



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	2 nd Year
Duration:	1 Semester	
Subject Coordinator: Ian Breakspear (Sydney Campus)		
Subject is:	Subject Credit Points:	4
Core		

Student Workload:

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

Delivery Mode:

Face to Face (On Campus)	2 x 2 hour lectures	2 x 1 hour tutorials
e-Learning (Online)	Narrated PowerPoint presentations Tutorials: Asynchronous tutor moderated discussion forum and activities Student handouts, web-based resources	
Intensive Delivery (Summer School)	Contact hours are delivered over 5 weeks with 4 x 4 hour days delivered per week Content: Combination lecture and tutorial activities Assessment: Quizzes – Week 2 and Week 3; Final Exam – Week 6	
	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	1-4	5	25%
Quiz 2 (Multiple choice, short answer questions - 45 mins)	1,2,3	5-7	8	25%
Final Examination (2 hours)	1-5	1-13	Final Exam Period	50%
All written assessments and online quizzes are due at 11:55 p.m. Sunday and submitted through the LMS				

Prescribed Readings:

1. Heinrich, M., Barnes, J., Gibbons, S., & Williamson, E. M. (Eds.) (2018). Fundamentals of pharmacognosy and phytotherapy (3rd ed.). Elsevier. [ebook available]
2. Pengelly, A. (2004). The constituents of medicinal plants: An introduction to the chemistry and therapeutics of herbal medicine (2nd ed.). Allen and Unwin. [ebook available]



Recommended Readings:

1. American Botanical Council. (2013). *Herbal medicine: Expanded commission E online*. <http://cms.herbalgram.org/herbstream/library/HerbalMedicine/index.html>
2. Bradley, P. (Ed.). (1992). *British herbal compendium: A handbook of scientific information on widely used plant drugs* (Vol. 1). British Herbal Medical Association.
3. Bradley, P. (Ed.). (2006). *British herbal compendium: A handbook of scientific information on widely used plant drugs* (Vol. 2). British Herbal Medical Association.
4. Braun, L., & Cohen, M. (2015). *Herbs and natural supplements: An evidence-based guide* (4th ed., Vol. 1). Elsevier. [ebook available]
5. Braun, L., & Cohen, M. (2015). *Herbs and natural supplements: An evidence-based guide* (4th ed., Vol. 2). Elsevier. [ebook available]
6. Evans, W. C. (2009). *Trease and Evans pharmacognosy* (16th ed.). Saunders Elsevier. [ebook available]
7. Mills, S., & Bone, K. (2013). *Principles and practice of phytotherapy: Modern herbal medicine* (2nd ed.). Churchill Livingstone Elsevier. [ebook available]

Subject Content

Week	Lectures	Tutorials / Practicals
1.	<p>Session 1</p> <p>Introduction to Herbal Medicine Pharmacology and Pharmacognosy:</p> <ul style="list-style-type: none"> ➤ Definition of key terms: Pharmacognosy, Pharmacokinetics, Pharmacodynamics etc. ➤ Context related to herbal medicine within evidence-based practice 	<p>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</p> <ul style="list-style-type: none"> ➤ Search for research articles using specified herbal medicine databases e.g. Medline, EBSCO Host, King's Dispensatory, Highwire press etc. and provide overview of experience
	<p>Session 2</p> <p>Factors Influencing the individual chemical constituents within Herbal Medicine:</p> <ul style="list-style-type: none"> ➤ Pharmaceutical GMP, Harvesting of raw materials, Phytochemistry and Galenical extracts ➤ The topic of Synergy as it applies to herbal medicines is also explored 	<ul style="list-style-type: none"> ➤ Debate of the topic: Synergy and Herbal Medicine: Art or Science? ➤ Summarise the information within the provided reading/s and maintain a central argument for or against the topic above
2.	<p>Session 3</p> <p>Safety Issues:</p> <ul style="list-style-type: none"> ➤ Adverse effects, toxicity, cautions and contraindications and safety in pregnancy ➤ Case study: Hypericum perforatum 	<ul style="list-style-type: none"> ➤ Conduct a literature search for 2 articles specific to Hypericum perforatum which identify concerns raised on the herb's usage. Discussing the levels of evidence provided and the conclusions drawn
	<p>Session 4</p> <p>Regulation and Scheduling of Herbal Medicines:</p>	<ul style="list-style-type: none"> ➤ Discussion: 'what is the evidence behind scheduled herbs' from a given list.



