# MAST10006 Calculus 2

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| **Credit Points:** | 12.5 |
| **Level:** | 1 (Undergraduate) |
| **Dates & Locations:** | 2015, Parkville<br><br>This subject commences in the following study period/s:<br>Semester 1, Parkville - Taught on campus.<br>Semester 2, Parkville - Taught on campus. |
| **Time Commitment:** | Contact Hours: 3 x one hour lectures per week, 1 x one hour practice class per week. Total Time Commitment: Estimated total time commitment of 170 hours |
| **Prerequisites:** | A study score of at least 29 in VCE Specialist Mathematics 3/4, or equivalent, or one of |

| Subject | Study Period Commencement: | Credit Points |
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| MAST10005 Calculus 1 | Semester 1, Semester 2 | 12.50 |
| MAST10007 Linear Algebra | Summer Term, Semester 1, Semester 2 | 12.50 |

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| **Corequisites:** | None |
| **Recommended Background Knowledge:** | None |
| **Non Allowed Subjects:** | Students may only gain credit for one of |

| Subject | Study Period Commencement: | Credit Points |
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| MAST10006 Calculus 2 | Semester 1, Semester 2 | 12.50 |
| MAST10009 Accelerated Mathematics 2 | Semester 2 | 12.50 |

Students may not enrol in MAST10005 Calculus 1 and MAST10006 Calculus 2 concurrently.

Bachelor of Science students are permitted to complete a maximum of three level-1 Mathematics and Statistics subjects. They are not permitted to complete all four of MAST10005, MAST10006, MAST10007 and MAST10010

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| **Core Participation Requirements:** | <p>For the purposes of considering request for Reasonable Adjustments under the Disability Standards for Education (Cwth 2005), and Student Support and Engagement Policy, academic requirements for this subject are articulated in the Subject Overview, Learning Outcomes, Assessment and Generic Skills sections of this entry.</p> <p>It is University policy to take all reasonable steps to minimise the impact of disability upon academic study, and reasonable adjustments will be made to enhance a student's participation in the University's programs. Students who feel their disability may impact on meeting the requirements of this subject are encouraged to discuss this matter with a Faculty Student Adviser and Student Equity and Disability Support: <a href="http://services.unimelb.edu.au/disability">http://services.unimelb.edu.au/disability</a></p> |
| **Coordinator:** | Dr Christine Mangelsdorf, Dr John Banks |
| **Contact:** | First Year Coordinator<br><br>**Email: fycoord@ms.unimelb.edu.au (mailto:fycoord@ms.unimelb.edu.au)** |
| **Subject Overview:** | This subject will extend knowledge of calculus from school. Students are introduced to hyperbolic functions and their inverses, the complex exponential and functions of two variables. Techniques of differentiation and integration will be extended to these cases. Students will be |

exposed to a wider class of differential equation models, both first and second order, to describe systems such as population models, electrical circuits and mechanical oscillators. The subject also introduces sequences and series including the concepts of convergence and divergence.

Calculus topics include: intuitive idea of limits and continuity of functions of one variable, sequences, series, hyperbolic functions and their inverses, level curves, partial derivatives, chain rules for partial derivatives, directional derivative, tangent planes and extrema for functions of several variables. Complex exponential topics include: definition, derivative, integral and applications. Integration topics include: techniques of integration and double integrals. Ordinary differential equations topics include: first order (separable, linear via integrating factor) and applications, second order constant coefficient (particular solutions, complementary functions) and applications.

| Learning Outcomes: | Students completing this subject should be able to:<br><br># calculate simple limits of a function of one variable;<br># determine convergence and divergence of sequences and series;<br># sketch and manipulate hyperbolic and inverse hyperbolic functions;<br># evaluate integrals using trigonometric and hyperbolic substitutions, partial fractions, integration by parts and the complex exponential;<br># find analytical solutions of first and second order ordinary differential equations, and use these equations to model some simple physical and biological systems;<br># calculate partial derivatives and gradients for functions of two variables, and use these to find maxima and minima. |
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| Assessment: | Four or five written assignments due at regular intervals during semester amounting to a total of up to 50 pages (20%), and a 3-hour written examination in the examination period (80%). |
| Prescribed Texts: | None |
| Breadth Options: | This subject potentially can be taken as a breadth subject component for the following courses:<br><br># **Bachelor of Arts (https://handbook.unimelb.edu.au/view/2015/B-ARTS)**<br># **Bachelor of Commerce (https://handbook.unimelb.edu.au/view/2015/B-COM)**<br># **Bachelor of Environments (https://handbook.unimelb.edu.au/view/2015/B-ENVS)**<br># **Bachelor of Music (https://handbook.unimelb.edu.au/view/2015/B-MUS)**<br><br>You should visit **learn more about breadth subjects (http://breadth.unimelb.edu.au/breadth/info/index.html)** and read the breadth requirements for your degree, and should discuss your choice with your student adviser, before deciding on your subjects. |
| Fees Information: | Subject EFTSL, Level, Discipline & Census Date, http://enrolment.unimelb.edu.au/fees |
| Generic Skills: | In addition to learning specific skills that will assist students in their future careers in science, they will have the opportunity to develop generic skills that will assist them in any future career path. These include:<br><br># problem-solving skills: the ability to engage with unfamiliar problems and identify relevant solution strategies;<br># analytical skills: the ability to construct and express logical arguments and to work in abstract or general terms to increase the clarity and efficiency of analysis;<br># collaborative skills: the ability to work in a team; and<br># time-management skills: the ability to meet regular deadlines while balancing competing commitments. |
| Notes: | This subject is available for science credit to students enrolled in the BSc (both pre-2008 and new degrees), BASc or a combined BSc course.<br><br>Students with a score of 40 or more in VCE Specialist Mathematics 3/4 are strongly encouraged to enrol in both<br><br># MAST10008 Accelerated Mathematics 1<br># MAST10009 Accelerated Mathematics 2 |

instead of both

- # MAST10006 Calculus 2
- # MAST10007 Linear Algebra

Students with a study score of 29 in VCE Specialist Mathematics 3/4 or equivalent, are eligible to enrol in MAST10005 Calculus 1, MAST10006 Calculus 2 or MAST10007 Linear Algebra. Such students should seek course advice before completing their enrolment.

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| **Related Course(s):** | Bachelor of Biomedicine<br>Bachelor of Environments |
| **Related Majors/Minors/ Specialisations:** | B-ENG Chemical Engineering stream<br>B-ENG Chemical and Biomolecular Engineering stream<br>B-ENG Civil Engineering stream<br>B-ENG Electrical Engineering stream<br>B-ENG Mechanical Engineering stream<br>B-ENG Software Engineering stream<br>Civil (Engineering) Systems major<br>Engineering Systems<br>Environmental Engineering Systems major<br>Environmental Science major<br>Environments Discipline subjects<br>Geomatics (Geomatic Engineering) major<br>Science-credited subjects - new generation B-SCI and B-ENG.<br>Selective subjects for B-BMED<br>Spatial Systems |
| **Related Breadth Track(s):** | Chemical Engineering<br>Mathematics for Economics<br>Mechanical Engineering<br>Electrical Engineering<br>Mathematics and Statistics |