Learning-Working Assignments: Conduct Market Operations

PEX 6.9.1: Conduct market research
PEX 6.9.2: Market products

PEX 6.9.3: Advertise products
PEX 6.9.4: Brand products/services
PEX 6.9.5: Observe good customer care practices

The underpinning theory below will be instructed as topics:

- Marketing Principles
- Branding
- Advertising
- Market Research
- Customer Care
- Business Communication

Additional Reading Materials

- Shteyn, E. and Shtein, M., (2013). *Scalable Innovation: A Guide to Inventors, Entrepreneurs and IP Professionals*. USA, CRC Press.
- Ries, E., (2011). T*he Lean Start-Up: How Today's Entrepreneur Uses Continuous Innovation to Create Radically Successful Businesses*. USA, Crown Business.
- Drucker, P. F., (2006). *Innovation and Entrepreneurship*. USA, Harper Business.

Minimum Required Teaching/Learning Resources

- Computer
- Computer business packages
- Books
- Pens/pencils
- Communication tools
- Calculators
- Printer

6.10. Learning-Working Assignments: Communicate with others

PEX 6.10.1: Write a curriculum vitae
PEX 6.10.2: Write minutes
PEX 6.10.3: Write technical reports
PEX 6.10.4: Write business letters
PEX 6.10.5: Write seminar/ conference/ workshop papers
PEX 6.10.6: Present papers in conferences/seminars
PEX 6.10.7: Chair a meeting
PEX 6.10.8: Build rapport
PEX 6.10.9: Provide empathy
PEX 6.10.10: Speak eloquently
PEX 6.10.11: Present self
PEX 6.10.12: Create work-friendly environment

The underpinning theory below will be instructed as topics:

- Business Principles
- Business Records
- Business Communication
- Organising Meetings
- Types of Technical/Business Reports

Additional Reading Materials

- Shteyn, E. and Shtein, M., (2013). S*calable Innovation: A Guide to Inventors, Entrepreneurs and IP Professionals*. USA, CRC Press.
- Ries, E., (2011). T*he Lean Start-Up: How Today's Entrepreneur Uses Continuous Innovation to Create Radically Successful Businesses*. USA, Crown Business.
- Drucker, P. F., (2006). *Innovation and Entrepreneurship*. USA, Harper Business.

Minimum Required Teaching/Learning Resources

- Computer
- Computer business packages
- Books
- Pens/pencils
- Communication tools
- Calculators
- Printer

Part 4: Occupational Assessment

Competence-based assessment (CBA) is a measure of one's ability to carry out a defined task. In the process, it supports occupational learning.The development of assessment instruments (test items) is critical to the success of assessment process. CBA demands objectivity in the development process of the instruments as well as in implementation of the assessment.

Assessment instruments developed should be of good quality if they are to serve the desired purpose. The criteria of quality assessment instruments include validity, objectivity, reliability, efficiency, transparency, differentiation, and comprehensiveness.

To increase the scope of assessment coverage, different types of written assessment instruments are generated/considered following the CBA development criteria. The written assessment instruments developed (samples) that are part of this curriculum include multiple choice, short answer, matching, and work sequence questions.

According to Bloom's Taxonomy, cognitive domains include remembering (knowledge), functional understanding (comprehension and application), and problem solving (analysis, synthesis, and evaluation). CBET puts more emphasis on complexity levels of functional understanding and problem solving cognitive domains in determining competence of individuals considering the competence/qualification level.

Composition of a written examination will be a mix of assessment instruments from the modules (part of the modules) covered in a particular learning period and from different cognitive domains.

Practical assessment instruments under competence-based assessment emphasize *how well* activities are performed. Attention will go beyond considering performed steps/activities to assessing the observable criteria (scoring guide for both the process and product) to determine the competence of an individual.

Following are sample assessment instruments (written and practical) for Diploma in Pharmacy. Additional assessment instruments consisting of written and practical items can be viewed from Test Item Banks managed by the recognised assessment body.

Question Type Examples

Example: Multiple Choice Type Question

Related Module: Extract and Standardize Crude Drugs

Question: What of the following methods is appropriate for separating volatile oils (select one)?

A. Steam distillation
B. Percolation
C. Soxhlet extraction
D. Maceration

Key: A

Example: Short Answer Type Question

Related Module: Manage Medicine and Supplies

Question: State two limitations for each of the following pharmaceutical and health supplies quantification methods.