	<ul style="list-style-type: none"> ➤ The scheduling of medicinal herbs ➤ Review of their actions, therapeutic indications, cautions and contraindications known safety concerns 	
3.	<p>Session 5</p> <p>Volatile oils Part I:</p> <ul style="list-style-type: none"> ➤ Introduction to Volatile oils ➤ Properties of Volatile oils (Pharmacodynamics and pharmacokinetics: Absorption, Distribution, Metabolism, Excretion and toxicity) ➤ Classes of Volatile oils, including: <ul style="list-style-type: none"> ○ Terpenes – Monoterpenes, Sesquiterpenes, Triterpenes etc. ➤ Herbs discussed include: <ul style="list-style-type: none"> ○ <i>Zingiber officinale</i> ○ <i>Cinnamomum zeylanicum</i> ○ <i>Mentha piperita</i> ○ <i>Rosmarinus officinalis</i> 	<ul style="list-style-type: none"> ➤ Students watch online video clips of steam distillation ➤ Students answer questions on steam distillation
	<p>Session 6</p> <p>Volatile oils Part II:</p> <ul style="list-style-type: none"> ➤ Herbs discussed include: <ul style="list-style-type: none"> ○ <i>Melissa officinalis</i> ○ <i>Matricaria recutita</i> ○ <i>Lavandula angustifolia</i> ○ <i>Pimpinella anisum</i> 	<p>Students answer questions on the herbs covered in session citing evidence:</p> <ul style="list-style-type: none"> ➤ Why are so many of the herbs covered this week both carminative and antispasmodic? ➤ Which key active constituents have these activities within the volatile oil containing plants studied this session? ➤ Do certain herbs share similar constituents? Is this also reflected in their action?
4.	<p>Session 7</p> <p>Resins:</p> <ul style="list-style-type: none"> ➤ Introduction to resins ➤ Properties of the resins (Pharmacodynamics and pharmacokinetics: Absorption, Distribution, Metabolism, Excretion and toxicity) ➤ Herbs discussed include: <ul style="list-style-type: none"> ○ <i>Boswellia serrata</i> ○ <i>Piper methysticum</i> ○ <i>Commiphora myrrha</i> ○ <i>Propolis</i> 	<ul style="list-style-type: none"> ➤ Using the provided case study students get into groups and complete provided questions. Class discussion to follow
	<p>Session 8</p> <p>Flavonoids Part 1:</p> <ul style="list-style-type: none"> ➤ Introduction to flavonoids 	<ul style="list-style-type: none"> ➤ In small groups, students research antioxidant properties of provided flavonoid containing plants. Students to draw on evidence that compare the antioxidant activity of the plant to a similar antioxidant vitamin



