UNIVERSITY OF KENT
FACULTY OF SCIENCE, TECHNOLOGY AND MEDICAL STUDIES

SCHOOL OF PHYSICAL SCIENCES

FOUNDATION YEAR AND STAGE 1 HANDBOOK 2007/2008

UNIVERSITY OF KENT

FACULTY OF SCIENCE, TECHNOLOGY AND MEDICAL STUDIES

SCHOOL OF PHYSICAL SCIENCES

Orientation Programme for Foundation and Stage 1 Students – September 2007

Programme of Study	**Monday 17th September 2007**	**Wednesday 19th September 2007**	**Friday 21st September 2007**
Forensic Science Foundation Year	2.00-2.30pm, PSLT Welcome from the Head of Department and Tutorial Team	FACULTY PROGRAMME TO BE ADVISED Details to be posted at: http://www.kent.ac.uk/stms/staff-student/induction-index.html	10.00-12.00pm, PSLT Introduction to your course and the Student Data System
	2.30-3.15pm Tour of the Department		1.00-2.00pm, Lab 1 Safety Induction
Forensic Science Stage 1	2.45pm – 3.15pm, PSLT Welcome from the Head of Department and Tutorial Team		1.00-2.00pm, PSLT Introduction to your course and the Student Data System
	3.15-4.00pm Tour of the Department		2.00-3.00pm, Lab 1 Safety Induction
Physics Foundation Year and Stage 1	3.30-4.00pm, PSLT Welcome from the Head of Department and Tutorial Team		2.00-3.00pm, PSLT Introduction to your course and the Student Data System
	4.00-4.45pm Tour of the Department		N/A

All new students are invited to a Welcome Drinks Reception in the School from 12-1pm on Friday 21st September.

Admin, teaching and tutorial staff will be available to answer questions in their offices, from 3-4pm on Friday 21st September.

UNIVERSITY OF KENT
FACULTY OF SCIENCE, TECHNOLOGY AND MEDICAL STUDIES

SCHOOL OF PHYSICAL SCIENCES

FOUNDATION YEAR & STAGE 1 HANDBOOK 2007/2008

Welcome to the University. We hope that you will find this year enjoyable and - if it is your first year at Kent - that you settle in smoothly to University life.

A programme of introductory talks has been arranged (page 2) to help you get to know the University and the department, register for your course and meet your tutor.

This handbook contains most of the details that you will need about the running of the Foundation Year and Stage 1 courses you will take:

- Section A contains general information about the department, points of contact and timetables;
- Sections B, C & D list the module requirements for each degree and provide a catalogue of all the modules available for students undertaking either the Foundation Year or Stage 1 of any of our Physical Sciences degrees;
- Section E contains more detailed information about regulations for attendance at classes and examination requirements;
- Section F contains student support information
- Section G contains lists of teaching and staff room locations to help you around the campus and department

Please note that the information presented in this booklet is given according to the current state of knowledge. The School of Physical Sciences may, at its discretion, introduce changes in the course or examination structure (including the addition, withdrawal or restructuring of courses) and any significant variation from that presented here will be announced and displayed on the notice boards and communicated by e-mail.

SECTION A: GENERAL INFORMATION

A1. 2007/2008 TERM DATES

Autumn Term	-	24th September 2007 – 14th December 2007 (Weeks 1-12)
Spring Term	-	14th January 2008 – 4 April 2008 (Weeks 13-24)
Summer Term	-	5 May 2008 – 13 June 2008 (Weeks 25-30)

Good Friday is 21 March 2008 and Easter Monday 24 March 2008; May Bank Holidays are Monday 5th May 2008 and Monday 26th May 2008. There will be no teaching or examinations on these dates.

NB: Introductory talks for new students begin on 17th September 2007.

A2. THE FIRST FEW DAYS

Important: This year you will be asked to register your module options online. Once you have completed online enrolment, you will be redirected to the appropriate pages.

On page 2 there is a timetable of the programme of introductory talks and meetings for students This will include a session with your programme tutor.

If you have any queries or questions, please see a member of staff in the Student Administration Office, Room 209 (second floor).

CONTACT POINTS
Departmental information will be transmitted to you via one or more of the following, which you should check frequently:

- Pigeon holes - in the student study room on the ground floor of the department (G48).
- Notice boards - in the student study room on the ground floor of the department (G48).
- E-mail - At registration you will be given information on using the computers on campus. You should become familiar with these as soon as possible, and log on to your Windows XP account before the first Monday of the Autumn Term if possible. This is **essential** for communication with staff and students by electronic mail (e-mail), the use of tuition software, and access to the Internet.

If you run into any problems then let either your tutor or the Director of Undergraduate Studies know, and they will do their best to sort them out as quickly as possible.

TIMETABLE
Normal teaching hours are from 9.00am - 6.00pm on Monday, Tuesday, Thursday and Friday, and 9.00am - 1.00pm on Wednesday. Students should however note that it is, on occasion, necessary for teaching to take place on Wednesday afternoon or from 6.00pm - 7.00pm on Monday, Tuesday, Thursday or Friday. Teaching takes the form of lectures, laboratory classes, examples classes, workshops and seminars. Your personal timetable is available from your pages of the Student Data System.

Any changes to these will be sent by email, from within the Student Data System.

Teaching starts at five minutes past each hour and finishes at five minutes to the hour in order to allow ample time to get from one lecture theatre to the next. A list of lecture theatre names and abbreviations is given in section G1.

CLASSES
Lists of groups for laboratory and workshop classes will be sent to you by email in the first few days of term. Please check the notice board each day to see if a list has been posted, in case you have been assigned to a class commencing on the following day. **Note** that if you are doing a module run by another department, information on classes etc. will be posted on their notice boards/emailed by them.

A3. WHO's WHO?

TUTORS
Every student in the School of Physical Sciences is allocated a tutor. You will find out who your programme tutor is in your first few days at Kent.

The tutor is there to assist you with general advice on academic issues, and to offer pastoral support. They will also be able to direct you towards other support services available on campus. You should feel free to seek their advice whenever you are faced with a problem.

Tutors also deal with the initial stages of the disciplinary process within the School. You may be asked to attend an appointment with your tutor if you have, for example, consistently failed to submit coursework on time.

Email is the best way of contacting your tutor to make an appointment to see them. You will find a list of staff email addresses at the back of this handbook. Some tutors may also post their "office hours" on the door of their room. These are times at which the tutor is available to see tutees.

SENIOR TUTOR
The Senior Tutor for the School of Physical Sciences manages the Personal and Academic Support System (PASS). He/She is assisted by the tutors. The Senior Tutor has a predominantly disciplinary role. Programme tutors refer students with consistently poor performance to the Senior Tutor who will often agree a *learning contract* with them, and support them as they attempt to get their studies back on track. Occasionally, the Senior Tutor may have to recommend to the Dean that a student's studies should be terminated due to lack of diligence or poor performance. Fortunately, this doesn't happen very often!

Additional and up-to-date information can be found at:
http://www.kent.ac.uk/physical-sciences/main/undergraduate/pass/index.htm

DIRECTOR OF UNDERGRADUATE STUDIES & DIRECTOR OF LEARNING AND TEACHING
Directors of Undergraduate Studies are in overall charge of all undergraduate teaching matters at a 'strategic' level, with a Director of Learning and Teaching assuming overall 'responsibility' for the undergraduate programmes offered by the entire School of Physical Sciences.
Details of the academic staff who currently hold these posts may be found on the SPS web site, but if in doubt feel free to enquire in the Student Admin Office (Room 209 on the Second Floor of the School building).

