SUBJECT OUTLINE

Subject Name:

Herbal Medicine Pharmacology and Pharmacognosy

Subject Code:

WHMF221

SECTION 1 – GENERAL INFORMATION

Award/s:		**Total Course Credit Points:**	**Level:**
	Bachelor of Health Science (Naturopathy)	128	2nd Year
Duration:	1 Semester		
Subject is:	Core	**Subject Credit Points:**	4

Student Workload:

No. timetabled hours per week: 6	No. personal study hours per week: 4	Total hours per week: 10

Delivery Mode*:

☐ **On campus** ☒ **Online / Digital** ☐ **Blended** ☐ **Intensive**

Weekly Session^ Format/s - 2 sessions per week:

☒ Livestream lectures:	☒ 2 hours	☐ 3 hours	2 lectures per week
☒ Livestream workshops / tutorials:	☒ 1 hour	☐ 2 hours	2 tutorials per week

*All modes are supported by the online learning management system which will include subject documents such as handouts, readings and assessment guides.

^A 'session' is made up of 3 hours of timetabled / online study time per week unless otherwise specified. Each subject has a set number of sessions as outlined above.

Note: As they are aware, international students on a Student Visa (500) must attend livestream classes on their local campus, using the Digital Learning space/s provided.

Study Pattern:	☒ Full Time ☒ Part Time
Pre-requisites:	BIOC211, BIOP211, WHMF212
Co-requisites:	Nil

SECTION 2 – ACADEMIC DETAILS

Subject Rationale

Building on the knowledge of individual herbs gained through Herbal Medicine Materia Medica 1 & 2 (WHMF112 & 212), this subject introduces students to the study of pharmacology and pharmacognosy. Through investigation of the major chemical constituents found in plants and the biological influences of those constituents in the human body, students gain a deeper understanding of the properties and therapeutic activities of herbs and their potential for managing different health conditions. Herbal Pharmacology and Pharmacognosy contributes to the later studies of Clinical Herbal Medicine and to the clinical practicum where students are required to determine suitable

treatment strategies for managing clients with various conditions, with consideration to contraindications and drug interactions.

Learning Outcomes

1. Analyse and evaluate the concepts of chemical complexity, pharmacodynamics and pharmacokinetics as they apply to clinical herbal medicine.
2. Evaluate the potential for toxicity of plant constituents and their biological influence in the management of health conditions through herbal treatments.
3. Determine the potential therapeutic properties of plants through an analysis of their chemical constituents.
4. Compare the toxicity potential of isolated chemical constituents from common medicinal herbs, and contrast it with the toxicity potential of whole plant preparations.
5. Evaluate and reflect upon the reason why specific components of each herbal medicine are indicated for use within hypothetical client management.

Assessment Tasks

Type	Learning Outcomes Assessed	Session Content Delivered	Week Due	Weighting
Quiz 1 (Multiple choice, short answer questions - 45 mins)	1,2,3	1- 8	5	25%
Quiz 2 (Multiple choice, short answer questions - 45 mins)	1,2,3	9-14	8	25%
Final Examination (2 hours)	1-5	1- 26	Final Exam Period	50%

All written assessments and online quizzes are due at 11:55 p.m. Sunday and submitted through the LMS.

Pass Requirements

To achieve a passing grade in this subject, students must:

- have a cumulative mark of at least 50%, and
- have submitted all assessment items with a value greater than 15%

Prescribed Readings:

Heinrich, M., Barnes, J., Gibbons, S., & Williamson, E. M. (Eds.) (2018). Fundamentals of pharmacognosy and phytotherapy (3rd ed.). Elsevier. [ebook available]

Mills, S., & Bone, K. (2013). Principles and practice of phytotherapy: Modern herbal medicine (2nd ed.). Churchill Livingstone Elsevier. [ebook available]

Recommended Readings:

American Botanical Council. (2013). *Herbal medicine: Expanded commission E online*. http://cms.herbalgram.org/herbstream/library/HerbalMedicine/index.html

Bradley, P. (Ed.). (1992). *British herbal compendium*: *A handbook of scientific information on widely used plant drugs* (Vol. 1). British Herbal Medical Association.

