PHARMACOGNOSY & MEDICINAL PLANTS DEPARTMENT

Courses of Pharmacognosy and Medicinal Plants Department

No.	Course Title	Course Code
1	Pharmacognosy I	PHG 111
2	Pharmacognosy II	PHG 122
3	Phytochemistry I	PHG 223
4	Phytochemistry II	PHG 314
5	Quality Control of Natural Products	PHG 425
6	Phytotherapy	PHG 526

Elective Courses:

No.	Course Title	Course Code
1	Marine Natural Products	PHG 609
2	Forensic Pharmacognosy	PHG 610

FUTURE UNIVERSITY IN EGYPT
FACULTY OF PHARMACEUTICAL SCIENCES AND PHARMACEUTICAL INDUSTRIES

Course Specifications

Pharmacognosy-I (PHG 111)

Program (s) on which the course is given:	Bachelor of Pharmacy
Department offering the program:	All Faculty Departments
Department offering the course:	Pharmacognosy and Medicinal Plants
Academic year:	2014/2015
Approval Date:	September 2014

A. Basic Information

Course Title: Pharmacognosy-I **Course Code: PHG 111**

Prerequisites: ---

Students' Level/Semester: First Level/ First Semester

Credit hours: 3 **3 (2+1)**

Actual teaching hours per week:

Lectures: 2 hr/week **Practical:** 2 hr/week **Tutorial:** N/A **Total:** 4 hr/week

B. Professional Information

1. **Overall Aim of Course**

   Upon successful completion of this course: the students will be able to demonstrate knowledge of basic concept in the principle of Pharmacognosy and relate medicinal actions of medicinal plants to their content of secondary metabolites. Students are supposed to have an overview of the steps of commercial production of medicinal plants to the market. The course provides students with knowledge and skills concerning authentication and/or quality assurance of medicinal plants when present either in entire or powdered forms and provide pharmacy students with different medicinal herbal drugs including certain medicinal plant leaves, herbs, bark and wood and their active constituents. It familiarizes students with herbs currently in use in the market.

2. **Intended Learning Outcomes (ILOs)**

   By the end of the course, the student should be able to:

   a- Knowledge and Understanding:

   a1. Define the following terms: pharmacognosy, medicinal plant, crude drug, folk medicine and flora.

   a2. Classify herbal drugs according to botanical origin, chemical constituents, and medicinal activity.

   a3. Discuss difference between wild and cultivated plants, advantages and disadvantages.

   a4. Explain different methods of cultivation, collection, curing, drying, adulteration and storage of medicinal plants.

   a5. Discuss different types of plant cells, secretory structures, different classes of secondary metabolites and their chemical identification.

a6. Describe methods for detection and identification of natural drugs, especially leaves, macro- and micro-morphologically and chemically.
a7. Recognize methods for detection and identification of natural drugs, especially herbs, macro- and micro-morphologically and chemically.
a8. Identify methods for detection and identification of natural drugs, especially barks and wood, macro- and micro-morphologically and chemically.
a9. Summarize different methods of commercial production of medicinal plants

b- Intellectual Skills:

b1. Compare between a given sample and the respective pharmacopoeial one.
b2. Identify unknown medicinal plant leaves, herbs, and barks morphologically.
b3. Design suitable natural drug formulations whether in entire, powdered forms according to pharmacopoeial criteria.
b4. Predict actions & medicinal uses of any plant based on its content of secondary metabolites.
b5. Determine the unknown plant leaves microscopically.
b6. Evaluate the purity of the medicinal drug as well as detection of its adulteration.
b7. Detect the active constituents of the medicinal plants (secondary metabolites).

c- Professional and Practical Skills:

c1. Handle the microscope and manipulate the microscopical specimens.
c2. Perform experiments for detection of adulteration.
c3. Identify different types of plant cells and its content.
c4. Identify the features that distinguish plant families.
c5. Test for the presence of different secondary metabolites.
c6. Use appropriately the basic laboratory equipment safely and efficiently.
c7. Perform experiments in the lab within proper technical, safety ethical framework.
c8. Deduce an unknown natural drug whether in entire or powdered form.
c9. Prepare an unknown natural drug for the aim of identification by chemical tests.

d- General and Transferable Skills:

d1. Plan a research task.
d2. Work independently or with a minimal guidance where appropriate
d3. Work effectively in team with minimal guidance where appropriate.
d4. Demonstrate good written and oral communication skills.
d5. Perform online (computer) search to develop information technology skills in order to retrieve information from a variety of sources.

3. Contents

Teaching Weeks	Topic	No. of hours	Lecture	Practical
One	General Introduction of pharmacognosy, definitions, main topics for description; different classification of crude drugs, viz. alphabetical, chemical, taxonomical, pharmacological.	4	2	
	Orientation- Introduction to Dusting powders; identification of potato & maize starch.			2
Two	Geographical & commercial origins, comparison between cultivation and wild sources.	4	2	
	How to use microscope, how to prepare microscopical mounts; identification of rice & wheat starch & revision.			2
Three	Collection, drying and adulteration of crude drugs.	4	2	
	Microscopical examination of epidermal cells and different types of stomata; trichomes (glandular & non-glandular) & ca ox. crystals.			2
Four	Introduction to plant secondary metabolites, differences between primary & secondary metabolites	4	2	
	Macro and microscopical examination of Senna leaf (T.S. and powder) • First Midterm Exam			1.5 0.5
Five	General introduction to leaves, Medicinally used leaves: Senna; origin, main diagnostic elements, chemical tests, active constituents and uses.	4	2	

	Macro and Microscopical Examination of Hyoscyamus, Datura, (T.S and powder).			**2**
Six	**Medicinal leaves: Solanaceous leaves; differentiation: origin, active constituents, chemical tests, main diagnostic elements and uses and Digitalis (chemical tests, active constituents and uses); examples of leaves containing volatile oil & flavonoids.**	**4**	**2**	
	General introduction of herbs macro and Microscopical Examination of mentha & Thyme (powder and chemical test)-			**2**
Seven	**General introduction of herbs; Vol. oil containing herbs.**	**4**	**2**	
	Introduction of bark, Cinchona, Cinnamon (morphology, TS, powder).			**2**
Eight				
	Second Midterm exam			
Nine	**Examples of herbs containing alkaloids.**	**4**	**2**	
	Quassia, Galls (Morphology, Powder & chemical tests)			**2**
Ten	**Introduction of bark, Cinchona, Pomengranate, Cascara, Frangula (origin, active constituents, chemical tests and uses)**	**4**	**2**	
	Revision			**2**
Eleven	**Cinnamon and Cassia, Quillaia & Salix: active constituents, uses, chemical test)**	**4**	**2**	
	Practical Exam-1			**2**
Twelve	**Introduction to wood. Definition & types, Quassia, Guaiacum origin, active constituents, uses**	**4**	**2**	

	Galls & REVISION.			
	Practical Exam-2			**2**
Thirteen	**REVISION**	**2**	**2**	
Total No. of hours		**46**	**24**	**22**
Fourteen	**University Elective Final Exams**			
Fifteen	**Final Exams**			
Sixteen				

4. Teaching and Learning Methods

- **4.1.** Data show and computer in lectures
- **4.2.** Laboratory sessions.
- **4.3.** Assignments.
- **4.4.** Office hours.
- **4.5.** Power point presentations
- **4.6.** Research and presentation

5. Student Assessment Methods

- **5.1.** Practical Exam: to assess practical skills in identification of unknown powdered drug.
- **5.2.** Written Exams**:** to assess knowledge and understanding in addition to intellectual skills.
- **5.3.** Oral Exam: to assess all types of skills and mainly general and transferrable skills.
- **5.4.** Class work (Participation + Project) to assess all types of skills.

Assessment Schedule

Assessment 1	1st midterm exam	Week 4
Assessment 2	2nd midterm exam	Week 8
Assessment 3	Practical exams	Weeks 11, 12
Assessment 4	Final written exam	Week 15/16
Assessment 5	Oral exam	Week 15/16
Assessment 6	Class Work (Participation + Project)	(During the semester)

Weighting of Assessments

1st Mid-Term Examination	5 %
2nd Mid-Term Examination	15 %
Final-Term Examination	30%
Oral Examination	10 %
Practical Examination	30%

- Unknown vegetable powder (15%)
- Identification of unknown spots (10%)
- Lab manual (5%)

Class Work 10 %

- Participation (5%)
- Project (5%)

Total **100%**

6. List of References

6.1. Course Notes

Staff lectures handouts are **uploaded to the Moodle**.
lab manual **is given to each student**.

6.2. Essential Books (Text Books)

- Evans(available), W. C., Trease and Evans Pharmacognosy, Edinburgh, London, New York, Oxford, Philadelphia, St. Louis and Toronto, 16th ed, Elsevier, 2010.