A. Consumption

1._____
2._____

B. Morbidity

1._____
2._____

Key:

Consumption method

- Requires accurate consumption data
- Can perpetuate irrational drug/medicine use
- Not appropriate for starting units

Morbidity method

- Morbidity data not available for all diseases
- Accurate attendance is not easy to predict
- Standard treatment may not be followed
- Requires accurate morbidity data

Example: Matching Type Question

Related Module: Manage Pharmaceutical Unit

Question: Match the following medicines to the description statements.

Medicines	**Description**
A. Thyroglobulin	1. Exempted drug
B. Kanamycin	2. Class B2 Medicine
C. Pethidine	3. Manufactured under supervision of the doctor
D. Hyoscine	4. Class B1 Medicine
	5. Kept under lock and key
	6. Class C1 medicine

Key: A3, B4, C5, D6

Example: Work Sequence Type Question

Related Module: Compound Pharmaceutical Products

Question: Re-arrange the work steps below in a sequential order of preparing 500mls of a sterile intravenous solution containing 0.9% sodium chloride.

Work steps in mixed/wrong order

A. Transfer solution into final container
B. Weigh sodium chloride
C. Dissolve sodium chloride in 300ml with freshly distilled water
D. Visually inspect the contents of the final container
E. Top up to 500ml through the filter in a measuring cylinder
F. Filter the solution into a measuring cylinder
G. Sterilise by autoclaving at 121°C for 30 minutes
H. Polish and label the product
I. Calculate quantities for 500ml

Key:

6th step
2nd step
3rd step
8th step
5th step
4th step
7th step
9th step
1st step

Example: Practical Type Question

Uganda Allied Health Examination Board	Performance Question
Qualification	Diploma in Pharmacy
Question code no.	
Question	Prepare eight (8) 2gm theobroma suppositories containing 125mg Paracetamol for baby Pexy on ward 16
Related Module	Compound Pharmaceutical Products
Required tools, materials, and equipment	B-balance, water bath, evaporating dish, 2gm molds, scooper, spatula, stirring rods, markers/pens, paper, cotton swabs, containers, detergent
Time allocation	1 Hour
Preferred venue	Pharmacy laboratory
Remarks for candidates	Observe safety and health precautions
Remarks for Institution	Prepare laboratory for the practical. Avail reference books.

#	Assessment Criteria	Scoring Guide	Maximum Score				Comments
			Process		Result		
1	Calculating quantities of ingredients required	Calculated the total preparation quantity of 8 suppositories as 16gm (2gm x 8 suppositories)	4				
		Catered for an additional 2suppositories (2gm x 2suppositories) =4gm	4				
		Calculated the quantity of Paracetamol for 10 suppositories (125gm x 10 suppositories) =1250gm			2		
		Wrote final working formula Paracetamol - 1250gm Thiobroma - 20mg			2		
2	Selecting equipment	Selected right equipment: Class B Balance, 2gm molds, porcelain dishes, scooper, spatula, stirring rods, cotton swabs, container for products, label papers	2				
		Cleaned with detergents, nodirt			1		
		Set balance to zero before use	3				
		Covered weighing pans	1				
		Protected balance against spillages			3		
3	Weighing Ingredients	Put balance in flat position before proceeding to weigh	3				
		Wrote readings of balance in case it cannot come to zero on a paper	2				
		Used spatula/scooper to weigh Paracetamol 125mg±0 thiobroma 20gm±0			2		
		No spillages			2		
4	Lubricating the mould	Lubricated with liquid paraffin and arachis oil	2				
		No excess lubricant observed on surface	2				
5	Warming Ingredients	Warmed thiobroma, in an evaporating dish over a water bath	2				
		No spillages			1		
		Completely melted			1		
		No solid pieces seen			1		
6	Mixing ingredients	Used stirring rod	1				
		No air sacs observed	1				
		No bubbles observed	1				
		Incorporated Paracetemol into thiobroma	2				
		Uniform mixture attained	2				
		No shaking observed	1				
7	Filling the mould	Filled the mould to brim	2				
		No spillages observed	1				
8	Removing formed suppositories	Removed from the mould	1				
		No air pockets in products	2				
		No broken edges	2				
9	Packing suppositories	No damaged suppositories packed	3				
		Used container with cover	2				
10	Labelling suppositories	Labelled for pexy in the ward	1				
		Put the strength of the suppositories 2gm	1				
		Batch no.	1				
		How to use it (rectal use only)	2				
		Expiry date (2 weeks from week of manufacture)	2				
TOTAL			**70**				