STUDENT ADMINISTRATION OFFICE
The School's Student Administration Office is located in Room 209 on the Second Floor. It is a "one-stop" shop for all student related matters. If you have any queries regarding your registration, modules, marks, intermissions or withdrawals you should go to the student admin office. Staff there will also issue you with status letters and transcripts.

A4. PREPARATION FOR A YEAR ABROAD

If you register for an MPhys degree with a year of study in the USA you will spend the third year of your degree studying there. Because of the demands of studying your subject within a different educational system , we require that you reach a good level of performance in Stage 1and 2 in all areas of performance.

All queries regarding your preparation for a year abroad should be directed to the Director of Undergraduate Studies for your programme.

A5. PREPARATION FOR A YEAR IN INDUSTRY

If you are registered for the BSc in Forensic Science or Forensic Chemistry with a Year in Industry your Stage 3 year is spent on an industrial placement working on some aspect of research and/or development. Placements are very competitive and need to be applied for early in your Stage 2 year. During Stage 1 you will be contacted by the Department's industrial placement coordinator who will offer advice and encouragement.

SECTION B: CATALOGUE OF COURSES
FOUNDATION YEAR FORENSIC SCIENCE (F412)

B1. INTRODUCTION & MODULE REQUIREMENTS

Firstly, welcome to the University of Kent. We hope that you will find the University a pleasant and friendly environment in which to study and the Foundation Year course both challenging and interesting. The course is taught on the Canterbury Campus by lecturing staff from the Faculty of Science, Technology and Medical Studies.

The Foundation Year course is managed by the Learning and Teaching Committee of the School. The course is designed to provide the basic knowledge and techniques required for entry to Stage I of your chosen Degree Programme; at the end of the year you will need to pass a qualifying examination in order to progress to that course.

Communication between staff and students is important throughout the year and information is normally communicated by email. Please check your email regularly.

The course consists of 120 credits. The modules in this course are:-

BI305 Fundamental Human Biology *(15 credits)*
PS014 Mathematics and Essay Writing *(15 credits)*
PS021 Molecules and Analysis *(30 credits)*
PS022 Chemical Reactivity *(30 credits)*
PS023 Properties of Matter *(30 credits)*

ASSESSMENT AND EXAMINATIONS

Assessment Structure
One year's full-time undergraduate course contains a workload of 120 credits, each credit representing 10 hours' study time (including private study as well as timetabled classes).

The Forensic Science Foundation Year is divided into three 30-credit modules (codes PS021, PS022, and PS023), one 15-credit module of mathematics and essay writing (code PS014) and one 15-credit module of biology (BI305).

40% of the marks for each module come from continuously-assessed coursework. This coursework includes work set during weekly lectures, laboratory work, and end-of-term class examinations. Mark weightings are given in the module descriptions later in this handbook. For the Mathematics/essay module, coursework includes weekly assignments and class examinations. For the Biology module the coursework consists of four elements of continuous assessment; 2 multiple choice tests and 2 timed essay answer tests .

The remaining 60% of the marks for each module come from end-of-year written examinations, held in May or June.

Criteria for Passing
To pass the Foundation Year students must be awarded credit in all modules. Credit will be awarded in each module where the student achieves a minimum mark of 40%. (Details of the Credit Framework appear later in section E). An overall weighted average of 60% or more attracts a grade of Merit, and of 70% or more a grade of Distinction.

Students who do not achieve a pass in May may be allowed to resit the examinations in failed modules in August. Students are allowed a maximum of two resit opportunities. All coursework marks are carried forward to the resit examination.

Students should note that continuously assessed coursework and laboratory practical classes cannot be resat in the summer and can only be retaken by repeating the module the following year without the possibility of immediately proceeding to Stage 1 of their chosen degree programme.

Students should note that none of the Foundation Year modules may be trailed into Stage 1.

After the course is over
Once you have passed you will receive a transcript and you will be automatically eligible to proceed to Stage 1 of the F410 Forensic Science or F1F4 Forensic Chemistry courses in the School of Physical Sciences.

B2. SYLLABUS AND MODULE DETAILS

The following catalogue of modules provides a reference for the content, aims and objectives, method of assessment and core texts for all modules available to Foundation year Forensic Science students.

We are constantly striving to provide the best teaching and learning environment for our students, and modules are reviewed annually to ensure that the content is appropriate for the overall aims of the degrees. There may be some minor changes to the content of some of the modules as a result of such reviews. You will be notified of any amendments at the start of the appropriate term.

Details of the modules follow:

FUNDAMENTAL HUMAN BIOLOGY

BI305

Biosciences Convenor Dr. K.E. Foster ECTS Credits 7.5
Taught in Autum and Spring Terms Kent Credits 15 Level C

Pre-requisites: Science at GCSE level (or equivalent)

Subject Specific Learning Outcomes: On successful completion of this module students will have knowledge of:

1. The basic structure and function of eukaryotic cells.
2. The basic chemistry of macromolecules.
3. How cells divide and pass information to the next generation.
4. The major systems of the body - blood, muscle and bone, digestive tract, kidneys and nerves.
5. How the body is co-ordinated and controlled.
6. The basic functioning of the immune system and causes of disease.

Learning and Teaching Methods: Lectures: 20h; Tests: 2h; Feedback sessions: 1h; Revision workshops: 1h. Self Study: Essay preparation: 20h; Multiple choice preparation: 40h; Reading, revision: 66h.

Lectures:

Lectures will be based largely on the main textbook and will introduce the precise terminology and current conceptual beliefs natural scientists use to describe the human body and explain its functions.

1-3. Cell structure and function.
4-5. Cell division.
6. Differentiation.
7. Bones.
8. Muscles and movement.
9. Infection and Immunity I.
10. Infection and Immunity II.
11. Blood - Circulation and Transport of Gases
12. Digestion - Digestive Tracts and Enzymes.
13. Absorption and Assimilation - Transepithelial Transport, Metabolism and Storage.
14. Excretion I - Catabolism, Waste Products and the Kidney.
15. Excretion II - Kidney Structure/Function and its Regulation.
16. Coordination and Control - Homeostasis, Sensors, Effectors and Feedback Loops.
17. Hormones - Endocrine Glands and their Targets.
18. Hormone Action - Hormone Types, Receptors, Intracellular Effects.
19. Nerves I - Nervous System and Nerve Cell Structure/Function.
20. Nerves II - Senses, Reflexes, Effectors and Integration.

Methods of Assessment: Final Marks for the module will be made up from two elements: Continuous Assessment - two tests (20% each), each comprising multiple choice questions and one short essay question, and end of year exam (60%).

Recommended textbook:

Mader, Sylvia, S. `Human Biology', (10th edition), 2007, McGraw-Hill - recommended text (under review).

Dictionary of Biological Terms (various alternatives exist) - recommended purchase for all students unfamiliar with biological terms or limited familiarity of English versions of these.

Related texts in UKC library as reference material also video cassettes housed in the Templeman library.

MATHEMATICS AND ESSAY WRITING **PS014**

School of Physical Sciences Convenor Dr L L Boyle ECTS Credits: 7.5
Taught in Autumn & Spring terms Kent Credits 15 level F

Teaching Provision:
12 lectures on mathematics (Weeks 1–12). 8 examples classes on mathematics (Weeks 4–11).
2 lectures on statistics (Weeks 1–2). 1 examples class on statistics (Week 3).
5 2-hour seminars on essay writing (Weeks 13, 15, 17, 19 and 21 in Spring Term).

Learning Outcomes:
1. To introduce, revise and reinforce GCSE mathematics.
2. To introduce logarithms and basic statistics.
3. To teach the principles of planning and writing an essay in the context of some legal aspect of forensic science.

