Pharmacognosy

1	**Course name**	**Pharmacognosy**
2	**Course Code**	**PH 104**
3	**Course type: /general/specialty/optional**	**General**
4	**Accredited units**	**4 Units (Theoretical 3 Lecture/Week** **Practical 2 hours/Week)**
5	**Educational hours**	**5hrs/week**
6	**Pre-requisite requirements**	**passed examination in Botany**
7	**Program offered the course**	**Department of Pharmacognosy**
8	**Instruction Language**	**English Language**
9	**Date of course approval**	**12/2021**

Brief Description:	Pharmacognosy is a branch of pharmaceutical sciences which focuses on drugs of herbal and natural origin. Although Pharmacognosy mostly deals with medicinal herbs, some animal products and bacterial products are also discussed in it Pharmacognosy is the oldest branch of pharmacy since humans have been producing medicines using plants and microbes for ages.	
Textbooks required for this Course:	Treas and Evans` Pharmacognosy by William Charles Evans ISBN: 9780702029332 Publication Date 2009 Additional Resources: Lectures Notes	
Course Duration	28 weeks	
Delivery	Lectures (Tools: board, data show). The lectures were added on the internet site of the faculty to be available to the students all the time as an *e*-learning. Practical Session (Tools: labs., boards, instruments, chemicals, glassware, equipment). Assignments, seminars, researches and posters.	
Course Objectives:	Upon successful completion of this course, the students should be able to - Illustrate the morphological and histological structures of different organs of medicinal plants such as leaves, Flowers, Herbs, Barks and woods, seeds, fruits, roots and rhizomes. - Discuss role of these medicinal plants in the treatment of different disease conditions. - Identify many medicinal plants microscopically in both their entire and powdered forms.	
Course Assessments	Midyear Examination	20.0%
	Practical continuous Assessment, Exam	10.0%
	Quiz, reports , presentation	10.0%
	Final practical Examination	20.0%
	Final written Examination	40.0%
	Total	100%
Content Breakdown Topical Coverage	Content Breakdown Topical Coverage	
Session 1 (Week 1)	- General Introduction to Pharmacognosy - Selection & breeding of medicinal plants. - Cultivation of medicinal plants. - Factors affecting plant growth	
Session 2 (Week 2)	- Pharmacognosical study of crude drugs - Preparation of drugs from plants to pharmaceuticals. - Adulteration. - Secondary plant metabolites. - Dusting powder.	
Session 3 (Week 3)	.**- Drugs composed of Leaves** **Introduction to Leaves.** Senna Digitalis (In detail) • Morphology. T.S, Characteristic elements in powder, active constituents, Chemical test, Uses.	
Session 4 (Week 4)	Buchu, Uvaursi, Belladonna, Stramonium, Egyptian henbane, Coca, Boldo Jaborandi, Eucalyptus, Gambier, Henna and Tea leaf. (Characteristic elements in powder, active constituents, Chemical test, Uses).	

Session 5 (Week 5)	**- Introduction to flower.** - Roman & German chamomile. Clove, (In detail) Morphology. T.S, Characteristic elements in powder, active constituents, Chemical test, Uses.
Session 6 (Week 6)	Pyrethrum, Santonica, Saffron, Safflower, Karkadeh, Lavander. (Characteristic elements in powder, active constituents, Chemical test, Uses).
Session 7 (Week 7)	**- Introduction to barks** - Cinchona, Cinnamon, Cassia and Galls. (In detail) Morphology. T.S, Characteristic elements in powder, active constituents, Chemical test, Uses.
Session 8 (Week 8)	Cascara, FrangulaQuillaia, pomegranate bark, Characteristic elements in powder, active constituents, Chemical test, Uses.
Session 9 (Week 9)	- **Introduction to wood.** - Quassia wood. (In detail) Morphology. T.S, Characteristic elements in powder, active constituents, Chemical test, Uses. Sandal and Guiacum woods**.** (Characteristic elements in powder, active constituents, Chemical test, Uses.
Session 10 (Week 10)	**-Introduction to seeds.** - Cardamom, Strophanthus, Nux vomica,(In detail),Stramonium, Colchicum, Nutmeg, Black mustard White mustard, Linseed, Fenugreek, Castor seed.
Session 11 (Week 11) **Session 12 (Week 12)** **Session 13 (Week 13)** **Session 14 (Week 14)**	**Midyear Exam**
Session 15 (Week 15)	-**Introduction to fruits** - Umbelliferous fruit Fennel, Anise, Coriander, (in detail) Ammivisnaga, Ammimajus, Caraway, Dill. Cumin, Hemlock,
Session 16 (Week 16)	Black pepper, Colocynth. Bitter orange peels, Hops.Vanilla.Capsicum, Poppy
Session 17 (Week 17)	**Introduction to subterranean organs** **Rhizomes**: Ginger, Rhubarb, In detail
Session 18 (Week 18)	Filix mass, Valerian. Podophyllum, Hydrastis, Turmeric, Colchicum.
Session 19 (Week 19)	**Roots:** Liquorice, Ipecacuanha, Rauwolfia. In detail
Session 20 (Week 20)	Senega, Marshmallow, Gentian, Jalap, Aconite. Sasaparilla
Session 21 (Week 21)	**Introduction to herbs** Hyoscyamus, Lobelia, In detail
Session 22 (Week 22	Vinca, Mentha, Thyme, Ephedra Ergot & Cannabis
Session 23 (Week 23)	**Introduction to unorganized drugs** Colophony, Aloes, Myrrh, Asafetida
Session 24 (Week 24)	Mastic Olibanum Benzoin Balsam Peru Balsam Tolu

