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
Bachelor of Health Science (Western Herbal Medicine) 96 2nd Year
Duration: 1 Semester
Subject Coordinator: Ian Breakspear (Sydney)
Subject is: Core  Subject Credit Points: 4

Student Workload:

<table>
<thead>
<tr>
<th>No. timetabled hours per week:</th>
<th>No. personal study hours per week:</th>
<th>Total hours per week:</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>2 x 2 hours lecture</td>
<td>2 x 1 hour tutorial</td>
</tr>
<tr>
<td>E-learning</td>
<td>2 x 1 hour tutorial</td>
<td></td>
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<tr>
<td>Details:</td>
<td>E-learning Details:</td>
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<tr>
<td>Face to face</td>
<td>Details:</td>
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<tr>
<td>Delivery Mode</td>
<td>Details:</td>
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<tr>
<td>E-learning</td>
<td>Details:</td>
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<tr>
<td>Intensive Delivery</td>
<td>Delivery - 4 hours per day, 2 days per week over 5 weeks, combination lecture and tutorial activities. Assessment: Quizzes - Sessions 9 and 15; Final exam - Week 6.</td>
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<tr>
<td>Full Time</td>
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<td>Part Time</td>
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<tr>
<td>Pre-requisites:</td>
<td>BIOP211, BIOC211, WHMF212,</td>
<td></td>
</tr>
<tr>
<td>Co-requisites:</td>
<td>Nil</td>
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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

<table>
<thead>
<tr>
<th>Type</th>
<th>Learning Outcomes Assessed</th>
<th>Week Content Delivered</th>
<th>Week Due</th>
<th>Weighting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quiz 1</td>
<td>1,2,3</td>
<td>1-4</td>
<td>5</td>
<td>25%</td>
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<tr>
<td>(Multiple choice, short answer questions - 45 mins)</td>
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<td></td>
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<tr>
<td>Quiz 2</td>
<td>1,2,3</td>
<td>5-7</td>
<td>8</td>
<td>25%</td>
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<tr>
<td>(Multiple choice, short answer questions - 45 mins)</td>
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<tr>
<td>Final Examination</td>
<td>1-5</td>
<td>1-13</td>
<td>Final Exam Period</td>
<td>50%</td>
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<tr>
<td>(2 hours)</td>
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Prescribed readings:

Recommended readings:

Subject Content

<table>
<thead>
<tr>
<th>Week</th>
<th>Lecture</th>
<th>Tutorial</th>
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</thead>
</table>
| 1.   | Session 1  
Introduction to Herbal Medicine 
Pharmacology and Pharmacognosy:  
- Definition of key terms: Pharmacognosy, Pharmacokinetics, Pharmacodynamics etc.  |
<p>|      | 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>
<table>
<thead>
<tr>
<th>Session 2</th>
<th>Factors Influencing the individual chemical constituents within Herbal Medicine:</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>• Pharmaceutical GMP, Harvesting of raw materials, Phytochemistry and Galenical extracts.</td>
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<tr>
<td></td>
<td>• The topic of Synergy as it applies to herbal medicines is also explored.</td>
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<td></td>
<td>• Debate of the topic: Synergy and Herbal Medicine: Art or Science?</td>
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<td>• Summarise the information within the provided reading/s and maintain a central argument for or against the topic above.</td>
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<thead>
<tr>
<th>Session 3</th>
<th>Safety Issues:</th>
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<tbody>
<tr>
<td></td>
<td>• Adverse effects, toxicity, cautions and contraindications and safety in pregnancy.</td>
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<td></td>
<td>• Case study: Hypericum perforatum.</td>
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<td>• 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.</td>
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<tr>
<th>Session 4</th>
<th>Regulation and Scheduling of Herbal Medicines:</th>
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<tbody>
<tr>
<td></td>
<td>• The scheduling of medicinal herbs.</td>
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<tr>
<td></td>
<td>• Review of their actions, therapeutic indications, cautions and contraindications known safety concerns.</td>
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<td></td>
<td>• Discussion: ‘what is the evidence behind scheduled herbs’ from a given list.</td>
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<thead>
<tr>
<th>Session 5</th>
<th>Volatile oils Part I:</th>
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<tbody>
<tr>
<td></td>
<td>• Introduction to Volatile oils.</td>
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<tr>
<td></td>
<td>• Properties of Volatile oils (Pharmacodynamics and pharmacokinetics: Absorption, Distribution, Metabolism, Excretion and toxicity).</td>
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<tr>
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<td>• Classes of Volatile oils, including:</td>
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<tr>
<td></td>
<td>o Terpenes – Monoterpenes, Sesquiterpenes, Triterpenes etc.</td>
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<td>• Herbs discussed include:</td>
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<tr>
<td></td>
<td>o Zingiber officinale</td>
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<tr>
<td></td>
<td>o Cinnamomum zeylanicum</td>
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<tr>
<td></td>
<td>o Mentha piperita</td>
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<tr>
<td></td>
<td>o Rosmarinus officinalis</td>
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<td></td>
<td>• Students watch online video clips of steam distillation.</td>
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<td>• Students answer questions on steam distillation.</td>
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<thead>
<tr>
<th>Session 6</th>
<th>Volatile oils Part II:</th>
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<tbody>
<tr>
<td></td>
<td>• Herbs discussed include:</td>
</tr>
<tr>
<td></td>
<td>o Melissa officinalis</td>
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<tr>
<td></td>
<td>o Matricaria recutita</td>
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<td></td>
<td>o Lavandula angustifolia</td>
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<td></td>
<td>o Pimpinella anisum</td>
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<td></td>
<td>Students answer questions on the herbs covered in session citing evidence:</td>
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<td>• Why are so many of the herbs covered this week both carminative and antispasmodic?</td>
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<td></td>
<td>• Which key active constituents have these activities within the volatile oil containing plants studied this session?</td>
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<td>• Do certain herbs share similar constituents? Is this also reflected in their action?</td>
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<thead>
<tr>
<th>Session 7</th>
<th>Resins:</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>• Introduction to resins.</td>
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<tr>
<td></td>
<td>• Using the provided case study students get into groups and complete provided questions. Class discussion to follow.</td>
</tr>
</tbody>
</table>
### Properties of the resins
**(Pharmacodynamics and pharmacokinetics: Absorption, Distribution, Metabolism, Excretion and toxicity)**