SYLLABUS
Mathematics Seminars
Use of a scientific calculator. Significant figures and decimal places (with or without a calculator). Accuracy in measurement: limits between which a measurement must lie when given to a number of significant figures or decimal places.
Algebra: the expression of algebraic quantities. Evaluation of expressions when given values of the individual variables. Formation of equations. Solving linear equations in one variable.
Simplification of algebraic expressions by expanding brackets and adding/subtracting like terms. Simplifying algebraic fractions by dividing out common factors. Expansion of expressions of the form $(a \pm b)(c \pm d)$; $(a \pm b)^2$; $(a - b)(a + b)$.
Generalisation of indices to include fractional and negative indices. Rules for indices. Surds.
Manipulation of algebraic terms containing indices. Transposition of formulæ.
Factorizing algebraic expressions: factors of binomial expressions, including the difference of two squares. Factors of $x^2 + bx + c$ and $ax^2 + abx + ac$.
Simultaneous linear equations.
The general equation of the straight line in the forms $y = mx + c$ and $ax + by + c = 0$. Calculation of the gradient and the intercept on the y-axis. Calculation of the equation of a line given the co-ordinates of two points on it or given its gradient and the co-ordinates of one point on it. Parallel lines. Calculation of the point of intersection of two straight lines.
The quadratic equation: its solution by factors and/or formula.
Logarithms: base 10 and base e. Manipulation of log expressions using the rules for logarithms. Solution of log equations and index equations. General shape of the graphs of $\log x$ and a^x $(a > 1)$.
Addition of algebraic fractions. Expansion of algebraic products where more than two brackets are involved.
The trigonometry of the right-angled triangle. Use of Pythagoras's theorem.

Statistics lectures
Statistics — introduction to the normal distribution. Mean, range and standard deviation.

Essay-writing seminars
Information-retrieval skills.
The importance of writing — what is an essay? Why write essays? How to develop the ability to write essays.
What does an essay look like? Critique of specimen essays.
What is a good essay? — answering the question; presenting a coherent argument; adopting a clear, analytical, style.
The craft of writing — the essay title, gathering material, committing ideas to paper, organising the material and writing drafts.
Coursework: preparation of an essay plan; writing an essay on a popular forensic science topic.

Assessment Methods
1 statistics examples class (2%); 8 mathematics assignments (16%)
1 essay plan (8.333%); 1 essay (33.333%)
1 1-hour class examination in mathematics and statistics (in Week 24 of Spring Term) (5.333%)
1 2-hour examination in mathematics and statistics (late May or June) (35%).

Core Text (under review – check before purchasing)
Paul Monk, Mathematics for Chemistry, (Oxford: Oxford University Press; 2006). (Templeman Library shelfmark QA 37.2)

MOLECULES AND ANALYSIS

PS021

School of Physical Sciences Convenor Dr LL Boyle ECTSCredits: 15
Taught in Autumn term Kent Credits 30 level F

Teaching Provision
55 lectures in 11 units of 5 lectures each, 6 six-hour practicals.

Aims
To develop an understanding of basic chemistry and some of the basic experimental skills including safe handling of chemicals and safe laboratory practice,

Learning Outcomes:
Acquisition of knowledge and understanding of elementary (A-level standard) chemistry.
Acquisition of basic experimental skills.
Development of ability to interpret experimental data.

SYLLABUS
Lectures [The last half of the final lecture of each unit is spent doing a test.]
The numbers in brackets at the end of the description of each unit refer to chapters in the textbook.

Unit 1 Moles. Chemical equations. Balancing chemical equations. Empirical and molecular formulæ. Percentage compositions. Molar masses of gases and liquids. [37–38]

Unit 2 Moles and titrations. Standard solutions. The concentration of a solution. Calculations. Different types of titrations. Formal oxidation numbers and oxidation states. Redox reactions. [39–41]

Unit 3 Basic ideas about electrons, atoms and elements. The evidence for them. Quantisation. Energy levels and transitions between them. Planck's equation. Light as a form of energy. The atomic nucleus — protons and neutrons. Isotopes. Atomic and molecular mass units. [1–3]

Unit 4 Acids and bases. The Brønsted and Lewis theories. Strong and weak acids. The ionic product of water. Equilibrium constants for the dissociation of acids and bases. Calculation of the degree of dissociation. Calculation of the pH of a weak acid. Buffer solutions. Neutralisation and titrations. Hydrolysis of a salt. Dependence of the endpoint of a titration on the strengths of the acid and the base. Choice of a suitable indicator for the endpoint. [74–76]

Unit 5 Bohr's model of the atom. Calculation of ionisation energies. Orbitals. Stationary states. Ground and excited states. Balmer's formula for hydrogen. Other series of lines in the spectrum of atomic hydrogen. The nature of light. Wave–particle duality. De Broglie's equation. Schrödinger's theory. Quantum numbers. Differences between orbitals. Shape and spin. The *Aufbau* principle. The Pauli exclusion principle. Hund's rule. Ionisation energies and their variation in the Periodic Table. Shielding. [8–13]

Unit 6 Valence-bond theory. Representing bonds by lines. Difficulties such as resonant structures and coördinate bonding. Molecular-orbital theory. The sign of a wave function. Bonding and antibonding combinations of wave functions. Examples of molecular orbitals for homopolar and heteropolar diatomic molecules and hydrocarbon molecules. [14–16]

Unit 7 The shapes of molecules. Different types of molecular models. Simple ideas about electron repulsions and hybrid orbitals. The isoelectronic principle. Ionic and covalent bonding. Occurrence of ionic compounds. Polar molecules and polar bonds. Dipole moments and polarisabilities. Intermolecular forces and their origins. [17–20]

Unit 8 Emission and absorption spectra. Electronic, vibrational and rotational spectra. Electromagnetic waves. The effects of electric and magnetic fields on electrons. Selection rules. Visible spectroscopy: the colours of solutions. The effect of vibrations on colour. The ultra-violet spectra of some organic molecules. [24–26]

Unit 9 Vibrational spectroscopy as an analytical tool. Group frequencies. Bond strengths. Nuclear spin and nuclear magnetic resonance. Variation of magnetic field-strength as an alternative to frequency variation for producing a spectrum. Interpretation of simple spectra. Mass spectrometry. Calculating relative atomic masses from a mass spectrum. The interpretation of fragmentation patterns. The effects of the presence of isotopes. [27–29]

Unit 10 Energy changes and chemical bonds. Exothermic and endothermic reactions. Enthalpy. Standard states. Functions of state. Hess's law. Standard enthalpies. Heats of formation, combustion. Bond energies. Calculations using Hess's law. The Born–Haber cycle. [42–45]

Unit 11 Hydrogen bonding and its associated bond energy. Evidence for hydrogen bonding. Intermolecular and intramolecular hydrogen bonding. Occurrence in biochemistry and solids. Metals and metallic bonding. [21–22]

Laboratory experiments
Determination of the total hardness of local water.
Tests for oxidants and reductants.
The thermal stability of some s-block carbonates.
Solubility trends of some Group II metal compounds.
The analysis of local chalk.
A heating curve for 1-hexadecanol.
The dependence of the boiling point on the composition of some liquid mixtures.
Absorption spectrophotometry.
Calorimetry.

ASSESSMENT METHODS
11 half-hour tests performed in class without textbooks or collusion. (20%)
1 one-hour end-of-term examination. (8%)
1 two-hour end-of-year examination. (60%)
6 write-ups of laboratory experiments. (12%)

CORE TEXT
Matthews, Philip: "Advanced Chemistry", Cambridge University Press (1992).
[UKC library shelfmark qQD 453.2]

CHEMICAL REACTIVITY **PS022**

School of Physical Sciences Convenor Dr LL Boyle ECTS Credits: 15
Taught in Spring term Kent Credits 30 level F

Teaching Provision
55 lectures in 11 units of 5 lectures, 6 six-hour practicals.