Session 25 (Week 25)	Storax Gum acacia Gum tragacanth, Agar, Gelatin Opium
Session 26 (Week 26)	**Introduction to animal drugs** Cochineal, Cod liver oil, Cantharides, Insulin, Collagen Heparin, Beeswax, Musk, Umber.
Session 27 (Week 27)	Review
Session 28 (Week 28)	Review
	Final theoretical exam
Practical Work	1- safety rules
	2- Introduction to the Microscope, microscopical identification for starch &dusting powders.
	3- Drugs composed of Leaves a- T. S of Drug. powder. Active constituents, Chemical test, medicinal uses. Senna leaf b- Characteristic elements in Powder, Active constituents, Chemical test, medicinal uses. Digitalis, Belladonna leaf. c. Origin, Active constituents, Chemical test, medicinal uses. Eucalyptus, Boldo, Henna, Uvi-ursi,
	4-Drugs composed of Flower a. T. S of Drug. powder. Active constituents, Chemical test, medicinal uses. Clove b- Characteristic elements in Powder, Active constituents, Chemical test, medicinal uses. Chamomile. c. Origin, Active constituents, Chemical test, medicinal uses. Karkadeh, Santonica
	5-Drugs composed of Seeds a. Linseed, b. Cardemom, Nux vomica and c. Nutmeg, Fenugreek
	6-Drugs composed of Fruits a. Fennel, b. Anise, Capsicum, and c. Ammivisnage, Black pepper, Colocynth, Coriander.
	7-Drugs composed of Fruits a. Fennel, b. Anise, Capsicum, and c. Ammivisnage, Black pepper, Colocynth, Coriander.
	8-Drugs composed of Barks a. Cinchona, Galls, b. Cinnamon, Cassia, and c. Pomeograntha, Cascara. Drugs composed of Wods a. Quassia wood
	9-Drugs composed of Roots a. Liquorice, b. Squill, and c. Ipecachuana
	10-Drugs composed of Rhizomes a. Ginger, b. Rhubarb, Curcuma, and c. Curcuma
	11- Drugs composed of Unorganized Drugs Morphology Active constituents and Medicinal use Colophony, Myrrh, Acacia Arabic, Benzoin, Aloes
	12- Final practical exam.
Attendance Expectations	Students are expected to attend every session of class, arriving on time, returning from breaks promptly and remaining until class is dismissed. Absences are permitted only for medical reasons and must be supported

	with a doctor's note.
Generic Skills	The faculty is committed to ensuring that students have the full range of knowledge and skills required for full participation in all aspects of their lives, including skills enabling them to be life-long learners. To ensure graduates have this preparation, such generic skills as literacy and numeric, computer, interpersonal communications, and critical thinking skills will be embedded in all courses.
Course Change	Information contained in this course outline is correct at the time of publication. Content of the courses is revised on an ongoing basis to ensure relevance to changing educational employment and marketing needs. The instructor will endeavor to provide notice of changes to students as soon as possible. Timetable may also be revised.