- Herbs discussed include:
  - *Boswellia serrata*
  - *Piper methysticum*
  - *Commiphora myrrha*
  - *Propolis*

### Session 8
**Flavonoids Part 1:**
- Introduction to flavonoids.
- Properties of flavonoids
  **(Pharmacodynamics and pharmacokinetics: Absorption, Distribution, Metabolism, Excretion and toxicity).**
- Classes of flavonoids, including:
  - Flavones
  - Flavanones
  - Flavanols
  - Anthocyanins

- In small groups, students research antioxidant properties of provided flavonoid containing plants. Student to draw on evidence that compare the antioxidant activity of the plant to a similar antioxidant vitamin.
- Students to provide a brief overview of findings to class.

### Session 9
**5. Quiz 1**
**Flavonoids Part 2:**
- Herbs discussed include:
  - *Silybum marianum*
  - *Scutellaria baicalensis*
  - *Ginkgo biloba*
  - *Crataegus spp.*
  - *Camellia sinensis*

- Using the provided case study students get into groups and complete provided questions. Class discussion to follow.

### Session 10
**Glycosides Part I:**
- Introduction to glycosides.
- Properties of glycosides
  **(Pharmacodynamics and pharmacokinetics: Absorption, Distribution, Metabolism, Excretion and toxicity).**
- Classes of glycosides, including:
  - Anthraquinone glycosides: *Rhamnus purshiana*; *Rheum palmatum*; *Cassia angustifolia*
  - *Salix alba*; *Viburnum opulus*

- Using the provided case study students get into groups and complete provided questions. Class discussion to follow.

### Session 11
**6. Glycosides Part II:**
- Cardiac glycosides: *Digitalis purpurea*; *Convallaria majalis*.
- Cyanide glycosides: *Prunus serotina*.

- 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.
- **Glucosinalates:**
  *Brassica nigra; Amoracia rusticana; Allium spp.*
- **Secoiridoids:**
  *Picrorrhiza kurroa, Gentiana lutea, Olea europea, Harpagophytum procumbens.*

### Session 12
**Phenols:**
- Introduction to phenols.
- Properties of phenols. *(Pharmacodynamics and pharmacokinetics: Absorption, Distribution, Metabolism, Excretion and toxicity).*
- Classes of phenols, including:
  - Simple phenols and phenylpropanoids.
- Herbs discussed include:
  - *Arctostaphylos uva ursi*
  - *Thymus vulgaris*
  - *Cynara scolymus*
  - *Vaccinium myrtillus*
  - *Hamamelis virginiana*

- Using the provided case study students get into groups and complete provided questions. Class discussion to follow.