	<ul style="list-style-type: none"> ➤ Properties of flavonoids (Pharmacodynamics and pharmacokinetics: Absorption, Distribution, Metabolism, Excretion and toxicity) ➤ Classes of flavonoids, including: <ul style="list-style-type: none"> ○ Flavones ○ Flavanones ○ Flavanols ○ Anthocyanins 	<ul style="list-style-type: none"> ➤ Students to provide a brief overview of findings to class
5.	<p>Session 9</p> <p>Quiz 1</p> <p>Flavonoids Part 2:</p> <ul style="list-style-type: none"> ➤ Herbs discussed include: <ul style="list-style-type: none"> ○ <i>Silybum marianum</i> ○ <i>Scutellaria baicalensis</i> ○ <i>Ginkgo biloba</i> ○ <i>Crataegus spp.</i> ○ <i>Camellia sinensis</i> 	<ul style="list-style-type: none"> ➤ Using the provided case study students get into groups and complete provided questions. Class discussion to follow
	<p>Session 10</p> <p>Glycosides Part I:</p> <ul style="list-style-type: none"> ➤ Introduction to glycosides ➤ Properties of glycosides (Pharmacodynamics and pharmacokinetics: Absorption, Distribution, Metabolism, Excretion and toxicity) ➤ Classes of glycosides, including: <ul style="list-style-type: none"> ○ Anthraquinone glycosides: <i>Rhamnus purshiana</i>; <i>Rheum palmatum</i>; <i>Cassia angustifolia</i> ○ <i>Salix alba</i>; <i>Viburnum opulus</i> 	<ul style="list-style-type: none"> ➤ Using the provided case study students get into groups and complete provided questions. Class discussion to follow
6.	<p>Session 11</p> <p>Glycosides Part II:</p> <ul style="list-style-type: none"> ➤ Cardiac glycosides: <i>Digitalis purpurea</i>; <i>Convallaria majalis</i> ➤ Cyanide glycosides: <i>Prunus serotina</i> ➤ Glucosinalates: <i>Brassica nigra</i>; <i>Amoracia rusticana</i>; <i>Allium spp.</i> ➤ Secoiridoids: <i>Picrorrhiza kurroa</i>; <i>Gentiana lutea</i>; <i>Olea europea</i>; <i>Harpagophytum procumbens</i> 	<ul style="list-style-type: none"> ➤ Students collate evidence (from either journal articles or evidence-based textbooks) supporting the in-vitro / in-vivo antimicrobial activity of oleuropein. Class discussion to follow
	<p>Session 12</p> <p>Phenols:</p> <ul style="list-style-type: none"> ➤ Introduction to phenols 	<ul style="list-style-type: none"> ➤ Using the provided case study students get into groups and complete provided questions. Class discussion to follow



	<ul style="list-style-type: none"> ➤ Properties of phenols (Pharmacodynamics and pharmacokinetics: Absorption, Distribution, Metabolism, Excretion and toxicity) ➤ Classes of phenols, including: <ul style="list-style-type: none"> ○ Simple phenols and phenylpropanoids ➤ Herbs discussed include: <ul style="list-style-type: none"> ○ <i>Arctostaphylos uva ursi</i> ○ <i>Thymus vulgaris</i> ○ <i>Cynara scolymus</i> ○ <i>Vaccinium myrtillus</i> ○ <i>Hamamelis virginiana</i> 	
7.	<p>Session 13</p> <p>Tannins:</p> <ul style="list-style-type: none"> ➤ Introduction to tannins ➤ Properties of tannins (Pharmacodynamics and pharmacokinetics: Absorption, Distribution, Metabolism, Excretion and toxicity) ➤ Classes of tannins, including: <ul style="list-style-type: none"> ○ Hydrolysable and condensed tannins ➤ Herbs discussed include: <ul style="list-style-type: none"> ○ <i>Geranium maculatum</i> ○ <i>Agrimonia eupatorium</i> ○ <i>Capsella bursa-pastoris</i> ○ <i>Achillea millefolium</i> 	<ul style="list-style-type: none"> ➤ Drawing upon appropriate evidence sources, students discuss the impact of tannins on mucous membranes. Students to also include toxicology considerations, potential for adverse reactions and physico-chemical interactions
	<p>Session 14</p> <p>Polysaccharides Part I:</p> <ul style="list-style-type: none"> ➤ Introduction to polysaccharides ➤ Properties of polysaccharides (Pharmacodynamics and pharmacokinetics: Absorption, Distribution, Metabolism, Excretion and toxicity) ➤ Actions of polysaccharides, including: <ul style="list-style-type: none"> ○ Demulcents: <ul style="list-style-type: none"> ▪ <i>Althea officinalis</i> ▪ <i>Ulmus fulva</i> ▪ <i>Plantago psyllium</i> ○ Nutritives: <ul style="list-style-type: none"> ▪ <i>Chlorella pyrenoidosa</i> ▪ <i>Spirulina spp</i> 	<ul style="list-style-type: none"> ➤ Class debate: Students source and summarise at least four pieces of primary research to support your position on the following statement: "Echinacea reduces the incidence and/or severity of the common cold". ➤ Presentation in the following class
<p>NON-TEACHING WEEK (note that make-up classes may be scheduled in this week)</p> <p>Semester 1 – This aligns with the week after Easter so it may fall between Weeks 6 to 8</p>		