Phytochemistry

1	Course name	Phytochemistry
2	Course Code	PH 203
3	Course type: /general/specialty/optional	General
4	Accredited units	4 units (Theoretical 3 Lecture/Week Practical 2 hours/Week)
5	Educational hours	5hrs/week
6	Pre-requisite requirements	passed examination in Pharmacognosy
7	Program offered the course	Department of Pharmacognosy
8	Instruction Language	English Language
9	Date of course approval	12/2021

Brief Description:	**Phytochemistry** is a branch of pharmaceutical sciences which study the phytochemicals, derived from plants. Phytochemists strive to describe the structures of the large number of secondary metabolites found in plants, the functions of these compounds in human and plant biology, and the biosynthesis of these compounds. The compounds found in plants are of many kinds, but most can be grouped into four major biosynthetic classes: alkaloids, phenylpropanoids, polyketides, and terpenoids.
Textbooks required for this Course:	Treas and Evans` Pharmacognosy by William Charles Evans ISBN: 9780702029332 Publication Date 2009 Additional Resources: Lectures Notes
Course Duration	72 hours
Delivery	- Lectures (Tools: board, data show). -Tutorials and group discussions. -Assignments (if applicable), seminars, researches and posters. -Videos. - Practical classes (Lab experiments+ computerized experiments simulation). The lectures are added on the internet site of the faculty to be available to the students all the time as an *e*-learning.
Course Objectives:	Upon successful completion of this course, the students should illustrate the 2ry plant metabolites. The student should be able to: • Give an account on the chemistry, biological activity of volatile oils, carbohydrates, alkaloids, glycosides, bitter principles, tannins and resins. • Describe the mechanism of action of these biologically active components and their structureactivity relationship. • Recognize or draw the chemical structure of such biologically active compounds. • Enumerate the physical and chemical properties of active and inactive chemicals. • Define the role of these medicinal plants in the treatment of different diseased conditions • Illustrate the concepts of chemistry of biologically active natural products e.g. volatile oil, carbohydrates, alkaloids, glycosides, bitter principles, tannins and resins.
Course Assessments	Midyear Examination: 20.0% Quizzes, reports, presentation: 10.0% Practical continuous Assessment, Exam: 10.0% Final practical Examination: 20.0% Final written Examination: 40.0% Total: 100.0%
Content Breakdown Topical Coverage	Content Breakdown Topical Coverage
Session 1 (Week 1)	- General Introduction to Phytochemistry - Techniques commonly used in the field of Phytochemistry: study of general biosynthetic pathways, extraction and isolation of natural products
Session 2 (Week 2)	- Introduction to the volatile oil.

	- Methods of extraction - Biosynthesis - Physical and chemical properties - Classification
Session 3 (Week 3)	- Terpene volatile oil - Non-cyclic mono and sequiterpenes. - Cyclic mono and sesquiterpenes.
Session 4 (Week 4)	- Oxygenated terpene volatile oil - Non-cyclic mono and sequiterpenes. - Cyclic mono and sesqyiteroenes.
Session 5 (Week 5)	- Phenolic volatile oil - General Properties of Terpene Phenols - Classification The terpene phenols
Session 6 (Week 6)	- Introduction to the Alkaloids. - Naming and History. - Classifications - Physical and chemical Properties - Distribution in nature - Extraction - Biosynthesis
Session 7 (Week 7)	- Protoalkaloids", which contain nitrogen (but not the nitrogen heterocycle). - Phenylalkyl amine alkaloids
Session 8 (Week 8)	- True alkaloids" contain nitrogen in the heterocyclic and originate from amino acids. - Pyridine alkaloids - Pyrrolizidine alkaloids - Pipperine alkaloids
Session 9 (Week 9)	- Quinoline alkaloids - Isoquinoline alkaloids - Quinolizidine alkaloids
Session 10 (Week 10)	-**Tropane alkaloids** - Atropene group. - Cacain group.
Session 11 (Week 11)	Midyear Exam
Session 12 (Week 12)	
Session 13 (Week 13)	
Session 14 (Week 14)	
Session 15 (Week 15)	- Pseudoalkaloids – alkaloid-like compounds that do not originate from amino acids. - Purine-like alkaloids such as caffeine, theobromine and theophylline