6.3. Recommended Books

- Narayana, P. S., Pullaiah, T., Varalakshmi, D., Vol.2 (2014): Textbook of Pharmacognosy, CBS Publishers.
- Heinrich, M., Barnes, J. Gibbons S., and E. M. Williamson (ed) (2012 Fundamentals of Pharmacognosy and Phytotherapy, (2nd Ed), Elsevier):
- Egyptian Pharmacopoeia, English Text (2005).
- Blumenthal, M (ed). : "Herbal Medicine- Expanded Comission E Monographs", Integrative Medicine Communications, USA (2000). Duke, J.A., Godwin, M.J.B., Ducellier, J. and Duke, P.A.K.: "CRC Handbook of Medicinal Spices", CRC press, London, New York, Washington (2003).
- Hifny Saber, A.: "Practical Pharmacognosy", 4th Ed., Al Shaab Printing House (1966).
- Wallis(available), T.E.: "Text book of Pharmacognosy", 5th Ed., CBS publishers and Distributors, India (1999).

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6.4. Periodicals, Websites, ……etc

http://www.bestnetcraft.com/spicy_recipes.pdf
-http://www.herbdatanz.com/index.htm
-http://www.who.int/medicines/library/trm/medicinalplants.pdf
http://www. herb.com/

7. Facilities Required for Teaching and Learning

a. Lecture halls.
b. Laboratories.
c. Meeting rooms for office hours
d. White board
e. Books
f. Personal computer
g. computer equipped with projector and internet connection available for the usual lectures and labs
h. Library furnished with textbooks
i. Optical microscopes in labs
j. Slides and covers.
k. Test tubes and test tubes holders.

Course Coordinator Prof. Miriam F. Yousif

Head of Department: Prof. Miriam F. Yousif

Department Approval Date: September 2014

FUTURE UNIVERSITY IN EGYPT
FACULTY OF PHARMACEUTICAL SCIENCES AND PHARMACEUTICAL INDUSTRIES

Course Specifications

Pharmacognosy-II (PHG 122)

Program (s) on which the course is given:	Bachelor of Pharmacy
Department offering the program:	All Faculty Departments
Department offering the course:	Pharmacognosy and Medicinal Plants
Academic year:	2014/2015
Approval Date:	September 2014

A. Basic Information

Course Title: Pharmacognosy-II **Course Code: PHG 122**

Prerequisites: ---

Students' Level/Semester: First Level/ Second Semester

Credit hours: 3 **3 (2+1)**

Actual teaching hours per week:

Lectures: 2 hr/week **Practical:** 2 hr/week **Tutorial:** N/A **Total:** 4 hr/week

B. Professional Information

1. Overall Aim of Course

After completion of the course the student should have the knowledge and skills that enable her/ him to differentiate between different organs of an herb including flowers, fruits, seeds, and subterranean organs, as well as certain drugs of animal origin, identify active constituents and adulterants, describe micro- and macro-morphological characteristics, relate pharmaceutical actions to the possible uses and side effects and have an overview over the phytopharmaceuticals available on the market.

2. Intended Learning Outcomes (ILOs)

By the end of the course, the student should be able to:

a- Knowledge and Understanding:

a1. Explain methods for identification of natural drugs, specially flowers, macro & micro-morphologically.

a2. List methods for detection and identification of fruits, macro- & micro-morphologically and chemically.

a3. State methods for identification of natural drugs, specially seeds, macro & micro-morphologically and chemically.

a4. Recognize methods for detection and identification of natural drugs composed of subterranean organs, macro- and micro-morphologically and chemically

a5. Describe methods for detection of natural drugs, animal origin macro-morphologically and chemically.

a6. Discuss methods for selection of genuine natural drugs.

a7. Distinguish methods for differentiation between pharmacopoeial grade, varieties and adulterants**.**

b- Intellectual Skills:

b1. Outline suitable natural drug formulations whether in entire or powdered forms, according to pharmacopoeial criteria.

b2. Detect the quality of natural drug sample.

b3. Compare between a given sample and the respective pharmacopoeial one.

b4. Select methods for choice of suitable natural drugs taking in consideration patient history in each case**.**

c- Professional and Practical Skills:

c1. Identify an unknown natural drug whether in entire or powdered form.

c2. Examine an unknown natural drug for the aim of identification by chemical tests.

c3. Evaluate the quality of natural drug sample compared to the respective pharmacopoeial one**.**

d- General and Transferable Skills:

d1. Develop professional internet and literature retrieval skills

d2. Work in a team with minimal guidance where appropriate.

d3. Use different resources to enhance self-learning abilities.

d4. Communicate effectively with others.

d5. Plan work and time to meet targets within deadlines.

3. Contents

Teaching Weeks	Topic	No. of hours	Lecture	Practical
One	Introduction of flowers	4	2	
	Introduction of flowers; Macro- &Microscopic examination of Clove (entire & pd.)			2
Two	Clove, lavender, chamomile	4	2	
	Chamomile, Pyrethrum morphology & powder			2

Three	Pyrethrum,santonica, Introduction of seeds	4	2	
	Introduction of seeds, Linseed			2
Four	Introduction of seeds "cont.", Linseed, psyllium	4	2	
	Foenugreek, psyllium, Black mustard. First Midterm Exam			1.5 0.5
Five	Foenugreek, Black mustard, Strophanthus (Botanical origin, Constituents, Uses & Tests)	4	2	
	Introduction of fruits			2
Six	Introduction of fruits& general characters of umbilliferus fruits	4	2	
	Fennel, Anise, Ammi visnaga, Capsicum (Macro-&Microscopic examination, chemical tests & powder)			2
Seven	Fennel, Anise, *Ammi visnaga*, Capsicum, *Sylibum marianum* (Morphology, constituents, pd.,uses & Tests)	4	2	
	REVISION			2
Eight				
	Second Midterm exam			
Nine	Introduction of subterranean drugs	4	2	
	Introduction of subterranean drugs & Licorice (macro- & micromorphology, pd., tests)			2
Ten	Licorice, Ginger, Ginseng, Rhubarb (morphology, pd., constituents, uses & identification tests).	4	2	
	Ginger, Rhubarb (morphology, pd., tests) & revision			2
Eleven	Dioscorea, Squill, Garlic (Properties, Constituents, Uses & Tests)	4	2	
	Practical exam-1			2
Twelve	Animal Drugs	4	2	

	Practical exam-2			2
Thirteen	Revision	2	2	
Total No. of hours		46	24	22
Fourteen	**University Elective Final Exams**			
Fifteen	**Final Exams**			
Sixteen				

4. Teaching and Learning Methods

- **4.1.** Data show and computer in lectures.
- **4.2.** Laboratory sessions
- **4.3.** Group Discussion.
- **4.4.** Assignments.
- **4.5.** Office hours.
- **4.6.** Power point presentations
- **4.7.** Research and presentation

5. Student Assessment Methods

- **5.1.** Practical Exam: to assess professional and practical skills
- **5.2.** Written Exams**:** to assess knowledge and understanding as well as intellectual skills.
- **5.3.** Oral Exam: to assess all types of skills and mainly general and transferrable skills.
- **5.4.** Class work (Project + Participation) to assess knowledge and understanding, intellectual skills as well as general and practical skills.

Assessment Schedule

1st Mid-term exam	Week 4
2 nd Mid-term exam	Week 8
Practical examination-1	Week 11
Practical examination-2	Week 12
Final-Term Examination	Week 15/16
Oral examination	Week 15/16

Class work (During the semester)

Weighting of Assessments

1st Mid-Term Examination	5 %
2nd Mid-Term Examination	15 %
Final-Term Examination	30 %
Oral Examination	10 %
Practical Examination	30 %

- Unknown vegetable powder (15%)
- Identification of unknown spots (10%)
- Lab manual (5%)

Class Work	10 %

- Participation (5%)
- Project (5%)

Total 100 **%**

6. List of References

6.1. Course Notes

Staff lectures handouts are **uploaded to the Moodle**.
lab manual **is given to each student**.

6.2. Essential Books (Text Books)

Evans, W. C., Trease and Evans Pharmacognosy, Edinburgh, London, New York, Oxford, Philadelphia, St. Louis and Toronto, 16th ed, Elsevier, 2010.

6.3. Recommended Books

- Narayana, P. S., Pullaiah, T., Varalakshmi, D., Vol.2 (2014): Textbook of Pharmacognosy, CBS Publishers .
- Heinrich, M., Barnes, J. Gibbons S., and E. M. Williamson (ed) (2012), Fundamentals of Pharmacognosy and Phytotherapy, (2nd Ed), Elsevier
- Egyptian Pharmacopoeia, English Text (2005).
- Blumenthal, M (ed). : "Herbal Medicine- Expanded Comission E Monographs", Integrative Medicine Communications, USA (2000).
- Duke, J.A., Godwin, M.J.B., Ducellier, J. and Duke, P.A.K.: "CRC Handbook of Medicinal Spices", CRC press, London, New York, Washington (2003).
- Hifiny Saber, A.: "Practical Pharmacognosy", 4th Ed., Al Shaab Printing House (1966).