Semester 2 & Online students – The non-teaching week falls between Weeks 7 and 8		
8.	<p>Session 15</p> <p>Quiz 2</p> <p>Polysaccharides Part II:</p> <ul style="list-style-type: none"> ➤ Classes discussed include: <ul style="list-style-type: none"> ○ Immunostimulants/immune modulators: <ul style="list-style-type: none"> ▪ <i>Echinacea</i> spp ○ Immunostimulating fungi: <ul style="list-style-type: none"> ▪ <i>Lentinula edodes</i> ▪ <i>Ganoderma lucidum</i> 	<ul style="list-style-type: none"> ➤ Class debate: “Echinacea reduces the incidence and/or severity of the common cold” ➤ Class discussion: Is there enough evidence to substantiate this herb use for the common cold?
	<p>Session 16</p> <p>Sterols and Saponins Part I:</p> <ul style="list-style-type: none"> ➤ Introduction to sterols and saponins ➤ Properties of sterols and saponins (Pharmacodynamics and pharmacokinetics: Absorption, Distribution, Metabolism, Excretion and toxicity) ➤ The link between saponins and the adaptogen class ➤ Classes discussed include triterpenoid and steroidal saponins ➤ Herbs discussed include: <ul style="list-style-type: none"> ○ <i>Vitex agnus castus</i> ○ <i>Cimicifuga racemosa</i> ○ <i>Dioscorea villosa</i> ○ <i>Chamaelirium luteum</i> 	<ul style="list-style-type: none"> ➤ Using the provided case study students get into groups and complete provided questions. Class discussion to follow
9.	<p>Session 17</p> <p>Sterols and Saponins Part II:</p> <ul style="list-style-type: none"> ➤ Herbs discussed include: <ul style="list-style-type: none"> ○ <i>Glycyrrhiza glabra</i> ○ <i>Tribulus terrestris</i> ○ <i>Panax ginseng</i> ○ <i>Serenoa repens</i> ○ <i>Gymnema sylvestre</i> ○ <i>Bupleurum falcatum</i> 	<ul style="list-style-type: none"> ➤ Using the provided case study students get into groups and complete provided questions. Class discussion to follow
	<p>Session 18</p> <p>Alkaloids Part I:</p> <ul style="list-style-type: none"> ➤ Introduction to alkaloids ➤ Properties of alkaloids (Pharmacodynamics and pharmacokinetics: Absorption, Distribution, Metabolism, Excretion and toxicity) 	<ul style="list-style-type: none"> ➤ Students to compare and contrast alkaloid containing medicinal herbs, including scheduled herbs, according to physiological actions and toxicity



