

St Stephen's School, Carramar

Introductory Calculus – Course Outline – Semester 1 2008

Textbooks: Introductory Calculus Second Edition by A.J. Sadler (S), Introductory Calculus by O.T. Lee (L)

Term 1

Week	Topic	Resources	Assessment Items (approximate dates)
1	Linear Functions 1.1 Linear Functions, their graphs, essential features, parallel and Perpendicular lines.	L: Chapter 1 S: Chapter 2	Assignment 1 due 25 Feb (JBA)
2	Quadratics 1.2 Quadratic Functions, their graphs, essential features, different forms. 1.3 Quadratic Formula, Quadratic roots.	L: Chapter 2 S: Chapter 3	
3 - 4	Cubics and Other Functions 1.4 x^n (n fixed) functions and their related graphs. 1.5 Explore features of polynomials and their graphs. 1.6 Matching a function with its graph.	L: Chapter 3 S: Chapter 4	Test 1 - 28/29 Feb (JBA) Assignment 2 due 27 March (JK)
5 - 7	Indices and Logarithms 2.1 Index Laws. 2.9 $y = a \Leftrightarrow x = \log x$ Inverse Relationship.	L: Chapter 4 S: Chapter 5	Investigation 1 (JBA) Test 2 – 20 March (JK)
8 - 9	Geometric Progressions 2.4 Geometric Series. 2.5 Investigate the limiting behaviour of r^n as $n \rightarrow \infty$, (r fixed). 2.6 Infinite Geometric Series.	L Chapter 5 S: Chapter 5	Inv 1 Validation Test (27/28 Mar) (JBA)
10			Test 3 10/11 April (JBA) Investigation 2 (JK)

Term 2

Week	Topic		Assessment Items (approximate dates)
1	The Exponential Function 2.2 Exponential function properties and their graphs. 2.3 Geometric growth and decay. 2.7 Investigate the limiting behaviour, $\left(1 + \frac{a}{n}\right)^n$ as $n \rightarrow \infty$ (a fixed). 2.8 Define e as the limit of $\left(1 + \frac{1}{n}\right)^n$ as $n \rightarrow \infty$ 4.8 Identify and solve problems involving geometric growth and decay.	L: Chapter 6 S: Chapter 10	Inv 2 Validation Test (JK) 1/2 May
2	Natural Logarithms 2.9 $y = a^x \leftrightarrow x = \log_a x$ Inverse Relationship. 2.10 Properties of Logarithmic Functions and their graphs. 2.11 Define the natural logarithm $\log_e x$	L: Chapter 6 S: Chapter 11	Assignment 3 due 26 May (JBA)
3	Function Notation and Limits Function Notation, Limits	L: Chapter 7 S: Chapter 1	
3 - 4	Differentiation 3.1 Average rate of change of a function. 3.2 Instantaneous rate of change of a function. 3.3 Derivative Notation. 3.4 Differentiate x^n for any real number n . 3.5 Differentiation by first principles. 3.7 Sum, Product and Quotient rules. 3.8 Chain rule. 3.12 Second Derivative.	L: Chapter 8 S: Chapter 6	
5 - 7	Revision and Exams		Semester 1 Exam (15%)
8 - 10	3.10 Differentiate e^x . 3.6 Differentiate $\ln x$. 3.9 Differentiate inverse relationships, and use the formula $\frac{dx}{dy} \times \frac{dy}{dx} = 1$. 3.11 Derivative Functions.		Test 4 (JK) Investigation 3 (JBA)

Semester 2 2008

Term 3

Week	Topic	Resources	Assessment Items (approximate dates)
1, 2	Turning Points and Other Features 4.1 Gradient of a curve at a point. 4.2 Equation of a tangent to a curve. 4.5 Local extreme points, sign test and 2nd derivative tests. 4.6 Relate features of the graph of a function to properties of its first and second derivatives.	L: Chapter 10 S: Chapter 8	Inv 3 Validation Test (JBA) Assignment 4 (JK)
3 -6	Rates of Change and Applications of Differentiation 4.7 Solve optimisation problems by finding global extreme points. 4.3 Differentiate functions involving time such as velocity and acceleration. 4.4 Marginal rate of change and Instantaneous rate of change. 4.8 Identify and solve problems involving geometric growth and decay.	L: Chapter 11 S: Chapter 7 S: Chapter 9	Test 5 (JBA) Assignment 5 (JBA)
7 – 10	Integration 5.1 Develop the concept of the indefinite integral as an anti-derivative. 5.2 Integrate x^n ($n \neq -1$) 5.3 Integrate x^{-1} 5.4 Integrate e^x 5.5 Integrate $(ax + b)^n$ and e^{ax+b} ($= Ae^{kx}$) using linear changes of variable. 5.6 Integrate linear combinations of powers $(ax + b)^n$ and exponentials e^{ax+b} . 5.7 Solve the differential equation $y' = f(x)$ by integration, and evaluate the constant of integration using $y(a) = b$. 5.8 Develop the concept of the definite integral as the signed area under a graph. 5.9 Estimate integrals of x and x^2 using approximating sums of the areas of rectangles. 5.10 Use the 'integral of a derivative' formula: $\int_a^b f'(x)dx = f(a) - f(b)$ to calculate definite integrals.	L: Chapter 13 L: Chapter 14 S: Chapter 12	Assignment 6 (JK)

Term 4

Week	Topic	Resources	Assessment Items (approximate dates)
<i>1</i>	<i>Year 11 Retreat</i>		
2 – 3	Applications of Integration 6.1 Evaluate total changes from given rates of change. 6.2 Determine areas under and between curves.	L: Chapter 15 S: Chapter 13	Test 6 (JK)
4 – 6	Revision and Exams		Semester 2 Exam (25%)

Assessment Weightings

Assessment	Frequency	Total Weighting
Investigations/EPWs	3	15 %
Tests	6	35 %
Exams	2	40 %
Assignments	6	10 %
TOTAL	17	100 %