- Wallis, T.E.: "Text book of Pharmacognosy", 5th Ed., CBS publishers and Distributors, India (1999).

6.4. Periodicals, Websites, ……etc

http://www.bestnetcraft.com/spicy_recipes.pdf
http://www.herbdatanz.com/index.htm
http://www.who.int/medicines/library/trm/medicinalplants.pdf

7. Facilities Required for Teaching and Learning

a. Lecture halls.
b. Laboratories
c. White board
d. Books
e. Personal computer
f. computer equipped with projector and internet connection available for the usual lectures and labs
g. Library furnished with textbooks

Course Coordinator: Prof. Miriam F. Yousif

Head of Department: Prof. Miriam F. Yousif

Department Approval Date: September 2014

FUTURE UNIVERSITY IN EGYPT
FACULTY OF PHARMACEUTICAL SCIENCES AND PHARMACEUTICAL INDUSTRIES

Course Specifications

Phytochemistry-I (PHG 223)

Program (s) on which the course is given: Bachelor of Pharmacy
Department offering the program: All Faculty Departments
Department offering the course: Pharmacognosy and Medicinal Plants
Academic year: _____
Approval Date: September 2014

A. Basic Information

Course Title: Phytochemistry-I **Course Code: PHG 223**
Prerequisites: Pharmacognosy-I (PHG 111)+ Pharmacognosy- II (PHG 122)
Students' Level/Semester: Second Level/ Fourth Semester
Credit hours: 3 **3 (2+1)**
Actual teaching hours per week:
Lectures: 2 hr/week **Practical:** 2 hr/week **Tutorial:** N/A **Total:** 4 hr/week

B. Professional Information

1. Overall Aim of Course

After completion of the course, the students should have both the knowledge and skills that enable them to understand, describe and deal with the chemistry of volatile oils, bitter principles and carbohydrates of both plant and animal origin. The course also offers the primary and advanced methods of chromatography that are currently used for isolation, as well as, qualitative and quantitative determination of biologically active compounds.

2. Intended Learning Outcomes (ILOs)

By the end of the course, the student should be able to:

a- Knowledge and Understanding:

a1. Define different classes of biologically active compounds of natural origin.
a2. Identify the chemical structure, physio-chemical properties and uses of volatile oils.
a3. Describe the chemical structure, physio-chemical properties, identification of and uses of resins.
a4. Recognize the chemical structure, physio-chemical properties, identification and uses of carbohydrates.
a5. Recognize the general methods of extraction, separation, purification of carbohydrates.
a6. Outline how to identify and analyze the active constituents of medicinal plants by chromatographic methods.
a7. Determine therapeutic uses, side effects, interactions of medicines and their significance.

b- Intellectual Skills:

b1. Categorize the different types of secondary metabolites.
b2. Predict suitable methods for extraction and isolation.
b3. Propose new analytical methods.
b4. Relate between different course components.
b5. Apply critical thinking in solving problems.

c- Professional and Practical Skills:

c1. Apply basic methods of analysis of volatile oils.
c2. Use basic laboratory equipment safely and efficiently.
c3. Use basic methods of extraction, and purification of natural compounds.
c4. Practice basic methods of isolation, and identification of natural compounds.

d- General and Transferable Skills:

d1. Use different resources to enhance self-learning skills.
d2. Integrate different fields of knowledge.
d3. Communicate effectively with others.

3. Contents

Teaching Weeks	Topic	No. of hours	Lecture	Practical
One	Introduction of volatile oil & methods of preparation.	2	2	
	Orientation			----
Two	Physical properties &chemistry of volatile Oils. Classification of volatile oils.	4	2	
	Determination of eugenol in oil of clove.			2
Three	Hydrocarbon volatile oils; structure, properties & uses	4	2	
	Determination of cineole in oil of eucalyptus			2
Four	Alcohol volatile oils, properties, uses & tests.	4	2	
	Determination of benzaldehyde in oil of bitter almond and carvone in oil of caraway. **First Midterm Exam**			1.5 0.5
Five	Bicyclic monoterpene alcohols,	4	2	

	Properties, uses, tests.			
	Determination of allyl isothiocyanate in black mustard oil. & Revision.			2
Six	Sesquiterpene alcohols: properties & uses; Ketone & Aldehyde Volatile Oils; Properties & Uses; Esters of Aliphatic acids, compounds containing S & N	4	2	
	Practical Exam-1			2
Seven	Introduction of carbohydrates; physical characters of carbohydrates (solubility, optical activity, mutarotation, etc.....); determination of chemical characters of carbohydrates	4	2	
	Chromatography-1			2
Eight	**Second Midterm exam**			
Nine	Carbohydrates (Midterm Exam)	4	2	
	Chromatography-2			2
Ten	Carbohydrates	4	2	
	Identification of carbohydrates Glucose, fructose, sucrose, lactose, maltose.			2
Eleven	Chromatography	4	2	
	Identification of gum acacia and gum tragacanth , agar and starch			2
Twelve	Chromatography	4	2	
	Final Practical exam			2
Thirteen	Revision Christmas holiday	2	2	
Total No. of hours		44	24	20
Fourteen	**University Elective Final Exams**			

Fifteen	**Final Exams**			
Sixteen				

4. Teaching and Learning Methods

4.1. Data show and computer in lectures
4.2. Laboratory sessions.
4.3. Group Discussion
4.4. Assignments.
4.5. Office hours.
4.6. Power point presentations
4.7. Research and presentation

5. Student Assessment Methods

5.1. Written exams to assess knowledge and understanding as well as intellectual skills.
5.2. Practical exam to assess professional and practical skills.
5.3. Oral exam to assess all types of skills including general and transferrable skills.
5.4. Class Work [Participation (Quizzes and other assignments) + Project] to assess all types of skills.

Assessment Schedule

Assessment 1 1st midterm exam Week 4
Assessment 2 2nd midterm exam Week 8
Assessment 3 practical exam-1 Week 6
Assessment 4 practical exam-2 Week 12
Assessment 5 Final exam Week 15/16
Assessment 6 Oral exam Week 15/16
Assessment 7 Class Work [Participation (Quizzes and other assignments) + Project] (During the semester)

Weighting of Assessments

1st Mid-term exam 5%
2 nd Mid-term exam 15%
Final-Term Examination 30%

Oral Examination 10%

Practical Examination 30%

- Unknown carbohydrates powder (10%)
- Identification of V.O by using TLC (10%)
- Determination of the percentage of certain volatile constituents in V.O (10%)

Class Work 10 %

- Participation (Assignments & Quizzes) 5%
- Project (5%)

Total 100 %

6. List of References

6.1. Course Notes

Staff lectures handouts are **uploaded to the Moodle**.
lab manual **is given to each student**.

6.2. Essential Books (Text Books)

- Evans, W. C., Trease and Evans Pharmacognosy, Edinburgh, London, New York, Oxford, Philadelphia, St. Louis and Toronto: 16th. Ed. Elsevier, 2010.

6.3. Recommended Books

- Narayana, P. S., Pullaiah, T., Varalakshmi, D., Vol.2 (2014): Textbook of Pharmacognosy, CBS Publishers .
- Heinrich, M., Barnes, J. Gibbons S., and E. M. Williamson (ed) (2012) Fundamentals of Pharmacognosy and Phytotherapy, (2nd Ed), Elseviers
- Egyptian Pharmacopoeia, English Text (2005).
- Balbaa, S.I., S.H. Hilal and A.Y. Zaki. Medicinal Plant Constituents. 2nd ed. Egypt: Central Cairo, Agency for University and Schoolbooks. 1978.
- Connoly, Z.D. and R.A. Dictionary of Terpenoids Vols 1-3. London: Chapman and Hall, 1991
- The Merck Index, An Encyclopedia of chemicals, Drugs and Biologicals. 11th ed., USA: Merck and Co., Inc., Rahway, N.I., 1989.
- Robbers, J. E., M. K. Speedie and V.E. Tyler Pharmacognosy and Pharmacobiotechnology. Baltimore, London, Paris: Williams and Wilkins, 1996.

6.4. Periodicals, Websites, ……etc

Journals {phytochemistry, chromatography, pharmazia}…
Pubmed.com library

7. Facilities Required for Teaching and Learning

- Lecture halls.
- Laboratories
- White board.
- Books
- Personal computer
- computer equipped with projector and internet connection available for the usual lectures and labs
- Library furnished with textbooks
- Glassware as : separating funnels, glass rods, conical flasks, beakers,….etc.

