**SECTION 1 - GENERAL INFORMATION**

**Award/s:**
- Bachelor of Health Science (Naturopathy)  
- Bachelor of Health Science (Nutritional and Dietetic Medicine)  
- Bachelor of Health Science (Myotherapy)  
- Bachelor of Complementary Medicine

**Total Course Credit Points:**
- 128 Core 1st Year  
- 96 Core 1st Year  
- 96 Core 1st Year  
- 48 Elective 3rd Year

**Duration:** 1 Semester

**Subject Coordinator:** Dr Eric Owusu Sekyere (Sydney campus)

**Subject is:** Core or Elective as noted  **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>4</td>
<td>10</td>
</tr>
</tbody>
</table>

**Delivery Mode:**
- **Face to Face (On campus):** 2 x 2 hour lectures  
- **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 4 weeks with 3 x 6.5 hour days delivered per week  
  - Content: Combination lecture and tutorial activities  
  - Assessment: Online Quiz 1 - Week 1; Online Quiz 2 - Week 2; Written Assignment - Week 4; Final Written Exam - Week 5
- **Full Time**
- **Part Time**

**Pre-requisites:** Nil

**Co-requisites:** Nil

---

**SECTION 2 – ACADEMIC DETAILS**

**Subject Rationale**

The first part of this subject introduces the student to basic and organic chemistry and explores the nature and reactivity of matter. This provides the foundation for the second part — biochemistry — which examines the relationship between the structure and function of complex biomolecules. Students will study the role of enzymes, coenzymes and cofactors in energy metabolism, and metabolic pathways involving glucose, fatty acid and amino acid — providing knowledge of the metabolic processes that occur in the human body. This is a foundational subject for later study of nutrition, pharmacology, immunology, herbal medicine and clinical sciences.
**Learning Outcomes**

1. Describe elements, atoms, ions, chemical bonding, chemical reactions, the significance of energy transfer and catalysts in biochemical systems.
2. Define the nature of matter and the different states of matter (solid, liquid, and gas) and describe how movement of atoms in the different states impacts their properties.
3. Describe solutions, mixtures and their equilibrium and relate it to how they impact physiological processes and metabolism.
4. Identify and apply nomenclature and common chemical reactions associated with organic functional groups.
5. Describe the components that make up the nucleic acids in cells, describe DNA and RNA structure and alterations in DNA (mutations).
6. Illustrate and analyse the chemical nature of major biochemical groups including carbohydrates, lipids and proteins.
7. Discuss the major biochemical pathways, including metabolism of carbohydrates, lipids and proteins.
8. Investigate the major biochemical pathways in the context of nutrition and health.

**Assessment Tasks**

<table>
<thead>
<tr>
<th>Type</th>
<th>Learning Outcomes Assessed</th>
<th>Session Content Delivered</th>
<th>Due</th>
<th>Weighting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Online Quiz 1</td>
<td>multiple choice</td>
<td>1-2</td>
<td>1-6</td>
<td>Week 4</td>
</tr>
<tr>
<td></td>
<td>(40 minutes)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Online Quiz 2</td>
<td>multiple choice</td>
<td>3-4</td>
<td>7-15</td>
<td>Week 9</td>
</tr>
<tr>
<td></td>
<td>(45 minutes)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Written Assignment</td>
<td>(1200 words)</td>
<td>5-8</td>
<td>7-25</td>
<td>Week 12</td>
</tr>
<tr>
<td>Final Written Exam</td>
<td>multiple choice, short answers, definitions and extended responses</td>
<td>5-7</td>
<td>15-25</td>
<td>Final Examination Period</td>
</tr>
<tr>
<td></td>
<td>(2.5 hours)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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

**Prescribed Readings:**


**Recommended Readings:**


<table>
<thead>
<tr>
<th>Week</th>
<th>Lectures</th>
<th>Tutorials</th>
</tr>
</thead>
</table>
| 1.   | Session 1 Introduction (Subject Outline / Subject Aims / Assessment / Teaching Resources) **Introduction to Chemistry**  
• Matter and the structure of the atom  
• Periodic table of elements  
• Use of the periodic table to predict physical and chemical properties of elements  
• Electronic configuration and the octet rule  
• Formation of ions  
• Significance of isotopes  

Session 2 **Chemical Bonding**  
• Ionic and covalent bonding  
• Polyatomic ions  
• Electro negativity and polarity of bonds  
• Naming ionic and molecular compounds  

• Review of atom/subatomic particles, periodic table, and electronic configuration  
• Animations on electron configuration |  
| 2.   | Session 3 **Chemical Reactions**  
• Chemical change  
• Chemical equations  
• Mole  
• Formula weight  
• Balancing equations  
• Classification of chemical reactions  
• Heat of reaction  

Session 4 **Reaction Rates**  
• Le Châtelier’s principle and equilibrium  

• Review of factors affecting chemical equilibrium  
• Formative quiz 2 |  
| 3.   | Session 5 **Physical States of Matter**  
• Solids, liquids and gases  
• Boyle’s law  
• Dalton’s law  
• Transition between states of matter and intermolecular forces  
• Solubility  
• Kinetic molecular theory  

Session 6 **Acids and Bases**  
• Reactions of acids and bases, pH and buffers  

• Review of acids and bases, pH and buffer  
• Virtual labs on the use of indicators in distinguishing acids and bases  
• Formative quiz 3 |  