Aims
To develop an understanding of basic chemistry and some of the basic experimental skills including safe handling of chemicals and safe laboratory practice,

Learning Outcomes
Acquisition of knowledge and understanding of elementary (A-level standard) chemistry.
Acquisition of basic experimental skills.
Development of ability to interpret experimental data.

SYLLABUS
Lectures [The last half of the final lecture of each unit is spent doing a test.]
The numbers in brackets at the end of the description of each unit refer to chapters in the textbook.
Unit 12 Lattice energies. The Born–Haber cycle. Polymorphism. Allotropy.
Chemical equilibrium and equilibrium constants. Effects of temperature and pressure on equilibrium. Experimental determination of an equilibrium constant. Examples. [46, 57, 52, 54]
Unit 13 The Periodic Table. Periodicity of physical and chemical properties. Group 2A elements and their salts. Trends in solubilities. [87–89, 93]
Unit 14 The halogens and their properties. Halogen-containing compounds. Pseudo-halogens.
The noble gases and their compounds. [101–104]
Unit 15 Transition metals: electronic structures, oxidation states, complex ions, paramagnetism, colour, catalytic properties and alloys. Isomerism, stability constants and redox potentials. [105–106]
Unit 16 Organic chemicals. Shapes of organic molecules. Von Baeyer's strain theory. Homologous series, nomenclature, isomerism, organic analysis. Optical activity and chirality; enantiomers and racemic mixtures. Diastereoisomers. The configurations of optical isomers and the Cahn–Ingold–Prelog notation. The mutarotation of glucose.
Alkanes, alkenes and alkynes: preparations and properties. Ozonolysis and polymerisation. [109–112]
Unit 17 Aromatic hydrocarbons. Effect of side chains on electrophilic substitution. Activating and deactivating groups. Ortho-/para- and meta-directing groups.
Organic halogen compounds, alcohols and esters: preparation and properties. [113–116]
Unit 18 Phenols, aldehydes and ketones: preparation, properties and chemical identification. [117–118]
Unit 19 Carboxylic acids and their derivatives. Ethers. The different types of amine and their properties. [119–122]
Unit 20 Amino-acids and proteins: preparations, properties, identification. Electrophoresis and isoelectric points. How enzymes act as catalysts.
Carbohydrates and their structures. Polysaccharides and sugars.
The oil industry as a source of organic chemicals. Re-forming and cracking. [123, 125, 86]
Unit 21 Organic problem-solving. [130]
Unit 22 Reaction kinetics. How to change the rate of a reaction. Activation energy. Collision theory and transition-state theory. Measurement of reaction rates. Rate laws. Reaction mechanisms. The influence of catalysts. Enzyme reactions. [77–81]

Laboratory experiments
Reactions of copper (II) complexes. Determination of the copper content of brass.
The analysis of iron tablets.
The preparation of an ester.
Determination of the equilibrium constant of an esterification reaction.
Inorganic analysis.
Thin-layer chromatography.
pH changes and indicators.
Reactions of ethanol, phenol and carboxylic acids.
The preparation of ethene.
The catalytic decomposition of hydrogen peroxide.

The determination of the activation energy of a reaction.
The preparation of 1-bromobutane.
The identification of an unknown carbonyl compound. The identification of an unknown substance.

ASSESSMENT METHODS
11 half-hour tests performed in class without textbooks or collusion. (20%)
1 one-hour end-of-term examination. (8%)
1 two-hour end-of-year examination. (60%)
6 write-ups of laboratory experiments. (12%)

CORE TEXT
Matthews, Philip: "Advanced Chemistry", Cambridge University Press (1992).
[UKC library shelfmark qQD 453.2]

PROPERTIES OF MATTER

PS023

School of Physical Sciences Convenor Dr LL Boyle ECTSCredits: 15
Taught in Autumn & Spring terms Kent Credits: 30 level F

Teaching Provision:
55 lectures in 11 units of 5 lectures each, 6 six-hour practicals.

Aims
To develop an understanding of basic chemistry and some of the basic experimental skills including safe handling of chemicals and safe laboratory practice,

Learning Outcomes:
Acquisition of knowledge and understanding of elementary (A-level standard) chemistry.
Acquisition of basic experimental skills.
Development of ability to interpret experimental data.

SYLLABUS
Lectures [The last half of the final lecture of each unit is spent doing a test.]
The numbers in brackets at the end of the description of each unit refer to chapters in the textbook.
Unit 23 The states of matter: solids, liquids, gases, colloids, liquid crystals. [23]
Crystallography: sphere packings, co-ordination numbers, unit cells, lattices, radius-ratio tests. The meanings of atomic sizes in atoms, molecules and crystals. [31–33]
Unit 24 Radioactivity. Nuclear reactions. Radioactive decay. [4–5]
Unit 25 Real and ideal gases. The gas laws and approximations for non-ideal gases. Pressure as a consequence of the kinetic theory. Average speeds of gaseous molecules. The significance of the work of Gay-Lussac, Avogadro, Dalton and Graham. [34–36]
Unit 26 Hydrogen and hydrides. Water. Group I elements. [90–92]
Unit 27 Group III elements. Carbon and the Group IV elements. [94–96]
Unit 28 Nitrogen and the Group V elements. Group VI elements. [97–100]
Unit 29 Chromium, manganese and iron. Zinc, cadmium and mercury. [107–108]
What is forensic science? The rôle of the forensic scientist. Forensic science in the UK
Unit 30 Forensic science techniques related to high-profile cases such as those of 'The Yorkshire Ripper', 'The Birmingham Six', Colin Pitchfork, Harold Shipman and Georgi Markov. The composition of explosives. The analysis of gunshot residues.
Unit 31 Phases and phase diagrams. Solid–liquid equilibria. Cooling curves. Different types of chromatography. [55,58,56]
Unit 32 Solubility of salts in water. Fractional crystallisation. Water of crystallisation. Saturated and supersaturated solutions. Factors affecting solubilities. Volume changes on dissolution. Liquid mixtures: miscibility and immiscibility. Ideal solutions. Raoult's law. Solvent extraction. Partition coefficients. Distillation. Steam distillation. [59-63]
Unit 33 Electrochemistry; half-cells, cells and cell reactions; standard electrode potentials; anodes, cathodes and salt bridges. Standard redox potentials. Redox titrations. Electrolysis. The conductivity of a solution. Derivation of the degree of dissociation from the molar conductivity. [66, 70, 72–73]

Laboratory experiments
The visible emission spectrum of sodium.
The decay of protactinium-234.
The determination of Avogadro's number.
The chemistry of aluminium.
Molar masses and effusion.
Reactions of nitrogen compounds.
Reactions between halogens and halide ions.
Reactions of Group I metal halides.
Investigation of the dependence of the potential difference across a cell on the concentration of the electrolytes.
Comparison of the rates of hydrolysis of some haloalkanes.
The preparation of acetanilide. A multi-stage synthesis.

ASSESSMENT METHODS
11 half-hour tests performed in class without textbooks or collusion. (20%)
2 half-hour end-of-term examinations. (8% together)
1 two-hour end-of-year examination. (60%)
6 write-ups of laboratory experiments. (12%)

CORE TEXTS
Matthews, Philip, "Advanced Chemistry", Cambridge University Press (1992). [UKC library shelfmark qQD 453.2]
Jackson, Andrew R.W.and Jackson, Julie M., "Forensic Science", Pearson Prentice Hall, (2004). [UKC library shelfmark: HV 8073]
White, Peter (editor), "Crime Scene to Court: the essentials of Forensic Science", Royal Society of Chemistry, (1998, reprinted 1999). [UKC library shelfmark KB 290]

SECTION C: CATALOGUE OF COURSES
FOUNDATION YEAR PHYSICS (F305 PHYS)

C1. INTRODUCTION & MODULE REQUIREMENTS

Firstly, welcome to the University of Kent. We hope that you will find the University a pleasant and friendly environment in which to study and the Foundation Year course both challenging and interesting. The course is taught on the Canterbury Campus by lecturing staff from the Faculty of Science, Technology and Medical Studies.

