

Prescriptions and Schedule of Papers for 2007

Mode of Delivery

*	= Not available in 2007
B1, B2, B3	= Available as a block course
E, E1, E2	= Available extramurally
F1	= Face to face teaching
I, I1, I2, I3, I4, I5, I6, I7, I8, I9, I10, I11, I12, I13, I14, I15, I16, I17, I18, I19, I20, I21, I22, I23, I24, I25, I26, I27, I28, I29, I30, I31, I32, I33, I34, I35, I36, I37, I38, I39, I40, I41, I42, I43, I44, I45, I46, I47	= Available internally

Semesters

S1	Semester One
S2	Semester Two
S3	Summer School
S12	Double Semester

Locations

AG	Auckland Geographic Area
AL	Massey Albany
CG	Christchurch Geographic Area
CH	Christchurch
EM	Employers and Manufacturers Assc
HK	Hokowhitu Campus
HW	Hawkes Bay
MA	Military Stds Inst. Auckland
NT	Email/Internet
PG	Papua New Guinea Geographic Area
PN	Massey Palmerston North
RU	Ruawhoro Campus
SP	Singapore Aviation Academy
TH	Thailand Aviation Academy
TN	Tonga Geographic Area
WG	Wellington Geographic Area
WL	Massey Wellington

Paper No./Title	Credits	Sem	Mode	Loc
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Physics

124.001	24 credits	S2	I	PN
Foundation Studies in Physics		S3	I	PN

This paper provides a preliminary course in physics designed for students with little experience of learning physics in English. The basic concepts of physics that are covered include: scientific method and measurement, vectors, kinematics, dynamics, equilibrium, work and energy, rotation, simple harmonic motion, waves, electrostatics and electric circuits. Emphasis is placed on reading, writing and discussing physics in English. The laboratory course gives practice at handling scientific equipment as well as gathering and processing physical data.

124.100	15 credits	S3	E	PN
Foundations of Physics				

Philosophy of scientific measurement and method. Kinematics. Dynamics. Equilibrium. Vectors (momentum and force). Work and energy. Transmission of energy by wave motion. Light and sound. DC electric circuits.

124.101	15 credits	S1	I	AL
Physics I(a)		S1	I	PN
Translational kinematics, dynamics, simple harmonic motion. Waves, geometrical and physical optics. DC and AC circuits. Modern physics. Electronics. A laboratory course based on the above.		S1	I2	PN

124.102	15 credits	S2	I	AL
Physics I(b)		S2	I	PN
Rotational dynamics. Mechanical and thermal properties of matter. Thermodynamics. Electromagnetism. A laboratory course based on the above.		S2	I	WL

124.111	15 credits	S1	I	AL
Physics for Life Sciences		S1	I	PN
Describing motion. Forces and torques, work and energy in biological and non-biological system. Heat energy – its production and transfer in animals. Stress, strain and the strength of biological material. Ideal Gas Law. Flow of fluids in tube. Light, sound and their biological detection. DC and AC electric circuits. Acoustics and ultrasound. Ionising radiation. Biomedical instruments. A laboratory course based on the above which includes the use of basic statistics in the interpretation of data and illustration of the scientific method.		S2	E	PN

Paper No./Title	Credits	Sem	Mode	Loc
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124.150	15 credits	S12	E	PN
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Physical Worlds

An introductory paper about physics, suitable for students with little previous experience in physics or mathematics. Students will study selections from the following topics: astrophysics (including cosmology); quantum physics; physics of planet Earth; physics of technology; physics of sports and body mechanics; health and environmental issues; sound and music; physics in business; people of physics; science, the physical world, and us.

124.226	15 credits	S2	I	PN
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Quantum and Statistical Physics

Kinetic theory and introductory statistical mechanics, introductory quantum physics. A course of laboratory work related to the above.

124.228	15 credits	S2	I	PN
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Physics of Waves and Vibrations

AC theory, optics, electromagnetic wave phenomena. A course of laboratory work related to the above.

124.229	15 credits	S1	I	PN
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Special Relativity and Cosmology

The empirical basis for special relativity, the Lorentz transformation, the paradoxes, Hubble's law, the cosmological principle, the empirical basis for cosmological theories, the Big Bang Theory, the Steady State Theory. A course of laboratory work related to the above.

124.233	15 credits	S1	I	PN
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Classical Mechanics, Chaos and Fluids

Classical mechanics, Lagrangian mechanics, nonlinear dynamics and chaos, fluid mechanics, rheology. A course of laboratory work related to the above.

124.241	15 credits	S1	I	AL
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Analogue Electronics

A general introduction to analogue electronics and design. Topics covered include circuit analysis and simulation, power supplies, transducers, electronic devices, amplifiers and applications. A laboratory course based on the above. Modular computer-aided design and build group project involving analogue circuits.

