

PHYS 3008 BIOMEDICAL PHYSICS

Credit Points 10

Legacy Code 301459

Coordinator Antonio Lauto ([https://directory.westernsydney.edu.au/search/name/Antonio Lauto/](https://directory.westernsydney.edu.au/search/name/Antonio%20Lauto/))

Description Students completing this unit will be able to apply the principles and practice of physics to advanced biomedical applications, to critically analyse data regarding, and solve problems involving the physics of living systems, and to work with a range of advanced instrumentation. This unit will provide advanced training in biomedical physics and prepare students for career pathways in medical and biomedical physics. The unit content includes concepts of diffusion and Brownian motion; applications of thermodynamics to biological systems and the origin of life; biomolecular self-assembly; nuclear magnetic resonance and magnetic resonance imaging; atomic force microscopy; molecular dynamics simulations; biophotonics; and nuclear and radiation physics in biomedical sciences.

School Science

Discipline Physics

Student Contribution Band HECS Band 2 10cp

Check your HECS Band contribution amount via the Fees (https://www.westernsydney.edu.au/currentstudents/current_students/fees/) page.

Level Undergraduate Level 3 subject

Pre-requisite(s) MATH 1014 AND PHYS 1002

Restrictions Students must have passed 100cps of subjects.

Assumed Knowledge

Knowledge of Mathematics equivalent to Mathematics 1B is recommended, but not required.

Learning Outcomes

On successful completion of this subject, students should be able to:

1. Articulate and communicate how physics can be used to understand and manipulate biological systems, and the role and impact of biomedical physics in society.
2. Solve complex problems in the physical sciences by applying critical thinking, analytical and problem-solving skills.
3. Propose innovative solutions to problems and challenges in biomedical systems by integrating knowledge of physics, mathematics, chemistry, biology and other areas of science.
4. Conduct investigations in biomedical physics in a collaborative environment.

Subject Content

1. Diffusion and Thermodynamics of Biological Systems
Brownian motion, dissipation and driving forces, measurement techniques, osmotic pressure, biomolecular self-assembly, the origin and physics of life
2. Bioelectromagnetism
Hodgkin and Huxley nerve conduction model
3. Medical Imaging (MRI)

Sources of contrast, image formation, diffusion-weighted imaging

4. Mechanobiology

Atomic force microscopy, biological rheology

5. Biophotonics

Optics/coherent radiation, photodynamic therapy, fluorescence imaging

6. Nuclear Physics and Ionising Radiation in Biomedicine

PET MRI, MRI linac, radiation

Assessment

The following table summarises the standard assessment tasks for this subject. Please note this is a guide only. Assessment tasks are regularly updated, where there is a difference your Learning Guide takes precedence.

Item	Length	Percent	Threshold	Individual/Group Task
Numerical Problem Solving	2 hours	30	N	Individual
Presentation	15 minutes	20	N	Group
Applied Project	1 500 words	20	N	Individual
Viva Voce	20 minutes	30	N	Individual

Teaching Periods

Spring Campbelltown Day

Subject Contact Antonio Lauto ([https://directory.westernsydney.edu.au/search/name/Antonio Lauto/](https://directory.westernsydney.edu.au/search/name/Antonio%20Lauto/))

View timetable (https://classregistration.westernsydney.edu.au/even/timetable/?subject_code=PHYS3008_22-SPR_CA_D#subjects)