PH — PHYSICS

Offered by the Department of Physics. For contact details consult the Faculty of Engineering, Physical Sciences and Architecture entry in the Faculties, Schools and Departments chapter.

PH119 Introductory General Physics
#7 (3C) 1st
Inc: Snr Physics
Coordinator: Ms Wegener.
Assessment: Final examination.
Bridging subject, intended for students with little or no previous knowledge of physics, to be taken in conjunction with other level 1 physics subjects. Elementary treatment of kinematics, dynamics, electricity & magnetism, direct current circuits, heat, geometrical optics.

PH127 Physics for Physiotherapy
#6 (3C) 2nd
Coordinator: Assoc. Prof. Rubinsztein-Dunlop.
Assessment: Final examination.
Introduction to statics & mechanics, work & energy. Electricity (including physiological effects), alternating & high frequency currents, electromagnetic radiation (includes biological effects), ultrasonics.

PH138 The Physical Basis of Biological Systems
#12 (2L2T2P) 1-2
Inc: PH100 or 101 or 110 or 111 or 112 or 117 or 118 or 125 or 128 or 130 or 131 or 132 or 133 or 142 or 143 or 144 or 145 or 170 or 171
Coordinators: Prof. Milburn, Assoc. Prof. Rubinsztein-Dunlop.
Assessment: Examination, assignments, laboratory practicals.
Introductory mechanics, Newtonian dynamics, work & energy, mechanical properties of solids & fluids, laboratory experiments including radiation physics, d.c. electricity, bioelectric effects, fluid dynamics for human movement studies, simple harmonic motion, projectile motion & rotational dynamics. Special lectures on biophysical applications.

PH144 Mechanics & Thermal Physics I
#12 (3L1T3P) 1st
Inc: PH100 or 110 or 117 or 118 or 125 or 128 or 130 or 132 or 138 or 142 or 143 or 144 or 145 or 170 or 171
Mathematics B C: MT150
P: MT140 or Snr Mathematics
Coordinators: Assoc. Prof. Heckenberg, Dr Tuck (Lab).
Assessment: Examinations, assignments, laboratory practicals.
Nature of physics, kinematics, dynamics, gravitation, mechanical waves, fluids, elasticity, non-linear physics, chaos, thermal physics, physics of information, arrow of time, self-organisation, laboratory experiments & error analysis.

PH145 Electromagnetism, Optics, Relativity & Quantum Physics I
#12 (3L1T3P) 2nd
Inc: PH101 or 111 or 112 or 117 or 118 or 125 or 128 or 131 or 133 or 138 or 143 or 171 P: MT150 + PH144 C: MT151
Coordinators: Prof. Drummond, Mrs Harris (Lab).
Assessment: Examinations, assignments, laboratory practicals.
Electricity, magnetism, electric circuits, optics, quantum physics, quark theory of matter, special relativity, energy & mass, cosmology & evolution of universe & laboratory experiments.
**PH 208 Principles of Sensor Technology**  
#12 (4C) 2nd  
Pre: 9E102 or 103 Inc: PH 206  
Coordinator: Dr White.  
Assessment: Examination, major project, experimental sessions.  
Principles of sensor technologies: semiconductor, optoelectronic & other modern & emerging sensors are discussed & analysed.

**PH 226 Astronomy A**  
#12 (4C) 2nd  
Inc: PH 124 or 223  
Coordinator: Dr Ross.  
Assessment: Examinations.  

**PH 227 Astronomy B**  
#6 (2C) 1st  
Pre: PH 138 or 144 Inc: PH 224 or 317 or 324 or 327 P: PH 145  
Coordinator: Dr Ross.  
Assessment: Examinations.  
Astronomical distances, stellar astronomy, observed properties of stars. Stellar structure. Galactic astronomy, the interstellar medium, nebulae, magnetism. Galaxies, clusters, cosmology.

**PH 241 Thermodynamics & Condensed Matter Physics**  
#12 (4C) 1st  
Pre: MT151 + PH144 Inc: PH 201 or 231  
Coordinator: Prof. Milburn.  
Assessment: Examinations.  
Theoretical understanding of general properties of macroscopic sized material systems that apply irrespective of the detailed behaviour of microscopic particles constituting the system. Understanding of matter in condensed (liquid or solid) states.

**PH 242 Quantum Physics & Physical Optics**  
#12 (4C) 2nd  
Pre: MT152 + PH144 + 145 Comp: PH244 Inc: CH 373 or PH 207 or 212 or 213 or 232 or 237 or 251  
Coordinators: Dr O’Mara, Assoc. Prof. Rubinsztein-Dunlop.  
Assessment: Examination, assignment.  
Experimental basis & general features of quantum physics & modern optics. Selected topics from atomic, nuclear & solid state physics. Wide range of diffraction & interference situations. Wave motions satisfying boundary conditions emphasised.

**PH 244 Dynamics, Chaos & Special Relativity**  
#12 (4C) 2nd  
Pre: MT152 + PH144 + 145 Inc: MA 202 or 204 or 211 or 255 or 271 or 308 or PH 255  
Coordinators: Prof. Milburn, Dr O’Mara.  
Assessment: Examination & assignments.
Introduction to Lagrangian & Hamiltonian mechanics including elementary treatment of chaos in Hamiltonian systems. Calculus of variations, constraints, generalised coordinates, geometrical methods. Introduction to Special Relativity including relativistic particle mechanics.