The Foundation Year course is managed by the Learning and Teaching Committee of the School. The course is designed to provide the basic knowledge and techniques required for entry to Stage I of your chosen Degree Programme; at the end of the year you will need to pass a qualifying examination in order to progress to that course.

Communication between staff and students is important throughout the year and information is normally communicated by email. Please check your email regularly.

Students have to take 8 modules in the Foundation Year. Each of these modules is worth 15 credits. Some (PH023, PH025, PH026 and PH027) are solely for Physics students, others (PH020, EL021, MA022 and EL024) are shared with other departments and are taken alongside their students.

Module	Department with primary responsibility	Term
PH020 Algebra And Arithmetic	School of Physical Sciences	Autumn
EL021 Calculus	Electronics	Autumn & Spring
MA022 Graphs, Geometry and Trigonometry	Mathematics	Autumn & Spring
PH023 Motion and Mechanics	School of Physical Sciences	Autumn
EL024 Electromagnetics for engineers	Electronics	Spring
PH025 Waves and Vibrations	School of Physical Sciences	Spring
PH026 Properties of Matter	School of Physical Sciences	Autumn
PH027 Physics Tutorial Module	School of Physical Sciences	Autumn & Spring

As well as taught classes, students are expected to spend a substantial amount of additional time on laboratory report writing, problem solving and background reading. This self-study is an important part of University-level work; our experience shows that a failure to invest the time required to fulfil this learning requirement will almost inevitably result in a lower overall performance for the year.

FOUR YEAR DEGREE COURSES IN PHYSICS - FOUNDATION YEAR

These courses have been introduced in order to extend University access to a broader spectrum of students. They are designed for students who do not possess the A-level or equivalent qualifications in Mathematics and Physics that are normally required for entry to the Honours Degree Courses in Physics. Such applicants might include those students offering a BTEC Diploma or Certificate which does not include Mathematics beyond Level II, mature applicants who ceased their formal education after O level or GCSE, or students offering certain combinations of AS, A-levels or GNVQs which do not satisfy the entry requirements of the three year courses in Physics.

In addition, the course is designed for overseas applicants whose education ceased at a point below A-level. The study programme includes instruction in English for those who need to improve their proficiency in the language.

The first year of these courses - the Foundation Year - provides students with the opportunity to study Mathematics, Physics and Electronics and gain the practical laboratory skills that are necessary to enable them to proceed to the second and subsequent years of the course. The contents of the second, third and fourth years are identical to the three year Degree courses described in the University Prospectus and Departmental handbooks.

The Stage 1 examination is therefore taken at the end of the second year and students enter Stage 2 at the start of their third year.

In the first year three topics are covered:

Physics (including practical classes)
Mathematics
Electronics (including practical classes)

The **Physics** topic covers Mechanics, Waves and Vibrations, Properties of Matter.

The **Mathematics** topic covers Arithmetic, Algebra, Graphs, Geometry, Trigonometry, Series, Vectors, Differential and Integral Calculus and Differential Equations.

The **Electronics** topic covers electromagnetism.

OVERSEAS STUDENTS

This course is also designed for overseas applicants whose education ceased at a point below A-level. The study programme includes instruction in English for those whose ability to write English is reasonably good but who need to improve their proficiency in the language.

The course lasts a full academic year, from late September to the beginning of the following June.

For overseas students FOUR topics are covered:

Physics (including practical classes)
Mathematics
Electronics (including practical classes)
English for University Study

The contents of three of these courses have been described above. **English for University Study** is taught by staff who are specialists in the teaching of English as a foreign language. Students who successfully complete this Foundation Year are guaranteed a place on their chosen honours degree course in Physics.

Applications are considered individually and candidates should normally have obtained good grades from a secondary school-leaving examination at 18 years of age (minimum 17 years). Candidates are required to provide evidence that they have already reached a level of attainment in Physics and Mathematics such that after one year of intensive study on this foundation course they will be able to reach the normal standard for entry to a three-year honours degree course. A minimum standard of English language of 5.5 on the British Council IELTS test or the equivalent level in another recognised test of English language is also required.

ASSESSMENT AND EXAMINATIONS

The assessment of the Foundation Year of the Four Year Degree Courses in Physics (F305 Phys) is by coursework (laboratory work, assignments and assessment tests) and a major written examination which is held at the end of the academic year.

Assessment Tests
Assessment tests related to the lecture courses on Physics, Mathematics and Electronics will be held during the mid-term and end of term examples classes in the Autumn and Spring terms. <u>These will contribute to your overall mark for the foundation year.</u>

Foundation Year Examinations

(a) The end of year examination will consist of 7 written papers:

PH020 Algebra and Arithmetic
PH023 Motion and Mechanics
PH025 Waves and Vibrations
PH026 Properties of Matter
EL021 Calculus
EL024 Electromagnetics for Engineers
MA022 Graphs, Geometry and Trigonometry

(b) Each paper will be of 2 hours duration.

(c) **The module pass mark will be 40%. Progression to Stage 1 will depend on satisfying the criteria detailed in the CREDIT FRAMEWORK (Section E). [Note in particular the sub-sections on condonement and compensation].**

(d) Students who satisfy the Examiners in the Foundation Year Examination may proceed to Stage I.

(e) There will be a resit examination for each of the 7 modules listed above, in August of the same year. Students should note that continuously assessed coursework and laboratory practical classes cannot be resat in the summer and can only be retaken by repeating the module the following year without the possibility of proceeding to the first year of their chosen degree programme.

Students obtaining an overall average mark 70% or above will normally be awarded a Distinction; for a mark of between 60% and 69% a Merit will usually be awarded.

Students who do not achieve a pass in May may be allowed to resit the examinations in failed modules in August. Students are allowed a maximum of two resit opportunities. All coursework marks are carried forward to the resit examination. As stated above, coursework and practical work **cannot be retaken** so students will carry forward the mark originally awarded for such work (if credit has been awarded), unless the relevant module is repeated.

Students should note that none of the Foundation Year modules may be trailed into Stage 1.

Students who successfully complete the first year of the course may proceed to any of the following Physics courses

PHYSICS
PHYSICS with ASTROPHYSICS
PHYSICS with FORENSIC SCIENCE
PHYSICS with SPACE SCIENCE and SYSTEMS
ASTRONOMY, SPACE SCIENCE & ASTROPHYSICS

C2. SYLLABUS AND MODULE DETAILS

The following catalogue of modules provides a reference for the content, aims and objectives, method of assessment and core texts for all modules available to Foundation Year Physics students.

We are constantly striving to provide the best teaching and learning environment for our students, and modules are reviewed annually to ensure that the content is appropriate for the overall aims of the degrees. There may be some minor changes to the content of some of the modules as a result of such reviews. You will be notified of any amendments at the start of the appropriate term.

ALGEBRA AND ARITHMETIC

PH020

School of Physical Sciences Convenor Dr J Miao ECTS Credits 7.5
Taught in Autumn term Kent Credits 15 level F

Teaching Provision: 36 lectures; 12 workshops.

Aims:
1. To provide students with a familiarity with aspects of Algebra and Arithmetic at AS/A2 level standard.
2. The ability to apply this knowledge to solving mathematical based problems in other modules in the Foundation year.