	<ul style="list-style-type: none"> ➤ All alkaloidal classes are briefly discussed (e.g. Indoles, purines, isoquinolines, amines etc) 	
10.	<p>Session 19</p> <p>Alkaloids Part II:</p> <ul style="list-style-type: none"> ➤ Alkaloids in Health Management (Complementary and Orthodox medicine) ➤ Herbs discussed include: <ul style="list-style-type: none"> ○ <i>Hydrastis canadensis</i> ○ <i>Adhatoda vasica</i> ○ <i>Chelidonium majus</i> ○ <i>Corydalis ambigua</i> 	<ul style="list-style-type: none"> ➤ Using the provided case study students get into groups and complete provided questions. Class discussion to follow
	<p>Session 20</p> <p>Methylxanthines:</p> <ul style="list-style-type: none"> ➤ Introduction to methylxanthines ➤ Properties of methylxanthines (Pharmacodynamics and pharmacokinetics: Absorption, Distribution, Metabolism, Excretion and toxicity) ➤ Herbs discussed include: <ul style="list-style-type: none"> ○ <i>Coffea arabica / C.robusta</i> ○ <i>Theobroma cacao</i> ○ <i>Cola nitida</i> 	<ul style="list-style-type: none"> ➤ Students to identify and critically evaluate at least 5 physiological conditions which could be aggravated by concurrent caffeine use ➤ Support findings using both modern scientific evidence and historical naturopathic theory (i.e. energetics, organ systems etc.)
11.	<p>Session 21</p> <p>Coumarins Part I:</p> <ul style="list-style-type: none"> ➤ Introduction to coumarins ➤ Properties of coumarins (Pharmacodynamics and pharmacokinetics: Absorption, Distribution, Metabolism, Excretion and toxicity). ➤ Classes discussed include: <ul style="list-style-type: none"> ○ Furanocoumarins, phytoalexins 	<ul style="list-style-type: none"> ➤ Students summarise evidence (supportive or dismissive) found regarding the potential of coumarins, and coumarin containing plants, to be photosensitising or phototoxic. Discussion to follow
	<p>Session 22</p> <p>Coumarins Part II:</p> <ul style="list-style-type: none"> ➤ Herbs discussed include: <ul style="list-style-type: none"> ○ <i>Melilotus officinalis</i> ○ <i>Apium graveolens</i> ○ <i>Galium aparine</i> ○ <i>Petroselinum crispum</i> 	<ul style="list-style-type: none"> ➤ Using the provided case study students get into groups and complete provided questions. Class discussion to follow
12.	<p>Session 23</p> <p>Herb/Drug Interaction:</p> <ul style="list-style-type: none"> ➤ Definitions ➤ Mechanisms 	<ul style="list-style-type: none"> ➤ Students discuss the topic: "Herb/drug interactions: Interaction or overreaction?" by finding three herb/drug interactions with scientific evidence that are more theoretical in nature



	<ul style="list-style-type: none"> ➤ Factors affecting absorption ➤ Factors affecting metabolism ➤ Factors affecting excretion 	
	<p>Session 24</p> <p>Hepatology and Phytomedicine:</p> <ul style="list-style-type: none"> ➤ Hepato-toxicity, hepato-protection and modulation from plant medicines: <ul style="list-style-type: none"> ○ <i>Cynara scolymus</i> ○ <i>Taraxacum officinale</i> ○ <i>Silybum marianum</i> ○ <i>Piper methysticum</i> ○ <i>Teucrium chamaedrys</i> ➤ Pyrrolizidine alkaloids: <ul style="list-style-type: none"> ○ <i>Symphytum officinale</i> 	<ul style="list-style-type: none"> ➤ 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
13.	<p>Session 25</p> <p>Herbal Medicine Energetics:</p> <ul style="list-style-type: none"> ➤ 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 	<ul style="list-style-type: none"> ➤ Class discussion on the importance of principles and philosophies of natural medicine particularly Vitalism
	<p>Session 26</p> <p>The Roots of Pharmaceuticals:</p> <ul style="list-style-type: none"> ➤ Pharmaceutical drugs which have plant origins ➤ Drugs to be discussed include: <ul style="list-style-type: none"> ○ Aspirin ○ Digoxin ○ Theophylline ○ Ephedrine 	<ul style="list-style-type: none"> ➤ Students to research a provided pharmaceutical drug and address traditional use, interactions, cautions, contraindications and toxicity from an orthodox perspective ➤ Students then consider any herbs that could potentially interact with this medication, citing whether the interaction is theoretical or of known existence ➤ Include the proposed mechanism of action of such an interaction
14-15.	<p>Non-Teaching Week/Practical Examination Weeks 1 & 2</p> <p>Note that make-up classes may be scheduled in this week</p>	
16-17.	<p>Final Examination Weeks 1 & 2</p> <p>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.</p>	