



CHRISTIAN HERITAGE COLLEGE

**MT311**

**DISCRETE MATHEMATICS**

This sample unit outline is provided by CHC for prospective and current students to assist with unit selection.

Elements of this outline which may change with subsequent offerings of the unit include Content, Required Texts, Recommended Readings and details of the Assessment Tasks.

Students who are currently enrolled in this unit should obtain the outline for the relevant semester from the unit lecturer.

<b>Unit code</b>	MT311
<b>Unit name</b>	Discrete Mathematics
<b>Associated higher education awards</b>	Bachelor of Education (Primary) Bachelor of Education (Secondary) Bachelor of Arts/Bachelor of Education (Secondary)
<b>Duration</b>	One semester
<b>Level</b>	Intermediate
<b>Core/Elective</b>	Required for a minor in Mathematics
<b>Weighting</b>	Unit credit points: 10 Course credit points: Bachelor of Education (Primary) 320 Bachelor of Education (Secondary) 320 Bachelor of Arts/Bachelor of Education (Secondary) 320
<b>Delivery mode</b>	Face-to-face on-site
<b>Student workload</b>	<i>Face-to-face on site</i> Contact hours 30 hours Reading, study and assignment preparation 120 hours <b>TOTAL 150 hours</b>  Students requiring additional English language support are expected to undertake an additional one hour per week.
<b>Prerequisites/ co-requisites/ restrictions</b>	<i>Prerequisite:</i> 20 credit points of 100 level Mathematics units
<b>Rationale</b>	Discrete mathematics is the study of mathematical structures that are separated or distinct (discrete), in contrast with calculus which deals with continuous change. It is an important area of pure and applied mathematics, and it provides the mathematical basis for understanding of computers and modern computation. Discrete Mathematics also has increasing application in many areas of science and technology. Because of its wide range of applications, the Discrete Mathematics unit provides important background for students pursuing an education degree with a mathematical focus.  Students will engage with concepts of discrete mathematics, covering topics such as sets, logic, enumeration methods, probability, recurrence relations, induction and graph theory; such concepts reflect the order, logic, coherent and constant nature of God. This unit will emphasise mathematical reasoning and different ways of solving problems, allowing students to explore their innate creativity and rationality as created in the image of God. In particular, students acquire mathematical reasoning skills necessary for solving problems in set and number theory, Boolean algebra, combinatorics, relations and functions, and algorithm development as it applies to computer science.
<b>Prescribed text(s)</b>	Epp, S. (2010). <i>Discrete mathematics with applications</i> (4th ed.). Boston, MA: Cengage.  Selected readings will be available via the Moodle™ site for this unit.

<b>Recommended readings</b>	<p>Chartrand, G., &amp; Zhang, P. (2011). <i>Discrete mathematics</i>. Long Grove, IL: Waveland Pr Inc.</p> <p>Grossman, P. (2008). <i>Discrete mathematics for computing</i> (3rd ed.). New York, NY: Palgrave Macmillan.</p> <p>Hunter, D. (2010). <i>Essentials of discrete mathematics (The Jones &amp; Bartlet Learning International Series in Mathematics)</i> (2nd ed.). Sudbury, M A: Jones &amp; Bartlett Learning.</p> <p>Lovasz, L., Pelikan, J., &amp; Vesztergombi, K. (2003). <i>Discrete mathematics: elementary and beyond (undergraduate texts in mathematics)</i>. New York, NY: Springer.</p> <p>In addition to the resources above, students should have access to a Bible, preferably a modern translation such as The Holy Bible: The New International Version 2011 (NIV) or The Holy Bible: New King James Version (NKJV).</p> <p>These and other translations may be accessed free on-line at <a href="http://www.biblegateway.com">http://www.biblegateway.com</a>. The Bible app from LifeChurch.tv is also available free for smart phones and tablet devices.</p>
<b>Specialist resource requirements</b>	<p>Casio fx-82AU PLUS II scientific hand-calculator or equivalent</p>
<b>Content</b>	<ol style="list-style-type: none"> <li>1. Logic and proofs</li> <li>2. Number Theory</li> <li>3. Set Theory and Boolean Algebra</li> <li>4. Recursion and Mathematical Induction</li> <li>5. Theory and Application of Functions</li> <li>6. Relations: application to cryptography</li> <li>7. Counting and Probability</li> <li>8. Graphs and Trees</li> <li>9. Matrix Algebra and Applications to Graphs</li> <li>10. Algorithm efficiency</li> </ol>
<b>Learning outcomes</b>	<p>On completion of this unit, students will have demonstrated that they have:</p> <ol style="list-style-type: none"> <li>1. Demonstrated a working knowledge and understanding of the important mathematical approaches to a range of discrete systems;</li> <li>2. Developed and applied advanced mathematical skills to concepts of logic, set theory, relations, induction, principles of counting, elementary number theory to solve mathematical problems;</li> <li>3. Appreciated the order, logic, coherent and constant nature of God as reflected in mathematical concepts and processes;</li> <li>4. Applied critical and methodological rigour to effectively communicate mathematical concepts and arguments, using either written English or mathematical notations, as appropriate; and</li> <li>5. Communicated at an appropriate tertiary standard: with special attention to design elements, grammars, usage, logical relations, style, referencing and presentation.</li> </ol>
<b>Assessment tasks</b>	<p><b>Task 1: Investigation and Design</b></p> <p>Word Length/Duration: 2,500 words</p> <p>Weighting: 50%</p> <p>Learning Outcomes: 1-5</p> <p>Assessed: Week 8</p>

	<p><b>Task 2: Examination</b></p> <p>Word Length/Duration: 3 hours</p> <p>Weighting: 50%</p> <p>Learning Outcomes: 1-5</p> <p>Assessed: Examination Week</p>
<p><b>Unit summary</b></p>	<p>This course introduces elements of discrete mathematics, which is the study of objects and systems that assume only distinct values. It provides a foundation for using mathematical reasoning to solve problems in set and number theory, logic and proofs, Boolean algebra, combinatorics, elementary probability, relations and functions, recursion, graph theory and algorithm development.</p>

SAMPLE