Learning Outcomes:
1. To lay a firm foundation in maths (in combination with similar modules) to facilitate entry into year 1 of maths based degree programmes in the Faculty of Science Technology and Medicine.

SYLLABUS

Arithmetic 12 lectures

Calculations.
Significant figures.
Standard form.
Fractions
Simplification of fractions.
Percentages and fractional changes.
Errors.
Indices.
Logarithms and exponential functions.

Algebra 24 lectures

Basic rules (operations and indices).
Solving equations (substitution and order of operation).
Changing subject of a formula
Inverse operations
Rules of indices
Long division
Expansion
Factorisation
Quadratics equations
Solving linear equations and inequalities.
Solving simultaneous linear equations
Partial fractions.
Binomial Theorem.

Assessment Methods: Class Tests 30%, Final Examination 70%.

Core Texts:
Maths: The Core Mathematics for A Level, by Bostock and Chandler, ISBN 0-85950306-2. Copies are in the library

Supplementary text: Foundations Maths by Croft and Davison, 2nd ed., pub. Addison-Wesley, ISBN 0-201-17804-4. Copies are in the library.

CALCULUS

EL021

Electronics Convenor Dr A Drinkwater ECTS Credits 7.5
Taught in Autumn and Spring terms Kent Credits 15 level F

Teaching Summary		Term		Student Contact Hours	Student Workload Hours
Differentiation	Class Test	Autumn	Drinkwater AJ	1	5
Differentiation	Lecture	Autumn/Spring	Drinkwater AJ	16	54
Differentiation and Integration	Examples Class	Autumn/Spring	Drinkwater AJ	9	18
Integration	Lecture	Autumn/Spring	Drinkwater AJ	20	68
Integration	Class Test	Spring	Drinkwater AJ	1	5

Pre-requisite and co-requisite modules

PH020	ALGEBRA AND ARITHMETIC	Co-requisite
MA022	GRAPHS AND GEOMETRY	Co-requisite

The programme of study to which the module contributes

BEng Computer Systems Engineering including a Foundation Year
BEng Electronic and Communications Engineering including a Foundation Year

The intended subject specific learning outcomes and, as appropriate, their relationship to programme learning outcomes

On successful completion of the module, students should have:
1. A knowledge of Calculus to a level suitable for Level 1 courses;
2. The ability to apply this knowledge to elementary problem solving;
3. The ability to undertake more advanced study of these subjects.

These outcomes contribute to the programme learning outcomes in the ECEwFY and CSEwFY curriculum maps as follows: A1,B1 and C1

The intended generic learning outcomes and, as appropriate, their relationship to programme learning outcomes

For Electronic and Communications Engineering and Computer Systems Engineering Students, this module will contribute to the following programme generic learning outcomes: D5-D7.

A synopsis of the curriculum

Lecture Syllabus

DIFFERENTIATION
Graphical interpretation of a derivative and its numerical estimation
Differentiation of y = x squared from first principles
Differentiation of x to the power of n and polynomials by inference
Stationary values (turning points, Max and Min, points of inflection)
Differentiation of trigonometric functions
Differentiation of exponential functions
Differentiation of logarithmic functions
Differentiation of sums, products, quotients and functions of a function
Maclaurens series for sin x, cos x, e to the power of x, ln (1+x), (1+x) to the power of n

INTEGRATION
Comprehension and use of the integral notation symbol
Integration as the inverse operation of differentiation Constant of integration
Integration of polynomials, trigonometric functions and exponential functions
Integration of products and fractions
Integration by substitution (change of variables)

Integration by parts
Use of partial fractions
Integration of compound trigonometric functions
Calculation of the constant of integration
Integration as the process of summation
Definite integrals – calculations of areas
Simple first order differential equations – solution by the method of separation of variables.

Coursework

EXAMPLES CLASSES
Differentiation - 4 hours
Integration - 5 hours
Assessed by 2 tests in conjunction with MA022

HOMEWORK
Calculus x 4

Learning and Teaching Methods, including the nature and number of contact hours and the total study hours which will be expected of students, and how these relate to achievement of the intended learning outcomes

There will be 47 contact hours consisting of 36 hours of lectures, 9 hours of examples classes and 2 hours of tests. The examples classes will not be directly assessed, but will be assessed indirectly by the tests and the homework. The total student workload will be 150 hours.

Assessment methods and how these relate to testing achievement of the intended learning outcomes

Assessment for this module is by an end of year examination consisting of 90% of the value of the module. This will test the students' theoretical knowledge of the subject and their ability to make elementary calculations. The remaining 10% of the module will be allocated based on the test marks and homework.

Recommended Reading
Core Mathematics for Advanced Level, L. Bostock and S. Chandler, Nelson Thornes (Publishers) Ltd., ISBN 0 7487 55098.

Background Reading

None specified

Weightings

Examination	90%
Coursework	10%

GRAPHS, GEOMETRY AND TRIGONOMETRY

MA022

Institute of Mathematics, Statistics and Actuarial Science — ECTS Credits 7.5
Taught in Autumn and Spring terms — Convenor BJ Vowden — Kent Credits 15 level F

Core Module
Responsibility of the IMSAS

Contents	Contact Hours	Workload Hours
Lectures	36	150 hours
Examples classes and Tests	12	overall

1. Aims and Objectives

To provide appropriate mathematical knowledge relevant to graphical methods, coordinate geometry, vectors and trigonemtry, to a level suitable for level C modules.

2. Module Prerequisites

None.

3. Lecture Syllabus

3.1 Graphs and Geometry	3.2 Trigonometry	3.3 Vectors
• Graphs and the information to be read from them • The straight line, application to plots of experimental data • Coordinate geometry of straight lines: parallel and perpendicular lines • The graphical solution of equations • Graphs of the trigonometric functions; symmetry and translation properties • Equation of the circle	• Measures of angle • Triangles • Trigonometric functions • Pythagoras' theorem and the fundamental identity of trigonometry • Sine and cosine rules • The addition formulae, the double angle formulae • Trigonometric equations • Applications	• Notion of a vector quantity • Representation of a vector using components • Unit vectors • Addition and subtraction of vectors • Magnitude and orientation • Vectors in 3 dimensions • Scalar products • Introduction to vector fields

4. Coursework

Examples classes, assignments and tests

5. Reading List

Recommended reading:
Core Mathematics for Advanced Level, L Bostock and S Chandler, Stanley Thorne (Publishers) Ltd.

6. Assessment Weightings

85% 2-hour Examination, 15% Tests

MOTION AND MECHANICS

PH023

School of Physical Sciences Convenor Dr J Miao ECTS Credits 7.5
Taught in Autumn term Kent Credits 15 level F

Teaching Provision: 24 lectures and 12 hours of laboratory work.

Aims:
1. To provide students with a familiarity with aspects of the laws of motion and mechanics at AS/A2 level standard.
2. The ability to apply this knowledge in other Physics modules in the Foundation year.

Learning Outcomes:
1. The ability to understand and apply the features of motion and mechanics in physics, which appear in the Foundation year and are necessary for entry to year 1 of the Physics degree programmes.

SYLLABUS
Lectures:

i) Introduction; units and dimensions.
Dimensional analysis.
Dynamics; distance, velocity and acceleration time graphs.
Equations of motion.
(ii) Newton's Laws of Motion applied to single objects.
Newton's Laws applied to coupled objects.
Friction.
(iii) Work; scalar product.
Work against gravity.
Power.
Energy; potential energy and kinetic energy.
Conservation of energy.
(iv) Linear momentum.
Conservation of linear momentum
Circular motion.
Rotational systems.
Moment of inertia.
(v) Rotational forces.
Resolution of forces.
Triangle of forces; moments.
Force fields; gravitational, etc.
Potential energy in fields

Laboratory work:
There will be four 3-hour lab sessions. The work will include experiments teaching general lab skills and topics related to the lecture material.