Session 16 (Week 16)	- Terpen-like and steroid-like alkaloids
Session 17 (Week 17)	- Introduction of carbohydrate - Classification - Biosynthesis - Reactions and uses
Session 18 (Week 18)	- Introduction of glycosides. - Naming and History. - Classifications - Physical and chemical Properties - Distribution in nature - Extraction - Biosynthesis
Session 19 (Week 19)	- Alcoholic glycosides - Cyanogenic glycosides - Phenolic glycosides
Session 20 (Week 20)	- Anthraquinone glycosides - Coumarin glycosides
Session 21 (Week 21)	Flavonoid glycosides - Classification - Physical and chemical properties - Pharmacological activities.
Session 22 (Week 22)	Saponin glycosides - Classification - Physical and chemical properties - Pharmacological activities.
Session 23 (Week 23)	Tannins
Session 24 (Week 24)	Bitter principles
Session 25 (Week 25)	Resin and resin combination
Session 28 (Week 28)	Review
Session 28 (Week 28)	Review
Session 28 (Week 28)	Review
	Final theoretical exam
Practical Work	1-Safety rules
	2-Identification of some selected alkaloids by General tests and specific tests: Ephedrine, Atropine, Caffeine, Papaverine, Strychnine, Brucine, Quinine
	3-Distillation of volatile oil (Mentha herb)
	4-Determination of Phenol content in clove oil (Cassia Flask)
	5-Determination of Thymol content in Thymus oil
	6-Determination of Cineol content in Eucalyptus oil
	7-Identification different glycosides by qualitative tests

	8-Chemical test for Tannins and Saponins
	9-Identification different Carbohydrates by qualitative tests
	10-Practical Exam
Attendance Expectations	Students are expected to attend every session of class, arriving on time, returning from breaks promptly and remaining until class is dismissed. Absences are permitted only for medical reasons and must be supported with a doctor's note.
Generic Skills	The faculty is committed to ensuring that students have the full range of knowledge and skills required for full participation in all aspects of their lives, including skills enabling them to be life-long learners. To ensure graduates have this preparation, such generic skills as literacy and numeric, computer, interpersonal communications, and critical thinking skills will be embedded in all courses.
Course Change	Information contained in this course outline is correct at the time of publication. Content of the courses is revised on an ongoing basis to ensure relevance to changing educational employment and marketing needs. The instructor will endeavor to provide notice of changes to students as soon as possible. Timetable may also be revised.

Applied Pharmacognosy

1	**Course name**	**Applied Pharmacognosy**
2	**Course Code**	**PH 303**
3	**Course type: /general/specialty/optional**	**General**
4	**Accredited units**	**3 Units (Theoretical 2 Lecture/Week** **Practical 2 hours/Week)**
5	**Educational hours**	**4hrs/week**
6	**Pre-requisite requirements**	**Pharmacognosy and Phytochemistry**
7	**Program offered the course**	**Department of Pharmacognosy**
8	**Instruction Language**	**English Language**
9	**Date of course approval**	**12/2021**

Brief Description:	Upon successful completion of this course, the student should have information about formulation of herbal drug mixtures and their interaction, qualitative and quantitative evaluation of herbal medicines in addition to chromatographic techniques and its application in the isolating of active principles.
Textbooks required for this Course:	1. Trease, G.E. and Evans, W.C.; "Pharmacognosy", W.B. Saunders Publishers, Ltd, 17th ed., 2012. 2. 2D NMR spectroscopy, Silverstein. 3. Course notes 4. Lecture and practical notes prepared by instructors 5. Essential & Recommended books 6. Periodicals, Web sites, … etc 7. http://www.pubmed.com
Course Duration	28 weeks
Delivery	Lectures (Tools: board, data show). The lectures were added on the internet site of the faculty to be available to the students all the time as an *e*-learning. Practical Session (Tools: labs., boards, instruments, chemicals, glassware, equipment).

	Assignments, seminars, researches and posters.	
Course Objectives:	Upon completion of this course, the student will have reliably demonstrated the ability to: 1. Give an account on the general principles of quality control, chromatographic analysis of herbal products, storage and preservation of herbal drugs, marker determination, validation and applications of analysis of herbal tea bags. 2. Describe the application of GC and HPLC in the analysis of herbal constituents. 3. Recognize the structure of pure active natural products applying different methods of spectral analysis e.g. UV., IR, Ms and NMR. 4. Implement**/**Perform standard industrial and/or pharmaceutical instrumentation and laboratory procedures and applying such skill in aromatherapy. 5. Define Complementary therapies, including herbal therapies. 6. Enumerate the concepts of chemistry of biologically active natural products viz, carbohydrates, glycosides, tannins, bitter principles, alkaloids, volatile oil and unorganized drugs in addition to principle of chromatography that covers theories and applications in natural product analysis. 7. Enumerate the principle of Plant cell and tissue culture that covers theories and applications in natural product production. 8**.** Identify different classes of marine natural products illustrate the most important biologically active constituents from marine 9. Identify different classes of tumor inhibitors from natural products clinically use. 10.Identify different classes of hallucinogenics & drug abuse and methods of detection. 11. Identify the different methods Biosynthesis of secondary metabolites. 12. Identification of the most important Toxic plants of Libya	
Course Assessments	Midyear exam	20%
	Quizzes, reports, presentation	10%
	Practical continuous assessment, exam	10%
	Final Practical exam	20%
	Final theoretical exam	40%
	Total	100%
Content Breakdown Topical Coverage	Content Breakdown Topical Coverage	
Session 1 (Week 1)	**Extraction and Isolation of Active Constituents:** Maceration and hot continuous extraction. Solvent extraction	
Session 2 (Week 2)	**Phytochemical Screening**	
Session 3 (Week 3)	**Advanced Chromatographic Techniques** Definitions, Classification, Theoretical Partition chromatography : Paper Chromatography	
Session 4 (Week 4)	Adsorption Chromatography	