Course Coordinator----------
Head of Department Prof. Dr. Myriam Youssef

Department Approval Date: September 2014

FUTURE UNIVERSITY IN EGYPT
FACULTY OF PHARMACEUTICAL SCIENCES AND PHARMACEUTICAL INDUSTRIES

Course Specifications

Phytochemistry-II (PHG 314)

Program (s) on which the course is given:	Bachelor of Pharmacy
Department offering the program:	All Faculty Departments
Department offering the course:	Pharmacognosy and Medicinal plants
Academic year:	_____
Approval Date:	September 2014

A. Basic Information

Course Title: Phytochemistry-II **Course Code: PHG 314**

Prerequisites: Pharmacognosy- I (PHG 111) + Pharmacognosy -II (PHG 122)

Students' Level/Semester: Third Level/ Fifth Semester

Credit hours: 3 **3 (2+1)**

Actual teaching hours per week:

Lectures: 2 hr/week **Practical:** 2 hr/week **Tutorial:** N/A **Total:** 4 hr/week

B. Professional Information

1. Overall Aim of Course

After completion of the course, the students should have both the knowledge and skills that enable them to understand, describe and deal with the chemistry of alkaloids, glycosides, bitter principles and tannins of plant or animal origin and the related techniques.

2. Intended Learning Outcomes (ILOs)

By the end of the course, the student should be able to:

a- Knowledge and Understanding:

a1. Define different classes of biologically active compounds of alkaloids of natural origin and their distribution in nature.

a2. Describe the chemical structure, physio-chemical properties, identification, and uses of alkaloids.

a3. Illustrate the different chemical methods used to prepare, isolate and analyze the biologically active alkaloids with brief description of their medicinal uses.

a4. Recognize different classes of biologically active compounds of glycosides of natural origin and their distribution in nature.

a5. Identify the chemical structure, physio-chemical properties, identification, and uses of glycosides and tannins.

a6. Select the different chemical methods used to prepare, isolate and analyze the biologically active glycosides and tannins with brief description of their medicinal uses.

b- Intellectual Skills:

b1. Categorize the different types of biologically active secondary metabolites.

b2. Predict suitable methods for extraction of different compounds.

b3. Distinguish suitable methods for isolation of different compounds

b4. Recognize changes in structure that modify biological activities.

b5. Determine therapeutic uses, side effects, interactions of medicines and their significance.

b6. Relate between different course components structure, chemical identification and separation of certain chemical groups of plant constituents.

c- Professional and Practical Skills:

c1. Apply basic methods of extraction, isolation, purification and identification of natural compounds.

c2. Use basic laboratory equipment safely and efficiently.

c3. Analyze natural compounds quantitatively

d- General and Transferable Skills:

d1. Work effectively as part of a team to produce reports and presentations.

d2. Explain effective solutions for problems involving reasonable complex mixtures.

d3. Plan work and time to meet set targets within deadlines.

d4. Judge samples of plants independently.

d5. Integrate different fields of knowledge.

3. Contents

Teaching Weeks	Topic	No. of hours	Lecture	Practical
One	Introduction of Alkaloids Introduction of Phenolic Glycosides	4	2	
	Phytochemical Screening,			2
Two	Introduction of Alkaloids, (cont.) Physical & Chemical Properties Glycoside; Hydrolysis, Distribution, Extraction Isolation & Purification	4	2	
	Phytochemical Screening (cont.)			2
Three	Examples of Alkaloids of Phenyl	4	2	

	Alkyl-Amine group; Structure, Isolation & Identification Pharmacological Activity Structure Classification Simple Phenolic Glycosides; Occurrences, Isolation & Identification			
	Phytochemical Screening			2
Four	Examples of Alkaloids of Pyridine Piperine & Pyridone group; Structure, Isolation & Identification. Antharacene Glycosides; Occurrences, Types Structures Isolation & Identification	4	2	
	Revision First Midterm Exam			1.5 0.5
Five	Examples of Alkaloids of Tropane group; Structure, Isolation & Identification Flavonoid Glycosides; Occurrences, Types Structures Isolation & Identification, *(cont.)*	4	2	
	Determination of total Alkaloids in *Hyoscyamus muticus* "Egyptian Henbane"			2
Six	Examples of Alkaloids of Quionoline & Isoquionoline group; Structure, Isolation & Identification. Flavone Glycosides; Occurrence, Structures, Isolation & Identification	4	2	
	1st Practical Exam			2
Seven	Examples of Alkaloids of Phenanthene group; Structure, Isolation & Identification. Flavnone Glycosides; Occurrence, Types Structures Isolation & Identification	4	2	
	Identification of Eserine,			2

	Ephedrine, Quinine Alkaloids by different chemical Tests			
Eight	**Second Midterm exam**			
Nine	Examples of Alkaloids of Indole group; Structure, Isolation & Identification Isoflavonoid & Anthrocyanidin Glycosides; Occurrences, Types Structures Isolation & Identification.	4	2	
	Identification of Caffeine, Strychnine, & Brucine Alkaloids by different chemical Tests			2
Ten	Examples of Alkaloids of Carboline group; Structure, Isolation & Identification Coumarin Glycosides; Occurrences, Types Structures Isolation & Identification	4	2	
	Identification of Pilocarpine, Papaverine & Atropine Alkaloids			2
Eleven	Examples of Alkaloids of Imidazole & Purine group; Structure, Isolation & Identification Steroidal Cardio-Active Glycosides Occurrences, Types Structures Isolation & Identification	4	2	
	Revision			2
Twelve	Examples of Alkaloids of Steroidal group; Structure, Isolation & Identification Cyanophoric & Thioglycosides; Occurrences, Types Structures Isolation & Identification	4	2	
	2nd Practical Exam			2
Thirteen	Revision Tannins; Occurrences, Types & Identification	2	2	

Total No. of hours		46	24	22
Fourteen	**University Elective Final Exams**			
Fifteen	Final Exams			
Sixteen				

4. Teaching and Learning Methods

- **4.1.** Data show and computer in lectures.
- **4.2.** Laboratory session
- **4.3.** Group Discussion.
- **4.4.** Assignments.
- **4.5.** Office hours.
- **4.6.** Power point presentations
- **4.7.** Research and presentation

5. Student Assessment Methods

- **5.1.** Written exams to assess knowledge and understanding as well as intellectual skills.
- **5.2.** Practical exam to assess professional and practical skills.
- **5.3.** Oral exams to assess all types of skills and mainly general and transferrable skills.
- **5.4.** Class work [Participation (Quizzes and other assignments) + Project] to assess all types of skills.

Assessment Schedule

Assessment 1	1st midterm exam	Week 4
Assessment 2	2nd midterm exam	Week 8
Assessment 3	practical exam-1	Week 6
Assessment 4	practical exam-2	Week 12
Assessment 5	Final exam	Week 15/16
Assessment 6	Oral exam	Week 15/16

Assessment 7 Class Work [Participation (Quizzes and other assignments) + Project] (during the semester)

Weighting of Assessments

1st Mid-term exam	5%
2 nd Mid-term exam	15%
Final-Term Examination	30%
Oral Examination	10%
Practical Examination	30%
• Unknown alkaloid	(15%)
• Phytochemical screening	(15%)
Class Work	10 %
• Participation (Quizzes and other assignments)	(5%)
• Project	(5%)
Total	**100 %**

6. List of References

6.1. Course Notes

Staff lectures handouts are uploaded to the Moodle.

lab manual is given to each student.

6.2. Essential Books (Text Books)

Evans, W. C., Trease and Evans Pharmacognosy, Edinburgh, London, New York, Oxford, Philadelphia, St. Louis and Toronto: 16th. Ed. Elsevier, 2010.

6.3. Recommended Books

- Narayana, P. S., Pullaiah, T., Varalakshmi, D., Vol.2 (2014): Textbook of Pharmacognosy, CBS Publishers .
- Heinrich, M., Barnes, J. Gibbons S., and E. M. Williamson (ed) (2012 Fundamentals of Pharmacognosy and Phytotherapy, (2nd Ed), Elsevier:(
- Egyptian Pharmacopoeia, English Text (2005).
- Bruneton, J.: "Pharmacognosy Phytochemistry Medicinal Plants", Lavoisier publishing, (1999).
- Balbaa, S.I., S.H. Hilal and A.Y. Zaki. Medicinal Plant Constituents. 2nd ed. Egypt: Central Cairo, Agency for University and Schoolbooks. 1978.
- Connoly, Z.D. and R.A. Dictionary of Terpenoids Vols 1-3. London: Chapman and Hall, 1991
- The Merck Index, An Encyclopedia of chemicals, Drugs and Biologicals. 11th ed., USA: Merck and Co., Inc., Rahway, N.I., 1989.

- Robbers, J. E., M. K. Speedie and V.E. Tyler Pharmacognosy and Pharmacobiotechnology. Baltimore, London, Paris: Williams and Wilkins, 1996.

6.4. Periodicals, Websites, ……etc

Journals {phytochemistry, chromatography, pharmazia}…
Pubmed.com library

7. Facilities Required for Teaching and Learning

- Lecture halls.
- Laboratories
- White board.
- Books
- Personal computer
- computer equipped with projector and internet connection available for the usual lectures and labs
- Library furnished with textbooks
- Facilities for practical work (as glassware: separating funnels, beakers, conical flasks, burettes, bulb pipettes,……etc.)