124.242	15 credits	S2	I	AL
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Digital Electronics

A general introduction to digital electronics and design. Topics covered include digital design fundamentals, logic circuit families, combinational and sequential logic circuits, microprocessors and microcontrollers, data acquisition and conversion, signal processing. A laboratory course

Paper No./Title	Credits	Sem	Mode	Loc
based on the above. Modular computer-aided design and build group project involving digital circuits.				
124.251 Analogue Systems Design	15 credits	S1	I	AL
A general introduction to analogue electronics and design. Topics covered include circuit analysis and simulation, power supplies, transducers, electronic devices, amplifiers and applications. A laboratory course based on the above. Modular computer-aided design and build group project involving analogue circuits.				
124.252 Digital Systems Design	15 credits	S2	I	AL
A general introduction to digital electronics and design. Topics covered include digital design fundamentals, logic circuit families, combinational and sequential logic circuit, microprocessors and microcontrollers, data acquisition and conversion, signal processing. A laboratory course based on the above. Modular computer-aided design and build group project involving digital circuits.				
124.316 Advanced Experimental Physics	15 credits	S2	I	PN
A course in experimental physics comprising laboratory work.				
124.325 Advanced Quantum Physics	15 credits	S1	I	PN
Wave mechanics, atomic physics, solid state physics.				
124.327 Modern Statistical Physics and Thermodynamics	15 credits	S1	I	PN
Modern concepts and methods of statistical mechanics, their applications in physics and to interdisciplinary problems. Thermodynamics.				
124.328 Applied Electromagnetism	15 credits	S2	I	PN
An in-depth study of the application of electromagnetics in modern engineering, including selected aspects of vector algebra, magnetostatics, conductors, insulators, Poisson's and Laplace's equation, transmission lines, time-varying fields and Maxwell's equations. Other topics included in this paper are wave propagation, wave guides, solution of wave guide equations and their applications, and microwave devices. A practical course.				
124.344 Signals and Information	15 credits	S1	I	PN
Review of signals and systems, Fourier series, Fourier transform (DFT and FFT), sampling theory, advanced topics on A/D and D/A, noise, comb filters. Filter design, finite and infinite impulse response digital filters. Polynomial analogue filter design and implementation, z-transforms, multi-rate signal processing, adaptive signal processing. A practical course.				
124.345 Microelectronic Circuits	15 credits	S12	I	PN
The design and use of modern microelectronic components and microsystems. Technologies relevant to fabrication of micro devices and systems. The use of modern design tools. Introduction to a hardware description language. Laboratory course. Electronic devices, analogue circuits, digital circuits.				
124.711 Continuum Physics and Rheology	15 credits	S12	I	PN
Classical Fluid Mechanics: fluid kinematics, stress in a fluid, Navier-Stokes equations, application to simple flows, viscometric flows. Non-Newtonian Fluids: stress tensors, constitutive equations, rheometry.				
124.712 Condensed Matter Physics	15 credits	S12	I	PN
Selected topics of solid-state physics: crystal lattices and band structure, thermodynamic and electronic properties of materials, elementary transport processes. Macroscopic Quantum Phenomena: superfluidity, superconductivity, magnetism.				

Paper No./Title	Credits	Sem	Mode	Loc
124.721 Quantum Mechanics and Group Theory	15 credits	S12	I	AL
Group representations, irreducible representation, group character, Wigner-Eckart theorem. Dirac formalism. Unitary displacement operators, SU(n) symmetries. Angular momentum matrices, rotations, generalised rotation operators. Spinor and vector particles. Angular correlations. Product representations. Clebsch-Gordon coefficients. Hadron symmetries. Quantum statistics: density operator and dynamical evolution.				
124.722 Relativistic Quantum Mechanics and Field Theory	15 credits	S12	I	PN
Lorentz covariance. Four-vectors, electromagnetic fields and Maxwell's equations in four-vector formalism. Klein-Gordon Equation, Dirac equation and Spinors. Feynman diagrams. Second quantisation, oscillators and canonical formulation. Scattering. Symmetries and the gauge principle.				
124.741 Analogue and Digital Signal Processing	15 credits	*	*	*
Analogue signal processing systems, sampling, digital filters, FFT and applications, stochastic signals, power spectra, adaptive filtering, multirate signal processing.				
124.742 Electronic Devices and Materials	15 credits	*	*	*
Semiconductor devices, electronic transport in microstructures, technology of microstructures and integrated circuits. Materials: dielectric, magnetic, superconducting, amorphous.				
124.743 Quantum Electronics	15 credits	*	*	*
Wave mechanics: one-dimensional Schrödinger equation, barriers, discrete energy levels, perturbation theory, sudden approximation. Semiconductor physics: energy bands, Fermi level, equilibrium carrier densities, transport properties.				
124.744 Research Methods in Electronics	15 credits	S12	I	PN
A literature research paper investigating significant developments in electronics technology, applications and methods.				
124.745 Topics in Electronic Instrumentation	15 credits	S12	I	PN
Case studies of a range of electronic and signal processing applications.				
124.751 Electronic Design and Manufacturing	15 credits	*	*	*
This paper provides an opportunity to learn about electronic design and manufacture through an industrial based design and build project. The paper covers the formulation of customer requirements and technical specifications; conceptual and detailed design; manufacturing techniques; testing and reliability. An opportunity for students to develop their 'coaching skills' will be provided.				
124.752 Digital Communication Networks	15 credits	S1	I	PN
Switched and non-switched networks, queuing theory, teletraffic theory, layered architecture in networks, routing, congestion control. LAN, WAN, TCP/IP and OSI stacks, ISDN, common channel signalling, frame relay, FDDI, DQDB, SMDS, BISDN, ATM, SDH networks, internetworking. Mobile communication networks including GSM and network design and management. A practical course.				
124.753 Applied Digital Image/Speech Processing	15 credits	S12	I	PN
Image formation and capture. Point, local and global operators. Linear and nonlinear filters. Image segmentation, pattern classification and				