Assessment Methods: Laboratory work 30% and Final Examination 70%.

Core Texts: 'Applied Mathematics I', by L. Bostock and S. Chandler, pub. Stanley Thornes Ltd., ISBN 0-85950-019-5. Copies are in the library.

Supplementary texts: Maths: The Core Mathematics for A Level, by Bostock and Chandler, ISBN 0-85950306-2. Copies are in the library

ELECTROMAGNETICS FOR ENGINEERS

EL024

Electronics Convenor Dr R Oven ECTS Credits 7.5
Taught in Spring term Kent Credits 15 level F

Teaching Summary		Term		Student Contact Hours	Student Workload Hours
Charging Capacitors	Experiment	Spring	Drinkwater AJ	3	8
Electrostatics	Examples Class	Spring	Oven R	5	12
Electrostatics	Lecture	Spring	Oven R	12	49
Electrostatics/Magnetism	Class Test	Spring	Oven R	1	7
Magnetic Field around a Long Wire	Experiment	Spring	Drinkwater AJ	3	8
Magnetism	Lecture	Spring	Pepper MG	12	49
Magnetism	Examples Class	Spring	Pepper MG	4	12
Parallel Plate Capacitor	Experiment	Spring	Drinkwater AJ	3	5

Pre-requisite and co-requisite modules

PH020	ALGEBRA AND ARITHMETIC	Co-requisite
EL021	CALCULUS	Co-requisite
MA022	GRAPHS AND GEOMETRY	Co-requisite
EL025	ELECTRICAL PRINCIPLES AND MEASUREMENTS	Co-requisite

The programme of study to which the module contributes

BEng Computer Systems Engineering including a Foundation Year
BEng Electronic and Communications Engineering including a Foundation Year

The intended subject specific learning outcomes and, as appropriate, their relationship to programme learning outcomes

On successful completion of the module, students will be able to:
1. Understand basic laws of electrostatics and magnetism;
2. Be able to perform simple calculations on electromagnetic phenomena.

These outcomes contribute to the programme learning outcomes in the ECEwFY and CSEwFY curriculum maps as follows: A2, B1, B2, C1,C2, C3 and (C9 for EE, C10 for CSE)

The intended generic learning outcomes and, as appropriate, their relationship to programme learning outcomes

On successful completion of the module, students will be able to generate, analyse, present and Interpret data. They should also be able to communicate more effectively in writing. For Electronic and Communications Engineering and Computer Systems Engineering students these will contribute to the following programme generic learning outcomes: D1, D3, D4 and D5-D7.

A synopsis of the curriculum

Lecture Syllabus

ELECTROSTATICS
Introduction – Charge
Capacitance as a charge storage element
Capacitors in series and parallel
Charging capacitors using a current source
Charging capacitors using a resistor and voltage source
Discharging capacitors
Energy stored in capacitors
Coulombs Law
Electric field
Electric field between parallel plates

Breakdown field of insulators
Electric flux density
Capacitance of a parallel plate capacitor
Dielectrics
Fields outside cylinders and spheres

MAGNETISM
Magnetic field around permanent magnets and current carrying conductors
Rules for working out direction of magnetic field
Quantifying a magnetic field – flux and flux density
Force on a current carrying conductor – simple applications – Loudspeaker
Magnetic field intensity. Fields for toroids, solenoids and long wires
Permeability of free space. Magnetic materials, relative permeability.
Faraday's Law of Induction. Simple applications: Dynamic microphone, AC generator.
Mutual Inductance, Self Inductance. The transformer.

Coursework

LABORATORY CLASSES
There will be 3 x 3 hour laboratory classes. The titles of the laboratory experiments are:
Magnetic field around a long wire
Charging capacitors
Parallel plate capacitor

EXAMPLES CLASSES
ELECTROSTATICS - 5 hours
MAGNETISM - 4 hours
There will be 9 hours of examples classes. This work will be assessed by a 1 hour test.

HOMEWORK
ELECTROSTATICS x 1
MAGNETISM x 1

Learning and Teaching Methods, including the nature and number of contact hours and the total study hours which will be expected of students, and how these relate to achievement of the intended learning outcomes

There will be 43 contact hours consisting of 24 hours of lectures, 9 hours of experimental work, and 10 hours of examples classes and tests. The practical classes will be supported by demonstrators. Students will be expected to complete three laboratory reports. The workshops will not be directly assessed, but will be indirectly by the test and end of year examination. The total student workload will be 150 hours.

Assessment methods and how these relate to testing achievement of the intended learning outcomes

Assessment for this module is by an end of year examination consisting of 70% of the value of the module. This will test the students' theoretical knowledge of the subject and their ability to make elementary calculations and design decisions based on calculations. The reports based on the laboratory work will be assessed and have a value of 25% of the module. The remaining 5% of the module will be allocated based on the test marks and homework.

Recommended Reading

Electrical and Electronic Principles, C.R.Robertson, Edward Arnold, ISBN 0-340-57918-8

Background Reading

None specified

Weightings

Examination	70%
Coursework	30%

WAVES AND VIBRATIONS **PH025**

School of Physical Sciences Convenor Prof. R.J. Newport ECTS Credits 7.5
Taught in term 2 Kent Credits 15 level F

Teaching provision:- 24 lectures and 12h of laboratory work (the latter coordinated by Dr J. Miao).

Aims

a) To provide students with a familiarity with aspects of the physics of waves and vibrations to a level approximating to Physics AS/A2.
b) The ability to apply this knowledge in other Physics modules in the Foundation Year and subsequently to use it within Stage 1 Physics modules.

Intellectual and subject-specific learning outcomes

1. Knowledge and understanding of physical laws and principles, and their application to wave phenomena and the properties of matter.
2. An ability to identify relevant principles and laws when dealing with problems, and to make approximations necessary to obtain solutions.
3. An ability to solve problems in physics using appropriate mathematical tools.
4. An ability to execute and analyse critically the results of an experiment or investigation and draw valid conclusions.
5. An ability to use mathematical techniques and analysis to model physical behaviour.
6. An ability to present and interpret information.
7. An ability to communicate scientific information, in particular to produce clear and accurate scientific reports.
8. A familiarity with laboratory apparatus and techniques, including relevant aspects of Health & Safety.
9. The systematic and reliable recording of experimental data.
10. An ability to make use of appropriate texts, or other learning resources as part of managing their own learning.

Transferable skills learning outcomes

11. Investigative skills in the context of independent investigation including the use of textbooks and other available literature, and the interaction with colleagues to extract important information.
12. Communication skills in the area of dealing with surprising ideas and difficult concepts, including listening carefully, reading demanding texts and presenting complex information in a clear and concise manner.
13. Analytical skills associated with the need to pay attention to detail and to develop an ability to manipulate precise and intricate ideas, to construct logical arguments and to use technical language correctly.
14. Personal skills the ability to work independently, to use initiative, to organise oneself to meet deadlines and to interact constructively with other people.

Syllabus

Lectures

(i) Types of waves. Characteristics of a wave:- frequency, period, amplitude, wavelength and velocity. Introduction to transverse and longitudinal waves and polarisation. $c = f\lambda$

(ii) Properties of Waves. Qualitative description of the properties of waves; motion, reflection, refraction (Snell's law), dispersion, diffraction, interference, standing waves.

(iii) Sound Waves. Description of sound - loudness, noise, note, pitch, intensity, intensity level. properties of sound - reflection, refraction, interference (interference pattern produced by two speakers), beats, resonance in a vibrating wire, including overtones/harmonics. Qualitative treatment of Doppler effect.