Course Coordinator----------

Head of Department Prof. Dr. Myriam Youssef

Department Approval Date: September 2014

FUTURE UNIVERSITY IN EGYPT
FACULTY OF PHARMACEUTICAL SCIENCES AND PHARMACEUTICAL INDUSTRIES

Course Specifications

Quality Control of Natural Products (PHG 425)

Program (s) on which the course is given:	Bachelor of Pharmacy
Department offering the program:	All Faculty Departments
Department offering the course:	Pharmacognosy and Medicinal Plants
Academic year:	_____
Approval Date:	September 2014

A. Basic Information

Course Title: Quality Control of Natural Products **Course Code: PHG 425**

Prerequisites: Phytochemistry-I (PHG 223) + Phytochemistry-II (PHG 314)

Students' Level/Semester: Fourth Level/ Eighth Semester

Credit hours: **3 (2+1)**

Actual teaching hours per week:

Lectures: 2 hr/week **Practical:** 2 hr/week **Tutorial:** N/A **Total:** 4 hr/week

B. Professional Information

1. Overall Aim of Course

After attending this course, the students are expected to deal with the general principles of quality control: definitions, documentation, environmental monitoring, packaging systems, and the finished product. Student should be able to deal with quality control laboratory scheme including qualitative and quantitative microscopy as well as, qualitative and quantitative chromatographic analysis of herbal products, storage, preservation, marker determination, validation and applications of the proposed schemes. In addition, students will be capable of independently using the different spectroscopic methods to elucidate the structures of pure natural products applying different methods of spectral analysis viz., UV, IR, MS and NMR. The course also includes the applications of GC and HPLC in the analysis of herbal constituents.

2. Intended Learning Outcomes (ILOs)

By the end of the course, the student should be able to:

a- Knowledge and Understanding:

a1. Explain the general principles of quality control of crude drugs and herbal products including storage and preservation, hazards and deterioration, pesticides and microbial contaminations, common adulterants and their detection and marker compounds determination.

a2. Describe GC technique and its application in the analysis of herbal products.

a3. Discuss HPLC technique and its applications in the analysis of herbal products.

a4. Recognize the structure of pure active natural products applying different methods of spectral analysis viz., UV, IR, MS and NMR.

a5. Illustrate the analytical methods embracing principles, design, development, validation, and application, good laboratory practice (GLP) and good storage practice (GSP).
a6. Define complementary therapies, including herbal therapies.
a7. Enumerate the concepts of chemistry of biologically active natural products as, carbohydrates, glycosides, tannins, bitter principles, alkaloids, volatile oil and unorganized drugs.
a8. Recognize the principle of chromatography that covers theories and applications in natural product analysis.
a9. Summarize the major steps in quality control scheme including quantitative chromatographic analysis of herbal products, storage, preservation, marker determination, validation and applications of the proposed schemes.
a10. Define tissue culture technique, its main principle, requirements and applications of this technique for the aim of production of different secondary metabolites.

b- Intellectual Skills:

b1. Detect the best conditions to analyze natural and semi-synthetic drugs using different methods of chromatography.
b2. Predict methods to improve biosynthetic pathway of secondary metabolites.
b3. Elucidate different spectroscopic problems of natural compounds using U.V., I.R., NMR and Mass spectra.
b4. Design chromatographic technique for isolation of Secondary metabolites from their natural sources.
b5. Select the appropriate methods of isolation, synthesis, purification, identification, and standardization of active substances from different origins.

c- Professional and Practical Skills:

c1. Identify the components of a given unknown herbal mixture purity by using the microscope.
c2. Set up accurate assays for main constituents of marketed herbal products.
c3. Recognize the morphological and histological characters, how to isolate active constituents from callus culture of plants.
c4. Determine the pharmacopoeial constants of the herbal mixture.
c5. Identify different classes of natural compounds using spectroscopic methods
c6. Prepare samples to be analyzed using certain chromatographic techniques GC and HPLC.
c7. Isolate tissue explants.
c8. Sterilize explants and culture media.
c9. Use plant hormones to select the superior medical strains.
c10. Apply qualitative and quantitative analytical and biological methods for QC and assay of raw materials as well as pharmaceutical preparations.

d- General and Transferable Skills:

d1. Work effectively in team
d2. Communicate effectively with others.

d3. Perform online computer search to develop information technology skills and to be able to retrieve information from a variety of sources.

3. **Contents**

Teaching Weeks	Topic	No. of hours	Lecture	Practical
One	Traditional herbal medicines and human health regulation and registration of herbal medicines. WHO policy. Basic concept of quality control of herbal drugs.	**4**	**2**	
	Preliminary phytochemical screening of marketed pharmaceutical herbal drugs.			**2**
Two	Introduction to control purity of crude drugs: preservation and storage. Quality control methods for herbal materials, general advice on sampling, determination of foreign matter, macroscopic and microscopic examination	**4**	**2**	
	Microscopical examination of herbal preparation			**2**
Three	Determination of ash, extractable matter, water and volatile matter, micro methods for extraction, thin-layer chromatography; bitterness value	**4**	**2**	
	Proximate analysis and Potential contaminants.			**2**
Four	Determination of bitterness value, haemolytic activity, tannins, swelling index, foaming index, pesticide & fungal contamination; determination of toxic metals, microorganisms & aflatoxins, radioactive contamination.	**4**	**2**	
	Q.C of marketed herbal products mainly used for their volatile oil contents. **First Midterm Exam**			**1.5** **0.5**
Five	Micro methods for extraction, isolation and identification of alkaloids, volatile oils, glycosides, bitter principles and resins in pharmaceutical preparations;	**4**	**2**	

	Quality control			
	Q.C of herbal drugs having sedative effect.			**2**
Six	Quality control of different pharmaceutical preparations containing natural products : liquid and dry extracts , tinctures and spirits , aromatic water,syrups and pools , tablets , capsules , ointments , drops and herbal teas .	**4**	**2**	
	Q.C of herbal drugs used for kidney troubles.			**2**
Seven	Analysis of natural additives flavors , natural coloring matters and sweeteners	**4**	**2**	
	Q.C of herbal drugs used for intestinal disorders.			**2**
Eight				
	Second Midterm exam			
Nine	Applied chromatographic techniques in Q.C : Gas chromatography ,HPLC ,GLC (basis, instrumental, applications and Q.C. by finger print of natural products)	**4**	**2**	
	Evaluation of marketed alcoholic pharmaceutical products.			**2**
Ten	Structural elucidation of natural products (UV, IR, 1D &2D NMR and Mass spectrometry)	**4**	**2**	
	Spectroscopic identification of natural products.			**2**
Eleven	Structural elucidation cont. Cell and organ culture and colonel propagation (production of secondary metabolites , induced secondary metabolites metabolism in cell culture)	**4**	**2**	
	Final practical exam 1			**2**
Twelve	Biochemical conversions by plant cell cultures , organ culture and	**4**	**2**	

	colonel propagation			
	Final practical exam 2			**2**
Thirteen	Revision	**2**	**2**	
Total No. of hours		**46**	**24**	**22**
Fourteen	**University Elective Final Exams**			
Fifteen	**Final Exams**			
Sixteen				

4. Teaching and Learning Methods

4.1. Data show and computer in lectures.
4.2. Laboratory session.
4.3. Group Discussion.
4.4. Assignments.
4.5. Office hours.
4.6. Power point presentations
4.7. Research and presentation

5. Student Assessment Methods

5.1. Practical Exam: to assess professional and practical skills
5.2. Written Exams**:** to assess knowledge and understanding as well as intellectual skills.
5.3. Oral Exam: to assess all types of skills and mainly general and transferrable skills.
5.4. Class Work [Participation + Project] to assess all types of skills.

Assessment Schedule

Assessment 1	1st midterm exam	Week 4
Assessment 2	2nd midterm exam	Week 8
Assessment 3	Practical exam1	Week 11
Assessment 4	Practical exam2	Week 12
Assessment 5	Final exam	Week 15/16
Assessment 6	Oral exam	Week 15/16

Assessment 7 Class Work (Participation + Project) (During the semester)

Weighting of Assessments

1st Mid-Term Examination	5 %
2nd Mid-Term Examination	15 %
Final-Term Examination	30 %
Oral Examination	10 %
Practical Examination	30%

- Microscopically examination of certain herbal tea (15%)
- Q.C determination of marketed herbal product (15%)

Class Work	10 %

- Participation (5%)
- Project (5%)

Other types of assessment	-
Total	100 **%**

6. List of References

6.1. Course Notes

Staff lectures handouts are uploaded to the Moodle

Lab manual is given to each student.

6.2. Essential Books (Text Books)

- World Health Organization (2011): Quality control methods for herbal materials, Malta.
- Rouessac, F., Rouessac, A. (2000): Chemical Analysis Analysis Instrumentation Methods and Techniques.