Bradley, P. (Ed.). (2006). *British herbal compendium*: *A handbook of scientific information on widely used plant drugs* (Vol. 2). British Herbal Medical Association.

Braun, L., & Cohen, M. (2015). *Herbs and natural supplements: An evidence-based guide* (4th ed., Vol. 1). Elsevier. [ebook available]

Braun, L., & Cohen, M. (2015). *Herbs and natural supplements: An evidence-based guide* (4th ed., Vol. 2). Elsevier. [ebook available]

Evans, W. C. (2009). *Trease and Evans pharmacognosy* (16th ed.). Saunders Elsevier. [ebook available]

Tisserand, R., & Young, R. (2014). *Essential Oil Safety* (2nd ed.). Elsevier. [ebook available]

Subject Content

Week	Lectures	Tutorials / Practicals
1.	Session 1 **Introduction to Herbal Medicine Pharmacology and Pharmacognosy:** • Definition of key terms: pharmacognosy, pharmacokinetics, pharmacodynamics etc. • Context related to herbal medicine within evidence-based practice	Activities are developed to allow the students to explore relevant concepts, expand on ideas and have peer and lecturer interaction. Activities also allow for formative assessment and feedback. • Research the phytochemistry of a herb. • Develop skills related to document creation, and chemical structure visualisation.
	Session 2 **Factors Influencing the individual chemical constituents within Herbal Medicine:** • Pharmaceutical GMP, Harvesting of raw materials, Phytochemistry and Galenical extracts • The topic of Synergy as it applies to herbal medicines is also explored	• Research the pharmacology of the constituents of the herb chosen in Tutorial 1.
2.	Session 3 **Safety Issues:** • Adverse effects, toxicity, cautions and contraindications and safety in pregnancy • Case study: *Hypericum perforatum*	• Research potential pharmacological interactions and safety of the herb chosen in Tutorial 1.

	Session 4 **Regulation and Scheduling of Herbal Medicines:** • The scheduling of medicinal herbs • Review of their actions, therapeutic indications, cautions and contraindications known safety concerns	• Research the TGA Poisons Standard for any scheduling of the herb chosen in Tutorial 1.

3.	Session 5
	Volatile oils Part I:
	• Properties of Volatile oils (pharmacodynamics and pharmacokinetics: absorption, distribution, metabolism, excretion)
	• Classes of Volatile oils, including:
	  ◦ Terpenoids
	  ◦ Phenylpropanoids
	• Herbs discussed include:
	  ◦ *Zingiber officinale*
	  ◦ *Cinnamomum verum* (syn. C. *zeylanicum*)
		• Apply the knowledge gained in Session 5 to research the essential oil composition of an aromatic plant.

	Session 6
	Volatile oils Part II:
	• Herbs discussed include:
	  ◦ *Mentha x piperita*
	  ◦ *Salvia rosmarinus*
	  ◦ *Melissa officinalis*
	  ◦ *Matricaria chamomilla (*syn*. M. recutita)*
	  ◦ *Lavandula angustifolia*
	  ◦ *Pimpinella anisum*
		• Research the pharmacology of constituents found in the essential oil of the aromatic plant chosen in Tutorial 5.

4.	Session 7
	Resins:
	• Properties of the resins
	• Herbs discussed include:
	  ◦ *Boswellia serrata*
	  ◦ *Piper methysticum*
	  ◦ *Commiphora myrrha*
	  ◦ *Propolis*
		• Using the provided case study students get into groups and complete provided questions. Class discussion to follow.

	Session 8 **Flavonoids Part 1:** • Properties of flavonoids	• In small groups, students research the action of “antioxidant” to describe the mechanism of herbal antioxidant constituents.

	• Classes of flavonoids, including:
	  ◦ Flavones
	  ◦ Flavanones
	  ◦ Flavanols
	  ◦ Anthocyanins
	  ◦ Isoflavones
		• Students to provide a brief overview of findings to class.