**PH 248 Electronics & Circuit Theory**

#12 (3P2C) 1st  
Pre: PH145 Inc: PH203 or 233 or 253 or 270  
Coordinator: Dr Jones.  
Assessment: Examination & lab reports.  
Electric circuits & electronics designed for the laboratory scientist. Complex impedance & Laplace Transform methods. Elementary design of analogue & digital devices. Applications to signal processing & measurement systems.

**PH 282 Experimental Modern & Optical Physics**  
#12 (6P) 2nd  
Pre: PH145 Inc: PH272 or 273 P: PH144  
Coordinators: Assoc. Prof. Heckenberg, Assoc. Prof. Rubinsztein-Dunlop.  
Assessment: Lab reports.  
Laboratory work in physical optics & on experiments crucial in development of modern physics.

**PH 317 Space Physics & Astrophysics**  
#12 (4C) 1st  
Pre: (9E102 + 103) + MT151 Inc: PH224 or 227 or 324 or 327  
Coordinators: Dr Ross, Assoc. Prof. Rubinsztein-Dunlop.  
Assessment: Examinations.  

**PH 326 Condensed Matter Physics**  
#6 (2C) 1st  
Pre: (PH231 or 241) + (PH237 or 242) Inc: E3305 or PH356  
Coordinator: Dr Lucas.  
Assessment: Examinations.  

**PH 327 Stellar Evolution & Cosmology**  
#12 (4C) 2nd  
Pre: (MP212 or 282 or MT250 or 251 or PH224 or 227) + (PH231 or 241) Inc: PH324  
Coordinator: Dr O'Mara.  
Assessment: Examination, CAL assignments.  
Observational & theoretical aspects of stellar structure, stellar evolution & cosmology, synthesis of the elements in stars & in the early history of the universe.

**PH 341 Statistical Mechanics**  
#12 (4C) 2nd  
Pre: (MA 252 or PH 231 or 241) + (i) MP211 or (ii) MP281 or (iii) MT250 + 253 Inc: PH331  
Coordinator: Prof. Drummond.  
Assessment: Examinations.
Theoretical understanding of the physical properties of samples of material of macroscopic size, on the basis of the known quantum mechanical behaviour of the constituent (microscopic) particles.

**PH 342 Quantum Physics**  
#12 (4C) 1st  
Pre: (PH237 or 242) + [(i) (MP212 or 282) + MP213 or (ii) MT250 + 253] Inc: PH302 or 332  
P: PH244 or (PH 255 + MA 255)  
C: MP303  
Coordinator: Prof. Milburn.  
Assessment: Examination & assignment.  
Theoretical basis for the understanding of physical properties of systems, generally of microscopic size, such as atoms, molecules or nuclei, but also certain macroscopic systems, such as superfluids or superconductors.

**PH 348 Electromagnetic Theory III**  
#12 (4C) 2nd  
Pre: PH145 + (PH237 or 244) + (MP211 or 281 or (MT250 + 253)) Inc: MA375 or PH236 or 334 or 335 or 337 or 338  
Coordinator: Dr Jones.  
Assessment: Examinations.  
Introduction to classical electromagnetic theory embodying Maxwell’s equations with applications mainly to situations where electric charge can be treated as a continuous fluid. Maxwell’s equations in tensor form.

**PH 356 Solid State Physics**  
#10 (2L2C) 1st  
Pre: (PH201 or 231) + (PH207 or 212 or 232 or 237) Inc: E3305  
Coordinator: Dr Lucas.  
Assessment: Final examination.  
Crystal structures & their determination, crystal forces & lattice dynamics, theories of heat capacity, free electron model for a metal, elementary transport & band theories.

**PH 359 Laser Physics**  
#6 (2C) 1st  
Pre: (i) (PH 206 or 208) + (PH 308 or 322 or 323) or (ii) (PH 322 + 323) or (iii) (PH 251 or 242) + (CH231 or PH231 or 241) Inc: PH358  
Coordinator: Assoc. Prof. Heckenberg.  
Assessment: Examination, assignments.  

**PH 362 Computational Physics**  
#6 (4P) 1st  
Pre: (PH231 or 241) + [(i) (MP211 or 281) + MP213 or (ii) MT250 + 253] Inc: PH361  
Coordinator: Dr Jones.  
Assessment: Report & workbook.  
Computational physics involving the Visac laboratory & a mixture of Matlab & C programming. Topics to be covered include dynamics & ODE’s, Schrodinger Wave Equation & PDE’s.

**PH 380 Experimental Physics IIIA**
#12 (6P) 1st
Pre: (PH270 + 272 + 273) or (PH248 + 282) Inc: PH372 or 375 or 377
Coordinators: Assoc. Prof. Heckenberg, Dr Jones.
Assessment: Lab reports.
Advanced laboratory physics, digital control of experiments.

**PH 381 Experimental Physics III B**
#12 (6P) 2nd
Pre: (PH270 + 272 + 273) or (PH248 + 282) Inc: PH372 or 375 or 376 or 378 or 379 or 382
Coordinators: Dr Jones, Assoc. Prof. Heckenberg, Dr White.
Assessment: Lab reports.
Advanced laboratory physics.

**PH 490 Physics IV H**
#100 Year (May commence 2nd)
Program of advanced coursework in physics together with research project. Specific subjects available for the advanced coursework listed under PGDipSc (not PH470, PH480, PH 710, PH 720). For details consult Head of Department & Department of Physics Handbook.

**PH 493 Biophysics IV H**
#100 Year
Program of advanced coursework in physics & biological sciences, together with research project involving application of physics to a biological situation. For details consult Head of Department & Department of Physics Handbook.