6.3. Recommended Books

- Narayana, P. S., Pullaiah, T., Varalakshmi, D., Vol.2 (2014): Textbook of Pharmacognosy, CBS Publishers .
- Heinrich, M., Barnes, J. Gibbons S., and E. M. Williamson (ed) (2012 Fundamentals of Pharmacognosy and Phytotherapy, (2nd Ed), Elsevier:(
- Egyptian Pharmacopoeia, English Text (2005).
- World Health Organization (2011): Quality control methods for herbal materials. (Updated edition of Quality control methods for medicinal plant materials, 1998), Malta.
- World Health Organization (2007): WHO guidelines for assessing quality of herbal medicines with reference to contaminants and residues, Spain.
- World Health Organization (2006): Guidelines on minimum requirements for the registration of herbal medicinal products in the Eastern Mediterranean region. Regional Office for the Eastern Mediterranean, Cairo.

- World Health Organization (2004): Guidelines for the regulation of herbal medicines in the South-East Asia Region. Regional Office for South-East Asia, New Delhi.
- Kalia A.N. (2011): Textbook of Industrial Pharmacognosy. CBS Publisher & Distributors P Ltd., New Delhi, Bangalore.

6.4. Periodicals, Websites, ……etc

*apps.who.int/**medicine**docs/documents/h1791e/h1791e.pdf*

*www.who.int/**medicine**s/publications/qas_**herbal**med/en/*

www.intechopen.com/download/pdf/23473

www.intechopen.com/download/pdf/23472

www.euromedcommunications.com/.../335-**quality-control-of-herbal-dr**

www.arjournals.org/index.php/ijpm/article/download/23/19

www.ncbi.nlm.nih.gov/pubmed/15556488

www.ncbi.nlm.nih.gov › NCBI › Literature › PubMed Central (PMC)

7. Facilities Required for Teaching and Learning

a. Lecture halls.
b. Laboratories
c. White board.
d. Books
e. Personal computer
f. computer equipped with projector and internet connection available for the usual lectures and labs
g. Library furnished with textbooks
h. Facilities for practical work (equipment as: microscopes, glassware: slides and covers, separating funnels, conical flasks, beakers, bulb pipettes,….etc.)

Course Coordinator: -

Head of Department: Prof. Dr. Myriam Youssef

Department Approval Date: September 2014

FUTURE UNIVERSITY IN EGYPT
FACULTY OF PHARMACEUTICAL SCIENCES AND PHARMACEUTICAL INDUSTRIES

Course Specifications

Phytotherapy (PHG 526)

Program (s) on which the course is given:	Bachelor of Pharmacy
Department offering the program:	All Faculty Departments
Department offering the course	Pharmacognosy and Medicinal Plants
Academic year:	_____
Approval Date:	September 2014

A. Basic Information

Course Title: Phytotherapy **Course Code: PHG 526**

Prerequisites: Pharmacology-III (PHL 417)

Students' Level/Semester: Level Five/Tenth Semester

Credit hours: 1(1+0)

Actual teaching hours per week:

Lectures: 1 hr/week **Practical: N/A** **Tutorial:** N/A **Total:** 1 hr/week

B. Professional Information

1. Overall Aim of Course

By the end of the course the student should be able to prescribe herbal remedies as a type of alternative medicine or complementary medicine for treatment of the diseases of different organs. After completion of the course, the student should have the knowledge and skills about herbal drugs concerning their active constituents, mechanism of action, medical application, dose and dosage forms, contra-indications and side effects.

2. Intended Learning Outcomes (ILOs)

By the end of the course, the student should be able to:

a- Knowledge and Understanding:

a1. Recognize the history and advances in herbal remedies.
a2. Identify the characteristics of herbal drugs.
a3. Describe the disorders of different body systems, uses, and contraindications of the selected herbal drugs used for treatment of these disorders.
a4. Define different herbal dosage forms.
a5. Outline the mechanisms of action of some natural products on human systems.
a6. Identify associated risks of some natural products on human systems.
a7. Illustrate side effects and / or toxic reactions of herbal remedies.a8. Define the concepts of manufacturing natural products

b- Intellectual Skills:

b1. Select the right herbal drug for a particular treatment.
b2. Design suitable drug formulation (either single or mixture) whether as herbal tea, extract or pure isolate according to the pharmacopoeial criteria.
b3. Predict drug–herb or food–herb interactions and methods of avoiding them.

b4. Select methods for choice of suitable formulation of natural drugs; taking in consideration patient's history in each case.

c- Professional and Practical Skills:

c1. Practice as an information specialist for herbal medicine and herbal preparations.
c2. Choose useful and safe herbal drugs for certain cases.
c3. Suggest suitable solutions for treatment with herbal medicines

d- General and Transferable Skills:

d1. Integrate different fields of knowledge
d2. Work effectively in a team.
d3. Plan a research task.
d4. Apply good presentation skills.
d5. Relate basic information technology (IT) Literacy.
d6. Develop skills for independent learning.
d7. Describe a plan for a person who wants to use an herbal or a nutraceutical preparation or even a nutritional supplement for a certain health problem.

3. Contents

Teaching Weeks	Topic	No. of hours	Lecture
One	Introduction to herbal medicine -Definitions & Terminology. - Requirements for the preparation of medicinal Plant products from a plant	1	1
Two	Plants and the digestive system:- Stomatitis, Gingivitis & Glossitis, Gastritis and peptic ulcers	1	1
Three	Plants and the digestive system: - Dyspepsia, Flatulence, Constipation and Diarrhea	1	1
Four	Plants and the renal system- Infections of urinary tract and the use of diuretics and urinary antiseptics. **First Midterm Exam**	1	0.5 0.5
Five	Plants and the cardiovascular system: - Congestive heart failure, Arteriosclerosis, Hypertension, Angina pectoris, arrhythmia and Chronic Venous insufficiency.	1	1

Six	Plants and the respiratory system: - upper respiratory tract disorders such as Rhinitis, Common cold & influenza, Tonsillitis & chronic pharyngitis. Lower respiratory tract disorders such as Bronchial asthma, Bronchitis, Cough, Pneumonia and Tuberculosis.	1	1
Seven	Musculoskeletal Disorders: - Muscle Pain, Arthritis, Joint Inflammation and gout.	1	1
Eight	**Second Midterm exam**		
Nine	Nervous system disorders: - Herbal drugs acting on the nervous system such as Sedatives & hypnotics, Stimulants, Analgesics, Antidepressants & Drugs used for migraine & toothache.	1	1
Ten	Herbs that increase resistance to diseases and improve immunity.	1	1
Eleven	Endocrine and metabolic problems such as: - Diabetes mellitus, Thyroid disorders & Obesity.	1	1
Twelve	Assignment presentation.	1	1
Thirteen	Revision	1	1
Total No. of hours		12	12
Fourteen	**University Elective Final Exams**		
Fifteen	**Final Exams**		
Sixteen			

4. Teaching and Learning Methods

- **4.1.** Data show and computer in lectures.
- **4.2.** Assignments.
- **4.3.** Group Discussion.
- **4.4.** Case study.
- **4.5.** Assignments.
- **4.6.** Office hours.
- **4.7.** Power point presentations
- **4.8.** Research and presentation

5. Student Assessment Methods

- **5.1.** Written exams to assess knowledge and understanding, intellectual as well as professional skills.
- **5.2.** Class Work [Participation (Assignments and presentations) + Project] to assess general and transferable skills

Assessment Schedule

Assessment 1 1st midterm exam 4th Week
Assessment 2 2nd midterm 8th Week
Assessment 3 final written exam … 15/16 Week
Class work [Participation (Assignments and presentations) + Project] (During the semester)

Weighting of Assessments

1st Mid-Term Examination	10 %
2nd Mid-Term Examination	20 %
Final-Term Examination	40%
Class Work	30%

- Participation (10%) (Assignments and presentations)
- Project (20%)

Total **100 %**

6. List of References

6.1. Course Notes Staff lectures handouts are uploaded to the Moodle
Lab manual is given to each student.

6.2. Essential Books (Text Books)

- Capasso, F., Gaginelia, T.S., Grandolini, G., Izzo, A. A., Phytotherapy- "A Quick reference to herbal medicine", Elsevier (2002).
- Evans, W. C., "Trease and Evans Pharmacognosy", Edinburgh, London, New York, Oxford, Philadelphia, St. Louis and Toronto, 16th ed, Elsevier (2010).

6.3. Recommended Books

- Narayana, P. S., Pullaiah, T., Varalakshmi, D., Vol.2 (2014): Textbook of Pharmacognosy, CBS Publishers .
- Heinrich, M., Barnes, J. Gibbons S., and E. M. Williamson (ed) (2012 Fundamentals of Pharmacognosy and Phytotherapy, (2nd Ed), Elsevier
- Egyptian Pharmacopoeia, English Text (2005).
- Pizzorno J. E. and Murray, M.T., "Textbook of Natural Medicine", Churchill Livingstone, 3rd ed, (2006).
- Kalia, A.N., "Textbook of Industrial Pharmacognosy", CBS Publishers& Distributors, New Delhi, Bangalore (2005)

6.4. Periodicals, Websites, ……etc

Fitoterapia, J. of Ethnopharmacology.