5.	Session 9
	Quiz 1
	Flavonoids Part 2:
	• Herbs discussed include:
	  ◦ *Silybum marianum*
	  ◦ *Scutellaria baicalensis*
	  ◦ *Ginkgo biloba*
	  ◦ *Crataegus* spp.
	  ◦ *Camellia sinensis*
	  ◦ *Vaccinium myrtillus*
		• Using the provided case study students get into groups and complete provided questions. Class discussion to follow

	Session 10
	Glycosides Part I:
	• Properties of glycosides
	• Classes of glycosides, including:
	  ◦ Anthraquinone glycosides: *Frangula purshiana; Rheum palmatum; Senna alexandrina*
	  ◦ Phenolics and coumarins: Salix alba; Viburnum opulus
		• Using the provided case study students get into groups and complete provided questions. Class discussion to follow.

6.	Session 11 **Glycosides Part II:** • Cardiac glycosides: *Digitalis purpurea; Convallaria majalis* • Cyanogenic glycosides: *Prunus serotina* ◦ Glucosinolates: *Brassica nigra; Armoracia rusticana; Capsella bursa-pastoris* • Iridoids: *Picrorrhiza kurroa; Gentiana lutea; Olea europea; Harpagophytum procumbens*	• Students collate evidence (from either journal articles or evidence-based textbooks) on the toxicity of cyanide, and a cyanogenic constituent from a plant containing cyanogens, with a focus on safety and toxicology.
	Session 12 **Phenols:** • Properties of phenols • Classes of phenols, including:	• Using the provided case study students get into groups and complete provided questions. Class discussion to follow.

	◦ Simple phenols and phenylpropanoids • Herbs discussed include: ◦ *Arctostaphylos uva-ursi* ◦ *Thymus vulgaris* ◦ *Cynara scolymus* ◦ *Hamamelis virginiana*	
7.	Session 13 **Tannins:** • Properties of tannins • Classes of tannins, including: ◦ Hydrolysable and condensed tannins • Herbs discussed include: ◦ *Agrimonia eupatorium* ◦ *Achillea millefolium*	• Drawing upon appropriate evidence sources, students research and discuss the mechanism of astringency to better understand the impact of tannins on mucous membranes. Students to also include toxicology considerations, potential for adverse reactions and physico-chemical interactions.
	Session 14 **Polysaccharides Part I:** • Properties of polysaccharides • Actions of polysaccharides, including: ◦ Demulcents: ▪ *Althaea officinalis* ▪ *Ulmus rubra* ▪ *Plantago major* ◦ Nutritives: ▪ *Chlorella pyrenoidosa* ▪ *Spirulina* spp.	• Students to research the phytochemistry and pharmacology of Echinacea in the context of improving the physiological response to infection.
	NON-TEACHING WEEK (note that make-up classes may be scheduled in this week) **Semester 1** – This aligns with the week after Easter so it may fall between Weeks 6 to 8 **Semester 2 & Online students** – The non-teaching week falls between Weeks 7 and 8	
8.	Session 15 **Quiz 2** **Polysaccharides Part II:** • Classes discussed include: ◦ Immunostimulants/immune modulators: ▪ *Echinacea* spp. ▪ *Astragalus membranaceus* ◦ Immunostimulating fungi: ▪ *Lentinula edodes*	• Students to research the phytochemistry and pharmacology of medicinal mushrooms, noting synergy between mushroom combinations.

