CHRISTIAN HERITAGE COLLEGE

MT111

CALCULUS 1

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.

Unit code	MT111
Unit name	Calculus 1
Associated higher education awards	Bachelor of Education (Primary) Bachelor of Education (Secondary) Bachelor of Arts/Bachelor of Education (Secondary)
Duration	One semester
Level	Introductory
Core/Elective	Required for a minor in Mathematics
Weighting	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
Delivery mode	Face-to-face on-site
Student workload	*Face-to-face on site* Contact hours 30 hours Reading, study and assignment preparation 120 hours **TOTAL** **150 hours** Students requiring additional English language support are expected to undertake an additional one hour per week.
Prerequisites/ co-requisites/ restrictions	Nil
Rationale	According to the *The Mathematics? Why Not*? Report, prepared by the Australian Association of Mathematics Teachers and the University of New England, a key factor that deters students from studying higher level mathematics in senior secondary years is the large number of secondary teachers who are teaching mathematics outside their training and expertise. The authors state, "More than one-quarter of our junior secondary mathematics teachers have not even completed one year of university study in mathematics, making it difficult to engage students in a potentially demanding subject." This unit acts as a bridge between the students' previous experience in mathematics and further tertiary study in mathematics. Students will engage with new mathematical concepts and will be presented both with theory and practical examples. Topics include trigonometric functions, basic vector algebra in two and three dimensions, log exponential, trigonometric and periodic functions, basic differential and integral calculus of one variable and partial derivatives. Most importantly, they will learn how to apply fundamental mathematical tools and techniques used in most fields of science, engineering and mathematics. It is these applications that are essential for secondary classroom teachers to understand. Further, for the Christian teacher, developing a broader appreciation of the logic, order and consistency of such mathematical applications and how these reflect the character of God and His creation is of great significance. By weaving the cognitive with the eternal in this regard, it is possible for secondary classroom teachers to convey the relevance of higher level mathematics to their students and inspire them to higher levels of learning.

Prescribed text(s)	Stewart, J. (2015). *Calculus: Early transcendentals.* (8th ed.). Boston, MA: Cengage Learning. Selected readings will be available via the Moodle™ site for this unit.
Recommended readings	Adams, R.A., & Essex, C. (2013). *Calculus: A complete course.* (8th ed.). New York, NY: Pearson. Anton, H., Bivens, I., & Davis, S. (2012). *Calculus: Early transcendentals.* (10th ed.) New York, NY: Wiley. Larson, R., & Edwards, B. H. (2013). *Calculus.* (10th ed.). Boston, MA: Cengage Learning. Washington, A. (2013). *Basic technical mathematics with calculus.* (10th ed.). New York, NY: Pearson. 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). These and other translations may be accessed free on-line at http://www.biblegateway.com. The Bible app from LifeChurch.tv is also available free for smart phones and tablet devices.
Specialist resource requirements	Casio fx-82AU PLUS II scientific hand-calculator or equivalent
Content	1. Vectors 2. Functions and limits 3. Differentiation 4. Integration 5. Sequences and series
Learning outcomes	On completion of this unit, students will have demonstrated that they have: 1. developed fluency in using differential and integral calculus, vectors, functions, and sequences and series; 2. analysed mathematical problems to identify and apply relevant processes to solve such problems; 3. appreciated the logic, order and consistency of mathematics in relation to its reflection of both the character of God and His creation; 4. applied appropriate strategies to effectively communicate relevant mathematical concepts and arguments using either written English or mathematical notations, as appropriate; and 5. communicated at an appropriate tertiary standard: with special attention to design elements, grammars, usage, logical relations, style, referencing and presentation.
Assessment tasks	**Task 1**: **Folio** Word Length/Duration: 1 weeks Weighting: 20% Learning Outcomes: 1, 2, 4 Assessed: Weekly **Task 2**: **Investigation and Application** Word Length/Duration: 1500 words Weighting: 30% Learning Outcomes: 1-5 Assessed: Week 7

	Task 3: **Examination** Word Length/Duration: 3 hours Weighting: 50% Learning Outcomes: 1-5 Assessed: Examination Week
Unit summary	This course revises and extends basic differential and integral calculus of one variable, introduces partial derivatives and basic vector algebra in two and three dimensions. It provides a foundation for further studies in mathematics and science.