• Review of writing and naming compounds  
• Formative quiz 1 |
| 4. | Session 7 | Introduction to Organic Chemistry  
- Organic compounds  
- Hydrocarbons  
- Functional groups  
- Stereo isomers | Review of hydrocarbon compounds |
| --- | --- | --- |
| | Session 8 | Properties of the Functional Groups  
- Alkanes  
- Alkenes  
- Alkynes  
- Aromatics  
- Alcohols | Review of alkanes, alkenes, alkynes, aromatics and alcohols  
Formative quiz 4 |
| 5. | Session 9 | Properties of the Functional Groups (Continued)  
- Phenols  
- Ketones  
- Aldehydes  
- Carboxylic acids  
- Esters | Review of phenols, ketones, aldehydes, carboxylic acids and esters |
| | Session 10 | Properties of the Functional Groups (Continued)  
- Ethers  
- Thiols  
- Amines and amides | Review of ethers, thiols, amines and amides |
| 6. | Session 11 | Carbohydrates  
An introduction to classification, structure and function of carbohydrates | Concept maps on carbohydrate types |
| | Session 12 | Lipids  
An introduction to classification, structure and function of lipids | Concept maps on lipid types |
| 7. | Session 13 | Molecular Biology: Nucleic Acids, Nucleotides, DNA, RNA  
Classification, structure, nucleosides and nucleotides | Review of types of nucleic acids, DNA replication, review  
DVD on DNA structure |
| | Session 14 | Amino Acids and Proteins  
Introduction to classification, structure and function of amino acids  
Introduction to protein classification, structure and function | Review of amino acids and proteins  
Animations on the structure and formation of different levels of protein organisation |
<p>| 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 &amp; Online students | The non-teaching week falls between Weeks 7 and 8 |</p>
<table>
<thead>
<tr>
<th>Session</th>
<th>Topic</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.</td>
<td><strong>Session 15</strong>&lt;br&gt;<strong>Enzymes and Co-enzymes</strong>&lt;br&gt;• The different classes of enzymes are studied and the types of reactions they catalyse</td>
<td>• Review of enzymes&lt;br&gt;• Virtual lab on the effect of various factors on enzyme activity&lt;br&gt;<strong>Session 16</strong>&lt;br&gt;In Class Study Revision</td>
</tr>
<tr>
<td>9.</td>
<td><strong>Session 17</strong>&lt;br&gt;<strong>Bioenergy Production</strong>&lt;br&gt;• An overview of the role&lt;br&gt;• Integration of the common catabolic pathways</td>
<td>• Review of cell structure, role of ATP and co-enzymes, significance of ATP&lt;br&gt;<strong>Session 18</strong>&lt;br&gt;<strong>Metabolism</strong>&lt;br&gt;• Digestion of carbohydrates&lt;br&gt;• Glycolysis, pyruvate pathways&lt;br&gt;• Glycogen metabolism</td>
</tr>
<tr>
<td>10.</td>
<td><strong>Session 19</strong>&lt;br&gt;<strong>Metabolism (Continued)</strong>&lt;br&gt;• The citric acid cycle&lt;br&gt;• The Cori cycle</td>
<td>• Concept map on carbohydrate metabolism&lt;br&gt;<strong>Session 20</strong>&lt;br&gt;<strong>Metabolism (Continued)</strong>&lt;br&gt;• Electron transport chain&lt;br&gt;• Oxidative phosphorylation</td>
</tr>
<tr>
<td>11.</td>
<td><strong>Session 21</strong>&lt;br&gt;<strong>Metabolism (Continued)</strong>&lt;br&gt;• Gluconeogenesis&lt;br&gt;• Hormonal control of carbohydrate metabolism</td>
<td>• Review of carbohydrate metabolism&lt;br&gt;<strong>Session 22</strong>&lt;br&gt;<strong>Lipid Metabolism</strong>&lt;br&gt;• β-oxidation, ketogenesis</td>
</tr>
<tr>
<td>12.</td>
<td><strong>Session 23</strong>&lt;br&gt;<strong>Lipid Metabolism (Continued)</strong>&lt;br&gt;• Fatty acid synthesis</td>
<td>• Review of metabolism of lipids&lt;br&gt;<strong>Session 24</strong>&lt;br&gt;<strong>Protein Metabolism</strong>&lt;br&gt;• Urea cycle and synthesis of amino acids</td>
</tr>
<tr>
<td>13.</td>
<td><strong>Session 25</strong>&lt;br&gt;<strong>Metabolism (Continued)</strong>&lt;br&gt;• Integrating the metabolic pathways</td>
<td>• Concept map on integration of carbohydrates, protein and fat metabolism&lt;br&gt;<strong>Session 26</strong>&lt;br&gt;In Class Study Revision</td>
</tr>
<tr>
<td>14.</td>
<td><strong>Non-Teaching Week/Practical Examination Week 1</strong>&lt;br&gt;Note that make-up classes may be scheduled in this week</td>
<td></td>
</tr>
<tr>
<td>15.</td>
<td><strong>Non-Teaching Week/Practical Examination Week 2</strong>&lt;br&gt;Note that make-up classes may be scheduled in this week</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Final Examination Week 1</td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>--------------------------</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>On campus enrolled students</strong>: Refer to the Examination Timetable for your local campus for the exact day and time of exam</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Online enrolled students</strong>: You are required to sit examinations on campus per the <a href="#">Examination Policy - Higher Education</a>. The Examination Weeks for subjects offered online are identified in the Online Calendar</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Final Examination Week 2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>On campus enrolled students</strong>: Refer to the Examination Timetable for your local campus for the exact day and time of exam</td>
</tr>
<tr>
<td></td>
<td><strong>Online enrolled students</strong>: You are required to sit examinations on campus per the <a href="#">Examination Policy - Higher Education</a>. The Examination Weeks for subjects offered online are identified in the Online Calendar</td>
</tr>
</tbody>
</table>