7. Facilities Required for Teaching and Learning

a. Lecture halls.
b. Meeting rooms for office hours .
c. White board.
d. Books
e. Personal computer
f. computer equipped with projector and internet connection available for the usual lectures and labs
g. Library furnished with textbooks

Course Coordinator: -

Head of Department: Prof. Dr. Myriam Youssef

Department Approval Date:September 2014

FUTURE UNIVERSITY IN EGYPT
FACULTY OF PHARMACEUTICAL SCIENCES AND PHARMACEUTICAL INDUSTRIES

Course Specifications

Marine Natural Products (PHG 609)

Program (s) on which the course is given:	Bachelor of Pharmacy
Department offering the program:	All Faculty Departments
Department offering the course:	Pharmacognosy and Medicinal Plants
Academic year:	_____
Approval Date:	September 2014

A. Basic Information

Course Title: Marine Natural Products **Course Code:** PHG 609

Prerequisites: Phytochemistry-II (PHG 314)

Students' Level/Semester: Elective

Credit hours: 2(2+0)

Actual teaching hours per week:

Lectures: 2 hr/week **Practical:** N/A **Tutorial:** N/A **Total:** 2 hr/week

B. Professional Information

1. Overall Aim of Course

After completion of the course, the students should have both the knowledge and skills that enable them to understand, describe and deal with the composition and bioactivity of sea water, the marine ecosystem and the classification of major phyla of marine organisms, the importance of marine drugs as leads for novel pharmaceuticals; the chemistry, bioactivity and/or toxicity of metabolites derived from marine organisms (specially algae, invertebrates and microorganisms), as well as, the techniques adopted for drug development from marine resources.

2. Intended Learning Outcomes (ILOs)

By the end of the course, the student should be able to:

a- Knowledge and Understanding:

a1. Define the relationship between the ecological adaptation of marine organisms and production of bioactive metabolites for self-defense and reproduction.

a2. Identify marine-derived metabolites of different classes (brominated compounds, nitrogenous compounds, steroids, polysaccharides, terpenoids, quinones, prostaglandins and nitrogen-sulfur heterocyclics).

a3. Describe the therapeutic uses of marine-derived drugs, their expected interaction with other medicines and their significance in treatment of diseases.

a4. Recall the physiological properties of bioactive and/or toxic substances and their relationship to molecular structure.

a5. Recognize the general methods of extraction, separation, purification of water soluble constituents,

a6. Outline identification and analysis of active constituents of marine natural products by different chromatographic techniques.

b- Intellectual Skills:

b1. Apply the essential facts, concepts, principles and theories related to different types of marine secondary metabolites.
b2. Select the appropriate method of isolation, synthesis, and purification identification of marine-derived drugs.
b3. Select the suitable mean of identification of marine-derived drugs.
b4. Outline standardization methods of raw materials and pharmaceutical formulations containing marine drugs.
b5. Employ the pharmacological basis of therapeutics for proper selection and use of marine-derived metabolites in various disease conditions.
b6. Analyze published literature concerning marine metabolites.
b7. Categorize different types of marine organisms.

c- Professional and Practical Skills:

c1. Use different methods for extraction, isolation, identification and/or standardization of bioactive marine metabolites.
c2. Select techniques used in operating pharmaceutical equipment and instruments for analyzing drugs derived from marine resources.
c3. Point out the rational use of marine-derived drugs containing different types of constituents, as well as, social health hazards of intoxication from marine-derived toxins.
c6. Practice qualitative and quantitative analytical procedures for assessment of raw materials as well as pharmaceutical formulations containing these drugs.

d- General and Transferable Skills:

d1. Suggest solutions to problems.
d2. Integrate different fields of knowledge.
d3. Use different resources to enhance self-learning skills.
d4. Work effectively within a team.

3. Contents

Teaching Weeks	Topic	No. of hours	Lecture
One	Selected bioactive metabolites of marine algae, fungi & bacteria: Introduction, secondary metabolites of marine algae: brominated phenols, brominated	**2**	**2**

	oxygen heterocyclics, nitrogen heterocyclics, guanidine derivatives, phenazine derivatives, amino acids & amines, sterols, sulfated polysaccharides- marine bacteria & fungi, micro algae.		
Two	Selected bioactive metabolites of marine invertebrates: introduction- bioactive metabolites: steroids, terpenoids, isoprenoids, prostaglandins, quinones, brominated compounds. Marine toxins: tetrodotoxin, saxitoxin, pahutoxin, marine nucleosides , nitrogen-sulphur heterocyclics	**2**	**2**
Three	Bioactive metabolites of marine sponges: Coelenterates, Sea Anemones, Corals, Bryozoans, Molluscs, Echinoderms, Sea-urchins, Tunicates.	**2**	**2**
Four	Separation & isolation techniques: Introduction, separation techniques: water soluble constituents, ion-exchange chromatography, reverse-phase (RP) columns, high/medium pressure chromatography, combination of ion-exchange & size-exclusion chromatography. Bioassay directed fractionation : general fractionation, isolation procedures, amino acids & simple peptides, nucleosides, cytokinins & alkaloids **First Midterm Exam**	**2**	**1.5** **0.5**
Five	Marine Toxins: Saxitoxin , Brevetoxins , Tetrodotoxin , Ciguatoxin , Maitotoxin , Palytoxin , Gambierol Okadaic acids.	**2**	**2**
Six	Bioactivity of Marine Organisms Introduction , bacteria and fungi, Phytoplanktons , Bioactivity of Marine Organisms: Seaweeds, Marine invertebrates, search of pharmaceutically useful	**2**	**2**

	compounds, actinomycetes.		
Seven	Bioactive marine toxins: introduction, paralytic shellfish poisoning, transfer of toxins between organisms, saxitoxin, detection of paralytic shellfish toxins , tetrodotoxin, neurotoxic shellfish poisoning.	**2**	**2**
Eight	**Second Midterm exam**		
Nine	Bioactive marine toxins (cont.): Ciguatera (Seafood Poisoning), Ciguatoxin, maitotoxin , palytoxin gambierol, gambieric acids, diarrheic shellfish poisoning: okadaic acid & its analogs, dinophysistoxins, total synthesis of okadaic acid, pectenotoxins , Yessotoxin , miscellaneous toxins	**2**	**2**
Ten	Bioactive marine alkaloids: introduction, pyridoacridine alkaloids: occurrence & chemical properties, assignment of structure, Structural subtypes.	**2**	**2**
Eleven	Bioactive marine alkaloids (cont.) Pyrroloacridine & related alkaloids: indole alkaloids, pyrrole alkaloids, isoquinoline alkaloids, miscellaneous alkaloids.	**2**	**2**
Twelve	Marine Prostaglandins: Introduction, marine organisms, *Plexaura homomalla* , *Clavularia viridis*, *Labophyton depressum Telesto riisei*, *Gracilaria lichenoides*, mammalian-type prostaglandins in marine organisms biosynthesis.	**2**	**2**
Thirteen	**Revision**	**2**	**2**
Total No. of hours		**24**	**24**
Fourteen	**University Elective Final Exams**		
Fifteen	**Final Exams**		

Sixteen			

4. Teaching and Learning Methods

- **4.1.** Data show and computer in lectures.
- **4.2.** Assignments.
- **4.3.** Group Discussion.
- **4.4.** Assignments.
- **4.5.** Office hours.
- **4.6.** Power point presentations
- **4.7.** Research and presentation
- **4.8.** Case study.

5. Student Assessment Methods

- **5.1.** Written exams to assess knowledge and understanding as well as intellectual and professional skills.
- **5.2.** Quizzes and other assignments to assess all types of skills including general and transferrable skills.
- **5.3.** Oral Presentations to assess general and transferrable skills.

Assessment Schedule

Assessment 1 1st midterm Week 4
Assessment 2 2nd midterm exam Week 8
Assessment 3 Final exam Week 15/16
Assessment 4 Class Work (Quizzes, assignments and Oral Presentation) (During the semester)

Weighting of Assessments

1 st midterm	10	%
2 nd midterm	20	%
Class Work:	30	%
•Oral presentation 10 %		
• Assignments + Quizzes 20 %		
Final-Term Examination	40	%
Total **100**	**%**	

6. List of References

6.1. Course Notes

Staff lectures handouts given to students and/or uploaded to the Moodle

6.2. Essential Books (Text Books)

- Kalia A.N. (2011): Textbook of Industrial Pharmacognosy . CBS Publisher & Distributors P Ltd.
- Bhakuni D.S., Rawat, D.S. (2005): Bioactive Marine Natural Products**,** Co-published by Springer, New York 10013, USA with Anamaya Publishers, New Delhi, India.