Appendices

Appendix 1: List of Minimum Requirements of the Tools, Equipment, and Materials

Materials

Adsorbents
Autoclave tape
Cabins
Chemical raw materials
Containers
Eluants
Furniture
Labels
Packing materials
Pallets
Protective gear
Sanitizers
Sonicator
Stationery
Syringes
TLC plates
Towels

Tools and Equipment

Bunsen burners
Chromatography drums/beakers
Dispensing trays
Evaporating dishes
Filters
Fire extinguishers
Flasks
Funnels
Glass/porcelain slabs
Hot water bath pH meter
HPLC machine
Jars
Measuring cylinders
Mortars and pestles
Moulds
Ointment mills
Percolator
Pipettes and pipette pumps
Polarimeter
Powder sieves
Refractometer
Spatulas
Spoons
Stirring rods
Ampoule breaker
Autoclave
Bio-safety cabins
Calculators
Capping machine
Capsulator
Colorimeter
Computers
Distiller
Filter equipment
Hand dryers
Homogenizers
Hot air oven
Hot plate
Inspection light
Mixers
Printers (ordinary, labels)
Refrigerators
Sanitizers
Soxhlet
Spectrophotometer
Tableting machine
Thermometers
Weighing scales

Appendix 2: References

Adelbert, M. K, DiGangi. F. E,and Byrn S. R., (1982). *Quantitative Pharmaceutical Chemistry*. 7th Edition

BTVET Act, 2008.

Carter. (1984). *Cooper and Gunn's Dispensing for Pharmaceutical Students, 12th edition*. USA, CBS Publishers & Distributors.

DACUM Handbook

KIU- Dar es Salaam College (2011). *Curriculum for the Diploma in Pharmacy Technology Programme*.

Makerere University College of Health Sciences (2011). *Curriculum: The Bachelor of Pharmacy Degree*.Kampala, Uganda.

MOES. (2014). *Curriculum for Diploma in Pharmacy*

National Curriculum Development Centre (2014). *National Diploma in Information and Communication Technology (ICT) Syllabus*. Kampala.

The Universities and other Tertiary Institutions (grading and classification of undergraduate degrees and diplomas) regulations, 2015

Appendix 3: Panelist lists

List of Panelists - Stakeholders' Consultative Workshop

#	Name of participant	Title	Organization
1	Kamwesiga Julius	Principal Examination Officer	UAHEB
2	Kasagga Aloysius	Chairperson	AHPC
3	Kizito John Paul	Principal Dispenser	Jinja
4	Egou Augustine	Principal	Soroti School of Pharmacy
5	Nyago Musa	Dispenser	Mulago School of Pharmacy
6	Kagusa Chris. B.	Chairman, Pharmacy Board	AHP
7	Ojangole Max	Principal	Mulago School of Pharmacy
8	Obatta Paul	Principal Dispenser	Ngora
9	Dr. Mugume Francis	SMO	MoH
10	Wanyoto Agnes Flavia	Administrator	MoH
11	Nuwagira Peter	Lecturer	MUST
12	Imanirampa Lawrence	Lecturer	MUST
13	Ssebaggala Stephen	S.T. Advisor	SHRH
14	Okobet Paul	P. Tutor	SELHED
15	Tigawalana Robert	Project Officer AHP	SHRH
16	Dr. Okiria Charles	S. Lecturer	UDA
17	Mukasa Joseph	Principal Dispenser	Jinja/Wakiso District
18	Dr. Sebisubi Fred	Principal Pharmacist	MoH
19	Opio Patrick	Pharmacist	MoH
20	Bagwa Godfrey	SHRO	MoH
21	Kunya Joshua	Resource Person	Skills Initiative Uganda
22	Basalirwa Richard	Resource Person	Skills Initiative Uganda
23	Nekesa C	Resource Person	Skills Initiative Uganda