	▪ *Ganoderma lucidum*	
	Session 16 **Sterols and Saponins Part I:** ● Properties of sterols and saponins ● The link between saponins and the adaptogen class ● Classes discussed include triterpenoid and steroidal saponins ● Herbs discussed include: ○ *Vitex agnus-castus* ○ *Actaea racemosa* ○ *Dioscorea villosa* ○ *Chamaelirium luteum*	● Using the provided case study students get into groups and complete provided questions. Class discussion to follow
9.	Session 17 **Sterols and Saponins Part II:** ● Herbs discussed include: ○ *Glycyrrhiza glabra* ○ *Tribulus terrestris* ○ *Panax ginseng* ○ *Serenoa repens* ○ *Gymnema sylvestre* ○ *Bupleurum falcatum*	● Using the provided case study students get into groups and complete provided questions. Class discussion to follow
	Session 18 **Alkaloids Part I:** ● Properties of alkaloids ● All alkaloidal classes are briefly discussed (e.g. Indoles, purines, isoquinolines, amines etc)	● Students research the phytochemistry and pharmacology of alkaloid containing medicinal herbs, including scheduled herbs
10.	Session 19 **Alkaloids Part II:** ● Alkaloids in Health Management (Complementary and Orthodox medicine) ● Herbs discussed include: ○ *Hydrastis canadensis* ○ *Justicia adhatoda* ○ *Chelidonium majus* ○ *Corydalis ambigua*	● Using the provided case study students get into groups and complete provided questions. Class discussion to follow

	Session 20
	Methylxanthines:
	• Properties of methylxanthines
	• Herbs discussed include:
	  ◦ *Coffea arabica / C. robusta*
	  ◦ *Theobroma cacao*
	  ◦ *Cola nitida*
		• Students to identify and critically evaluate the sources, pharmacology and toxicology of caffeine
		• Support findings using both modern scientific evidence and historical naturopathic theory (i.e. energetics, organ systems etc.)

11.	Session 21 **Coumarins Part I:** • Properties of coumarins • Classes discussed include: ◦ Counmarins, Furanocoumarins, Coumestans	• Students summarise evidence (supportive or dismissive) found regarding the potential of coumarins, and coumarin containing plants, to be photosensitising or phototoxic. Discussion to follow

	Session 22
	Coumarins Part II:
	• Herbs discussed include:
	  ◦ *Melilotus officinalis*
	  ◦ *Apium graveolens*
	  ◦ *Galium aparine*
	  ◦ *Petroselinum crispum*
		• Using the provided case study students get into groups and complete provided questions. Class discussion to follow

12.	Session 23 **Herb/Drug Interaction:** • Definitions • Mechanisms • Factors affecting absorption • Factors affecting metabolism • Factors affecting excretion	• Students become familiar with the READI checklist (reporting drug interactions), and research the mechanisms of drug interactions.

	Session 24
	Hepatology and Phytomedicine:
	• Hepato-toxicity, hepato-protection and modulation from plant medicines:
	  ◦ *Cynara scolymus*
	  ◦ *Taraxacum officinale*
	  ◦ *Silybum marianum*
	  ◦ *Piper methysticum*
	  ◦ *Teucrium chamaedrys*
	  ◦ *Larrea tridentata*
		• Students to discuss the historical use of Piper methysticum, along with incidents/case reports leading to changes, recent research findings and scheduling as a hepatotoxic herb
		• Students to summarise at least 3 primary pieces of evidence and historical information

	• Pyrrolizidine alkaloids:
	  ◦ *Symphytum officinale*
	  ◦ *Tussilago farfara*	

13.	Session 25 **Herbal Medicine Energetics:** • Herbs can be prescribed based on action, indication and known pharmacology, but they can also be prescribed based on their energetics • The key principles of TCM and Humoral models as they pertain to herbal medicine	• Students to choose a common energetic action (e.g., heating or cooling), select a herb with this action, and then find biochemical and physiological explanations for the action of that herb.

	Session 26
	The Roots of Pharmaceuticals:
	• Pharmaceutical drugs which have plant origins
	• Drugs to be discussed include:
	  ◦ Aspirin
	  ◦ Digoxin
	  ◦ Theophylline
	  ◦ Ephedrine
		• Students to research common methods of drug discovery and drug development, including bioprospecting and the problem of biopiracy.

14-15.	**Non-Teaching Week/Practical Examination Weeks 1 & 2** Note that make-up classes may be scheduled in this week	
16-17.	**Final Examination Weeks 1 & 2** Students are required to sit examinations using the Respondus Lockdown Browser software per the Examination Policy – Higher Education. Refer to your local campus calendar for exam opening and closing times.	