6.3. Recommended Books:

- Narayana, P. S., Pullaiah, T., Varalakshmi, D., Vol.2 (2014): Textbook of Pharmacognosy, CBS Publishers .
- Heinrich, M., Barnes, J. Gibbons S., and E. M. Williamson (ed) (2012 Fundamentals of Pharmacognosy and Phytotherapy, (2nd Ed), Elsevier :(
- Evans, W. C., Trease and Evans Pharmacognosy, Edinburgh, London, New York, Oxford, Philadelphia, St. Louis and Toronto: 16th. Ed. Elsevier, 2010.
- Egyptian Pharmacopoeia, English Text (2005).
- John Faulkner, D. (2001): Marine natural products, Nat. Prod. Rep., 18, 1–49

6.4. Periodicals, Websites, ……etc

- www.mdpi.net/marinedrugs
- www.mdpi.org/marinedrugs/papers/md203123.pdf
- *www.mdpi.com/1660-3397/2/2/73/marinedrugs-02-00073.pdf*

7. Facilities Required for Teaching and Learning

a. Lecture halls.
b. Meeting rooms for office hours
c. White board.
d. Books
e. Personal computer
f. computer equipped with projector and internet connection available for the usual lectures and labs
g. Library furnished with textbooks

Course Coordinator: -

Head of Department: Prof. Miriam F. Yousif

Department Approval Date: September 2014

FUTURE UNIVERSITY IN EGYPT
FACULTY OF PHARMACEUTICAL SCIENCES AND PHARMACEUTICAL INDUSTRIES

Course Specifications

Forensic Pharmacognosy (PHG 610)

Program (s) on which the course is given:	Bachelor of Pharmacy
Department offering the program:	All Faculty Departments
Department offering the course:	Pharmacognosy and Medicinal Plants
Academic year:	_____
Approval Date:	September 2014

A. Basic Information

Course Title: Forensic Pharmacognosy **Course Code:** PHG 610
Prerequisites: Phytochemistry-II (PHG 314)
Students' Level/Semester: Elective
Credit hours: 2(2+0)
Actual teaching hours per week:
Lectures: 2 hr/week **Practical:** N/A **Tutorial:** N/A **Total:** 2 hr/week

B. Professional Information

1. Overall Aim of Course

The course of Forensic Pharmacognosy aims at providing the pharmacy student with sufficient knowledge concerning the investigation of a crime scene. In addition, methods related to examination and identification of the collected evidence are provided as well. The student will also be provided with sufficient knowledge concerning different botanical toxins; their identification and detection using different advanced chromatographic techniques.

2. Intended Learning Outcomes (ILOs)

By the end of the course, the student will be able to:

a- Knowledge and Understanding:

a1. Recognize the crime scene examination process and scene preservation.
a2. Identify knowledge about poisonous plants and their natural toxic principles that constitute health hazards, or intended for criminal uses to produce abortion, loss of mental control, hallucination, heart arrest, etc. and outline the associated symptoms.
a3. Describe drug dependence, narcotic analgesics, psychoenergetics, hallucinogens, etc.
a4. Demonstrate other types of crime scene evidences such as animal and human hairs, textile fibers, toxic fungi and mycotoxins.
a5. Discuss different methods of qualitative and quantitative identification of botanical poisons as mycotoxins, toxic glycosides and alkaloids.
a6. Summarize the identification of different types of hairs and its use as valuable and important evidence required by the investigators.

a7. Identify different types of mycotoxins, their detection, their production and their toxic symptoms.

a8. Summarize different types of toxic alkaloids and glycosides, methods of their detection, their botanical sources and their toxic symptoms.

b- Intellectual Skills:

b1. Apply the essential facts related to poisonous plants and their natural products.

b2. Select the appropriate method of qualitative and quantitative detection of different botanical poisons.

b3. Employ the basic principles for identification of different types of hairs by microscopical examination and DNA-testing

b4. Outline the different symptoms associated with the exposure or ingestion of these botanical poisons.

b5. Analyze published literature concerning forensic science.

c- Professional and Practical Skills:

c1. Apply different methods for extraction, isolation, identification and/or comparison with reference sample of different biological samples such as isolated tissues or fluids.

c2. Use different techniques in operating pharmaceutical equipment and instruments for detection of different botanicals or toxins using different chromatographic techniques.

c3. Detect different types of hairs as an important and valuable evidence for investigation.

c4. Apply different methodology for identification of illicit drugs and trace evidence as: GC, GC-MS, HPLC, capillary electrophoresis, etc.

d- General and Transferable Skills:

d1. Suggest solutions for problems.

d2. Integrate different fields of knowledge.

d3. Use different resources to enhance self-learning skills.

d4. Work effectively in a team.

3. Contents

Teaching Weeks	Topic	No. of hours	Lecture
One	Introduction including definition of forensic science, its importance in crime scene investigation, the main job of the forensic scientist and the importance of physical evidence.	**2**	**2**
Two	The main job of forensic scientist	**2**	**2**

	investigator by using recent techniques to analyze received evidence through chemical and physical tests collected from the scene of the crime , preparing reports and securing the crime scene		
Three	Different methods used for recording the crime scene (photography – sketches and notes), physical evidence in crime scene, their importance, collection and identification using standard reference sample.	**2**	**2**
Four	Poisonous plant and drug abuse and their serious toxic effects by giving examples of these toxic botanicals as mycotoxins –toxic alkaloids – toxic glycosides and psychoactive drugs. **First midterm exam.**	**2**	**1.5** **0.5**
Five	Mycotoxins (definition, major group of myco toxin as ergot alkaloids , afla toxins , ama toxins ,ocra toxins and phallo toxins) their occurance , production , toxic effects , detection and how to avoid exposure to these toxins .	**2**	**2**
Six	Myco toxins cont. (citrinin , patulin , fusarium and mascarine) their occurance , production , toxic effects , detection and how to avoid exposure to these toxins	**2**	**2**
Seven	Plant containing toxic glycosides (cyanogenic glycoside) plants containing this glycoside as cassava (linamarin and lotaustralin glycoside), their hydrolysis toxicity and their detection in biological tissues and fluids	**2**	**2**
Eight	**Second Midterm exam**		
Nine	Plant containing toxic glycosides (cyanogenic glycoside) cont. plants containing this glycoside as sorghum vulgare and sweet and bitter almond (amygdaline	**2**	**2**

	glycoside) their hydrolysis toxicity and their detection in biological tissues and fluids		
Ten	Cyanide toxicity, acute and chronic poisoning, their different symptoms and detection; the main reason for HCN occurrence in water or air and its determination in biological tissues or fluids.	**2**	**2**
Eleven	Basic structure of different types of hairs (morphologically and microscopically) as an importance and valuable evidence for the investigators such **as;** human, animals, insects and plant hair.	**2**	**2**
Twelve	Basic structure of different types of hairs cont. (microscopical measurements and DNA testing using chromatographic techniques).	**2**	**2**
Thirteen	**Revision**	**2**	**2**
Total No. of hours		**24**	**24**
Fourteen	**University Elective Final Exams**		
Fifteen	**Final Exams**		
Sixteen			

4. Teaching and Learning Methods

- **4.1.** Data show and computer in lectures.
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- **4.3.** Assignments.
- **4.4.** Data analysis
- **4.5.** problem solving
- **4.6.** Office hours.
- **4.7.** Power point presentations
- **4.8.** Research and presentation

5. Student Assessment Methods

5.1. Written exams to assess knowledge and understanding, intellectual skills as well as professional skills.

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Assessment Schedule

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•Oral presentation	10 %		
• Assignments + Quizzes	20 %		
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Total		**100**	**%**

6. List of References

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- Trease, G. E.; "A text book of Pharmacognosy"; 6th ed. London, Bailliere, Tindall and Cox. An introduction to general crime scene investigation, CSI, American Institute of Forensic Education, CA92262, 2009.

6.3. Recommended Books

- Narayana, P. S., Pullaiah, T., Varalakshmi, D., Vol.2 (2014): Textbook of Pharmacognosy, CBS Publishers .
- Heinrich, M., Barnes, J. Gibbons S., and E. M. Williamson (ed) (2012 Fundamentals of Pharmacognosy and Phytotherapy, (2nd Ed), Elsevier :(
- Egyptian Pharmacopoeia, English Text (2005).

- Criminal poisoning 2nd edition by John Harris Terstrall , III, Humana press Inc. 2007 , Totowa , New York

- The practice of crime scene investigation by John Hors well , CRC press , LLC 2004 , USA.

6.4. Periodicals, Websites, ……etc.

- Encyclopedia of Chromatography, Marcel Dekker, Inc. New York, 2002

7. Facilities Required for Teaching and Learning

a. Lecture halls.
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Course Coordinator: -
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Department Approval Date: September 2014