List of Panelists - Occupational Profiling

#	Name	Title	Organization	Yrs work	Contacts
1	Odecha Michael	Pharmacy Dispenser	Uganda Cancer Institute	4	0779-885100
2	Eludai Joshua	Senior Pharmacy Technician	Mbale Regional Referral Hospital	5	0784-155517
3	Mukasa Joseph	Principal Dispenser	Jinja District (Jinja Municipal)	39	0752-622406
4	Kizito John Paul	Principal Dispenser	Ministry of Health (Jinja Hospital)	36	0772-455256
5	Aceng Dorcus	Pharmacy Technician	Lira District Local Government	5	0773-143726
6	Iga Charles	Pharmacy Technician	Kawolo Hospital	20	0782-186627
7	Tino Harriet Okello	Pharmacy Technician	Lira Regional Referral Hospital	8	0782-799208

8	Isanga Umar Idi	Pharmacy Dispenser	AAR	4	0784-169472
9	Kasangaki Wilberforce	Pharmacy Technician	Rubongi Military Hospital - UPDF	2	0777-430406
10	Obatta Paul	Principal Dispenser	Ngora District Private Pharmacy	40	0772-666088

List of Panelists – Training Module Development

#	Name	Title	Organization	Contact details
1	Odecha Michael	Pharmacy Dispenser	Uganda Cancer Institute	0779-885100
2	Joseph Mukasa	Principal Dispenser	Jinja District (Jinja Minicipal)	0752-622406
3	Kizito John Paul	Principal Dispenser	Ministry of Health Jinja Hospital)	0772-455256
4	Aceng Docus	Pharmacy Technician	Lira District – Local Government	0773-143726
5	Iga Charles	Pharmacy Technician	Kawolo Hospital	0782-186627
6	Isanga Umar Idi	Pharmacy Dispenser	AAR	0784-169472
7	Kasangaki	Pharmacy	Rubongi Military	0777-430406
	Wilberforce	Technician	Hospital -UPDF	
8	Obatta Paul	Principal Dispenser	Ngora District Private Pharmacy	0772-666088
9	Ojangole Max	Principal Tutor	Pharmacy School UIAHMS	0783-992790
10	Okobet Paul	Principal Tutor	St Elizabeth - Mukono	0772-446405
11	Tumwesigye Ambrose	Tutor	Mulago	0712-807500
12	Achol James	Tutor	St Elizabeth - Mukono	0772-445456
13	Egou Augustine	Principal Tutor	SOPHTCO - Soroti	0782-050380
14	Tibikomwa Sarah	Tutor	UIAHMS Pharmacy School	0772-859089
15	Lamwaka Alice	Head of Pharmacy Programme	Gulu University	0772-588078
16	Nyago Musa	Tutor	Mulago School of Nursing	0703-150443
17	Tino Harriet Okello	Pharmacy Technician	Lira RRH	0782-799208

List of Panelists – Test Item Development

#	Name	Title	Organization	Contacts
1	Odecha Michael	Pharmacy Dispenser	Uganda Cancer Institute	0779-885100
2	Joseph Mukasa	Principal Dispenser	Jinja District (Jinja Municipal)	0752-622406
3	Kizito John Paul	Principal Dispenser	MoH (Jinja Hospital)	0772-455256
4	Charles Iga	Pharmacy Technician	Kawolo Hospital	0782-186627
5	Isanga Umar Idi	Pharmacy Dispenser	AAR	0784-169472
6	Kasangaki Wilberforce	Pharmacy Technician	Rubongi Military Hospital - UPDF	0777-430406
7	Obatta Paul	Principal Dispenser	Ngora District Private Pharmacy	0772-666088
8	James Achol	Tutor	St Elizabeth - Mukono	0772-445456
9	Egou Augustine	Principal Tutor	SOPHTCO - Soroti	0782-050380
10	Tino Harriet Okello	Pharmacy Technician	Lira RRH	0782-799208
11	Musa Nyago	Tutor	Mulago School of Nursing	0703-150443
12	Sarah Tibikomwa	Tutor	UIAHMS Pharmacy School	0772-859089
13	Paul Okobet	Principal Tutor	St Elizabeth - Mukono	0772-446403
14	Ojangole Max	Principal Tutor	UIAHMS Pharmacy School	0783-992790
15	Tumwesigye Ambrose	Tutor	Mulago	0712-807500

List of Panelists – Validation Workshop

#	Name	Title	Organization	Contacts
1	Odecha Michael	Pharmacy Dispenser	Uganda Cancer Institution	779885100
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