### Session 13
**Tannins:**
- Introduction to tannins.
- Properties of tannins. *(Pharmacodynamics and pharmacokinetics: Absorption, Distribution, Metabolism, Excretion and toxicity).*
- Classes of tannins, including:
  - Hydrolysable and condensed tannins.
- Herbs discussed include:
  - *Geranium maculatum*
  - *Agrimonia eupatorium*
  - *Capsella bursa-pastoris*
  - *Achillea millefolium*

- 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.

### Session 14
**Polysaccharides Part I:**
- Introduction to polysaccharides.
- Properties of polysaccharides *(Pharmacodynamics and pharmacokinetics: Absorption, Distribution, Metabolism, Excretion and toxicity).*
- Actions of polysaccharides, including:
  - Demulcents:
    - *Althea officinalis*

- 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.
<table>
<thead>
<tr>
<th>Session 15</th>
<th>Quiz 2 Polysaccharides Part II:</th>
</tr>
</thead>
</table>
| - Ulmus fulva  
| - Plantago psyllium  
| - Nutritives:  
| - Chlorella pyrenoidosa  
| - Spirulina spp  
|  
| 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 break week falls between Weeks 7 and 8.  
|  
| - 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?  
|  
| Session 16 Sterols and Saponins Part I: |  
| - 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:  
| - Vitex agnus castus  
| - Cimicifuga racemosa  
| - Dioscorea villosa  
| - Chamaelirium luteum  
|  
| - Using the provided case study students get into groups and complete provided questions. Class discussion to follow.  
|  
| 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: |  
| - Introduction to alkaloids.  
| - Properties of alkaloids (Pharmacodynamics and  
| - Students to compare and contrast alkaloid containing medicinal herbs, including scheduled herbs, according to physiological actions and toxicity.  
<p>|</p>
<table>
<thead>
<tr>
<th>Session</th>
<th>Description</th>
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</table>
| 10.     | **Session 19**  
**Alkaloids Part II:**  
- Alkaloids in Health Management (Complementary and Orthodox medicine).  
- Herbs discussed include:  
  - *Hydrastis canadensis*  
  - *Adhatoda vasica*  
  - *Chelidonium majus*  
  - *Corydalis ambigua*  
  - Using the provided case study students get into groups and complete provided questions. Class discussion to follow. |
| 11.     | **Session 20**  
**Methylxanthines:**  
- Introduction to methylxanthines.  
- Properties of methylxanthines (Pharmacodynamics and pharmacokinetics: Absorption, Distribution, Metabolism, Excretion and toxicity).  
- Herbs discussed include:  
  - *Coffea arabica / C.robusta*  
  - *Theobroma cacao*  
  - *Cola nitida*  
- Students 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.). |
| 12.     | **Session 21**  
**Coumarins Part I:**  
- Introduction to coumarins.  
- Properties of coumarins (Pharmacodynamics and pharmacokinetics: Absorption, Distribution, Metabolism, Excretion and toxicity).  
- Classes discussed include:  
  - *Furanocoumarins, phytoalexins*  
- Students summarise evidence (supportive or dismissive) found regarding the potential of coumarins, and coumarin containing plants, to be photosensitising or phototoxic. Discussion to follow. |
| 13.     | **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. |
| 14.     | **Session 23**  
**Herb/Drug Interaction:**  
- Definitions  
- Mechanisms  
- Factors affecting absorption  
- 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. |
### Session 24

**Hepatology and Phytomedicine:**

- Hepato-toxicity, hepato-protection and modulation from plant medicines:
  - *Cynara scolymus*
  - *Taraxacum officinale*
  - *Silybum marianum*
  - *Piper methysticum*
  - *Teucrium chamaedrys*
- Pyrrolizidine alkaloids:
  - *Symphytum officinale*

- 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.

### 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.

- Class discussion on the importance of principles and philosophies of natural medicine particularly Vitalism.

### Session 26

**The Roots of Pharmaceuticals:**

- Pharmaceutical drugs which have plant origins.
- Drugs to be discussed include:
  - Aspirin
  - Digoxin
  - Theophylline
  - Ephedrine.

- 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.

### Notes

**14. Non-Teaching Week/Practical Exam Week 1.** Note that make-up classes may be scheduled in this week.

**15. Non-Teaching Week/Practical Exam Week 2.** Note that make-up classes may be scheduled in this week.

**16. Final Exam Week 1**

Please refer to the Exam Timetable for your local campus for the exact day and time of exam.

**17. Final Exam Week 2**

Please refer to the Exam Timetable for your local campus for the exact day and time of exam.