	Thin Layer Chromatography (TLC) Column Chromatography
Session 5 (Week 5)	Separation Based on electric charge • 1- Electrophoresis • 2- Ion-exchange chromatography
Session 6 (Week 6)	Molecular exclusion chromatography (gel permeation or Gel filtration). Gas Chromatography (GC) High performance Liquid Chromatography (HPLC) Supercritical fluid chromatography
Session 7 (Week 7)	**Quality control of herbal drugs and their extracts**, include Evaluation of Medicinal Crude drugs.
Session 8 (Week 8)	Pharmacoepeial Standards
Session 9 (Week 9)	**Tissue culture**, include: I. Introduction II. Applications
Session 10 (Week 10)	Plant Biotechnology
Session 11 (Week 11)	Midyear Exam
Session 12 (Week 12)	
Session 13 (Week 13)	
Session 14 (Week 14)	
Session 15 (Week 15)	**- Marine Natural Products** Examples of Drugs derived from Algae Green Algae
Session 16 (Week 16)	Red Algae Brown Algae
Session 17 (Week 17)	- **Tumor Inhibitors from Plants** • Plant derived anticancer agents in clinical use • Detailed information about medicinal plants, family, part used and specific type of anticancer phytochemical and their mechanism of action againstparticular type of cancer
Session 18 (Week 18)	Plant derived anticancer agents in clinical use
Session 19 (Week 19)	**Hallucinogenics& Drug Abuse** - Stimulants
Session 20 (Week 20)	- Hallucinogenics - Narcotics
Session 21 (Week 21)	-**Phytotherapy**Including: CVS, GIT, Respiratory, Liver, Urinary tract, Endocrine, Reproductive system, Skin
Session 22 (Week 22)	- Aromatherapy
Session 23 (Week 23)	- Herbal Drug Interactions
Session 24 (Week 24)	**Biosynthesis of secondary metabolites.**
Session 25 (Week 25)	**Structure elucidation of Natural Products**
Session 26 (Week 26)	**Spectroscopy**, include: I. Ultraviolet spectroscopy II. Infra-red spectroscopy

	III. Mass spectrometry IV. Nuclear Magnetic resonance
Session 27 (Week 27)	**Toxic Plants in Libya**
Session 28 (Week 27)	Toxic Plants in Libya (continue)
	Final theoretical exam
Practical Work	1-Safety Rules
	2-Extraction Methods
	3-Phytochemical screening
	4-Chromatography Column, Thin Layer and Paper Chromatography Separation of Mixture of Dyes by Radial paper chromatography and Column chromatography
	5-Separtion of Mixture of Carbohydrates (Sugars) by l paper chromatography
	6-Identification for alkaloid by microcrystalline tests
	7-Quality control of drugs containing alkaloids Microscopically, TLC of Cinchona bark, and Mixture of Powder
	8-Quality control of drugs containing Volatile oils Microscopically, TLC of Clove oil, and Mixture of Powder
	9-Quality control of drugs containing Glycosides Microscopically, TLC of Rhubarb extract, and Mixture of Powder
	10-Screening of Libyan Medicinal Plants
	11- Final Practical Exam
Attendance Expectations	Students are expected to attend every session of class, arriving on time, returning from breaks promptly and remaining until class is dismissed. Absences are permitted only for medical reasons and must be supported with a doctor's note.
Generic Skills	The faculty is committed to ensuring that students have the full range of knowledge and skills required for full participation in all aspects of their lives, including skills enabling them to be life-long learners. To ensure graduates have this preparation, such generic skills as literacy and numeric, computer, interpersonal communications, and critical thinking skills will be embedded in all courses.
Course Change	Information contained in this course outline is correct at the time of publication. Content of the courses is revised on an ongoing basis to ensure relevance to changing educational employment and marketing needs. The instructor will endeavor to provide notice of changes to students as soon as possible. Timetable may also be revised.