# PHYC10006 Physics 2: Life Sciences & Environment

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| **Credit Points:** | 12.5 |
| **Level:** | 1 (Undergraduate) |
| **Dates & Locations:** | 2016, Parkville<br>This subject commences in the following study period/s:<br>Semester 2, Parkville - Taught on campus. |
| **Time Commitment:** | Contact Hours: 3 x one hour lectures per week; 1 x one hour tutorial per week; 28 hours of practical work (8 x three hour laboratory sessions and up to 30 minutes of pre-laboratory activity) and 10 weekly assignments of 30 minutes each during the semester. Total Time Commitment: Estimated total time commitment of 170 hours |
| **Prerequisites:** | Physics and Mathematics prerequisites exist for this subject.<br>Physics<br># Study score of 25 or more in VCE Physics 3/4 or equivalent<br>Or one of: |

| Subject | Study Period Commencement: | Credit Points: |
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| PHYC10001 Physics 1: Advanced | Semester 1 | 12.50 |
| PHYC10003 Physics 1 | Semester 1 | 12.50 |
| PHYC10005 Physics 1: Fundamentals | Semester 1 | 12.50 |

Mathematics

One of

# Study score of 25 or more in VCE Mathematical Methods 3/4 or equivalent
# Admission into the Bachelor of Science

OR both of

| Subject | Study Period Commencement: | Credit Points: |
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| MAST10014 Foundation Mathematics 1 | Semester 1 | 12.5 |
| MAST10015 Foundation Mathematics 2 | Semester 2 | 12.5 |

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| **Corequisites:** | None |
| **Recommended Background Knowledge:** | None |
| **Non Allowed Subjects:** | Students may only gain credit for one of<br># PHYC10002 Physics 2: Advanced<br># PHYC10004 Physics 2: Physical Science & Technology<br># PHYC10006 Physics 2: Life Sciences & Environment<br># PHYC10007 Physics for Biomedicine |
| **Core Participation Requirements:** | For the purposes of considering request for Reasonable Adjustments under the Disability Standards for Education (Cwth 2005), and Students Experiencing Academic Disadvantage Policy, academic requirements for this subject are articulated in the Subject Description, Subject Objectives, Generic Skills and Assessment Requirements of this entry.The University is dedicated to provide support to those with special requirements. Further details on |

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| | the disability support scheme can be found at the Disability Liaison Unit website: http://www.services.unimelb.edu.au/disability/ |
| **Coordinator:** | Assoc Prof Roger Rassool |
| **Contact:** | Director of First Year Studies<br>**Email: dfys@physics.unimelb.edu.au (mailto:dfys@physics.unimelb.edu.au)** |
| **Subject Overview:** | This subject aims to develop students' understanding of the physics principles underpinning biological and environmental systems. It is designed for students with a sound background in physics, whose interests lie mainly in the biological sciences. Topics include:<br>Fluids: blood pressure and the circulatory system, breathing and respiration (pressure in fluids, fluid flow, viscosity).<br>Thermal physics: heating and cooling, energy balance of living organisms, ion movement across membranes (temperature and thermal energy, phase changes, heat transfer mechanisms, first law of thermodynamics, diffusion).<br>Electricity and magnetism: bioelectricity, nerve conduction, electrical safety, power transmission, synchrotron, biological effects of electromagnetic fields (electric charge and field, electric potential, capacitance, electric circuits, resistance, magnetic fields and forces, Faraday's law of induction).<br>Atomic physics and lasers: fluorescence imaging and spectroscopy, laser surgery (structure of the atom, photons, spectroscopy, interaction of light with matter);<br>Radiation: radiation safety, therapeutic uses of radiation (the atomic nucleus, isotopes, nuclear decay and radiation, physical and biological half-life, ionising radiation); and<br>Imaging: modern biomedical imaging (X-rays, CT-scans and angiography, ultrasound imaging, positron emission tomography). |
| **Learning Outcomes:** | To enable students to understand the importance of physical principles to biological and environmental sciences, and develop their capacity to:<br># understand and explain the physics principles of fluids, thermal physics, electricity and magnetism, atomic, radiation and imaging physics;<br># apply these principles using logical reasoning, together with appropriate mathematical reasoning, to a variety of familiar and novel situations and problems in the biological and environmental sciences; and<br># acquire experimental data using a range of measurement instruments and interpret these data. |
| **Assessment:** | Ongoing assessment of practical work during the semester (25%); ten weekly assignments (10 x 1.5% = 15%); a 3-hour written examination in the examination period (60%). Satisfactory completion of practical work is necessary to pass the subject (i.e. attendance and submission of work for at least 80% of workshop sessions together with a result for assessed work of at least 50%). |
| **Prescribed Texts:** | Either: Physics Vol 2, Asia-Pacific Edition, R. Serway, J. Jewett, K. Wilson and K. Wilson, Pub. Cengage Learning: Volume 2 & EWA-9780170170970 OR: Physics for the Life Sciences 2E, Martin Zinke-Allmang, Ken Sills, Reza Nejat and Eduardo Galiano-Riveros, Cengage Learning: & EWA-9780170273473 |
| **Breadth Options:** | This subject potentially can be taken as a breadth subject component for the following courses:<br># **Bachelor of Arts (https://handbook.unimelb.edu.au/view/2016/B-ARTS)**<br># **Bachelor of Commerce (https://handbook.unimelb.edu.au/view/2016/B-COM)**<br># **Bachelor of Environments (https://handbook.unimelb.edu.au/view/2016/B-ENVS)**<br># **Bachelor of Music (https://handbook.unimelb.edu.au/view/2016/B-MUS)**<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 |

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| **Generic Skills:** | A student who completes this subject should be able to:<br># explain their understanding of physics principles and applications lucidly, both in writing and orally;<br># acquire and interpret experimental data and design experimental investigations;<br># participate as an effective member of a group in tutorial discussions, laboratory and study groups;<br># think independently and analytically, and direct his or her own learning; and<br># manage time effectively in order to be prepared for regular practical and tutorial classes, tests and the examination. |
| **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. |
| **Related Course(s):** | Bachelor of Biomedicine |
| **Related Majors/Minors/ Specialisations:** | Science-credited subjects - new generation B-SCI and B-ENG.<br>Selective subjects for B-BMED |