(iv) Electromagnetic (em) Waves. Electromagnetic spectrum. Generation and detection of em waves from different parts of the spectrum. Refraction of light - critical angle and optical fibres. Polarisation of light, microwaves and radio waves. Interference. Young's double slit experiment. The Michelson interferometer. Transmission diffraction grating - orders of diffraction, application in spectroscopy.

(v) Simple Harmonic Motion (SHM). Displacement, velocity and acceleration of a body undergoing S.H.M. Link between SHM. and circular motion. Force acting on a body undergoing SHM. Qualitative description of systems displaying SHM. Detailed description of pendulum and mass on a spring. Energy in SHM. General expression for SHM.

(vi) Damping and Forced Oscillations. Qualitative treatment of light, heavy and critical damping. Qualitative discussion of the concepts of natural frequency, resonance and the behaviour of vibratory systems driven by a periodic force.

Laboratory work
There will be four 3h laboratory sessions, with a range of experiments relating to both general experimental skills and vibrations and waves. The laboratory experiments are related to the above syllabus, but the laboratory sessions are organised separately to the lecture component of the module.

Learning & teaching methods
Lectures (24h) – provide the opportunity to learn and understand the theory and knowledge required; revision sessions are provided, which include the discussion of past examination papers;
Laboratory experiments (12h) – provide the opportunity to explore the theory and knowledge acquired in lectures within the context of the physical world via quantitative experimental measurement;
Private study and revision (~114h)

Assessment methods
Laboratory work 30%, final examination 70%.

Core texts
New Understanding Physics for Advanced Level 4th edition, by J. Breithaupt. (Copies of the 4th edition are in the library, + copies of earlier editions).

Supplementary texts
Background text: *Physics* by J. Breithaupt (Copies of 2003 edition in the library).

PROPERTIES OF MATTER **PH026**

School of Physical Sciences Convenor Prof R.J. Newport ECTS Credits 7.5
Taught in term 1 Kent Credits 15 level F

Teaching provision:- 24 lectures and 12h of laboratory work (the latter coordinated by Dr J. Miao).

Aims

a) To provide students with a familiarity with aspects of the physics of waves and vibrations to a level approximating to Physics AS/A2.
b) The ability to apply this knowledge in other Physics modules in the Foundation Year and subsequently to use it within Stage 1 Physics modules.

Intellectual and subject-specific learning outcomes

1. Knowledge and understanding of physical laws and principles, and their application to wave phenomena and the properties of matter.
2. An ability to identify relevant principles and laws when dealing with problems, and to make approximations necessary to obtain solutions.
3. An ability to solve problems in physics using appropriate mathematical tools.
4. An ability to execute and analyse critically the results of an experiment or investigation and draw valid conclusions.
5. An ability to use mathematical techniques and analysis to model physical behaviour.
6. An ability to present and interpret information.
7. An ability to communicate scientific information, in particular to produce clear and accurate scientific reports.
8. A familiarity with laboratory apparatus and techniques, including relevant aspects of Health & Safety.
9. The systematic and reliable recording of experimental data.
10. An ability to make use of appropriate texts, or other learning resources as part of managing their own learning.

Transferable skills learning outcomes

11. Investigative skills in the context of independent investigation including the use of textbooks and other available literature, and the interaction with colleagues to extract important information.
12. Communication skills in the area of dealing with surprising ideas and difficult concepts, including listening carefully, reading demanding texts and presenting complex information in a clear and concise manner.
13. Analytical skills associated with the need to pay attention to detail and to develop an ability to manipulate precise and intricate ideas, to construct logical arguments and to use technical language correctly.
14. Personal skills the ability to work independently, to use initiative, to organise oneself to meet deadlines and to interact constructively with other people.

Syllabus

Lectures

(i) Simple model of nuclear atom. Atomic number and mass. The periodic table. The mole and Avogadro's number. Solids, liquids and gases. Interatomic forces. Excitation and ionization. The electron volt.

(ii) Spectra and energy levels. E = hf. Relation of spectra to transitions between energy levels. Bohr atom quantitatively. Photoelectric effect. Crystalline lattices. Amorphous materials. X-ray diffraction. Polymers and plastics.

(iii) Gases, liquids and solids. Pressure. Archimedes principle. Hydrostatics. Heat and temperature scales. Thermometers. Latent heat. Thermal expansion. Perfect gas laws.

(iv) Thermal equilibrium and temperature. Thermal conduction. Radiation laws. Kinetic theory of gases.

(v) Introduction to radioactivity.

Laboratory work

There will be four 3h laboratory sessions, with a range of experiments relating to both general experimental skills and the properties of matter. The laboratory experiments are related to the above syllabus, but the laboratory sessions are organised separately to the lecture component of the module.

Learning & teaching methods

Lectures (24h) – provide the opportunity to learn and understand the theory and knowledge required; revision sessions are provided, which include the discussion of past examination papers;
Laboratory experiments (12h) – provide the opportunity to explore the theory and knowledge acquired in lectures within the context of the physical world via quantitative experimental measurement;

Private study and revision (~114h)

Assessment methods
Laboratory work 30% and Final Examination 70%.

Core texts:
New Understanding Physics for Advanced Level 4th edition, by J. Breithaupt. (Copies of the 4th edition are in the library, + copies of earlier editions).

Supplementary texts:
Background text: *Physics* by J. Breithaupt (Copies of 2003 edition in the library).

PHYSICS TUTORIAL MODULE

PH027

School of Physical Sciences Convenor G. Mountjoy ECTS Credits 7.5
Taught in Autumn and Spring terms Kent Credits 15 level F

Teaching Provision: 36 contact hours: 32 hours of workshops and 4 hours of tests.

Aims:
1. To support student adjustment to University.
2. To help develop learning skills in an University environment.
3. To develop the knowledge gained in the accompanying Physics modules.
4. To develop problem solving skills in physics.

Learning Outcomes:
1. The ability to understand and apply the more widely used mathematical techniques in physics to physics problem solving.
2. The ability for students to be active self-learners.

SYLLABUS

22 workshops (i.e. 11 in term 1 & 11 in term 2) based on problem solving related to the on-going lecture based modules PH023, PH025, PH026 and PH027, and maths revision.

10 workshops (i.e. 5 in term 1 & 5 in term 2) based on acquiring study skills (e.g. essay writing, preparing talks/presentations/general IT skills etc).

4 tests (i.e. 2 in term 1 and 2 in term 2).

Assessment Methods: 100% continuous assessment. 50% will be based on work submitted during the course, and 50% will be based on the results of the tests.

Core Texts: To be announced.

ENGLISH FOR UNIVERSITY STUDY

(50 hours)

(1) All registered overseas students will be given an English language assessment at the beginning of the academic year and the results will be used as the basis for deciding who should be required to follow regular compulsory classes.

(2) There will be a two-tier approach, with the weaker students having two compulsory hours tuition per week and the stronger ones having their language monitored through the marking, by an English language specialist, of their lab reports during the year.

(3) Those taking language classes will have half-termly tests, in the same week as other components of the Foundation Course. Those who, in the judgement of the English language specialist, no longer require language tuition may be allowed to drop the sessions.

BOOKLIST

You are advised not to buy any book until the lecturer confirms it is the set text.

Recommended Texts:

For Maths Lectures:
'Mathematics : The Core Course for A-level', L. Bostock and S. Chandler, Stanley Thornes (Publishers) Ltd., ISBN 0-85950-306-2

Recommended for those with little or no mathematics background to gain a good grounding is -
"Foundation Maths", Croft and Davison 2nd edition, Addision-Wesley, ISBN 0-201-17804-4

For Physics Lectures:
'Understanding Physics for Advanced Level', J. Breithaupt, Hutchinson (Publishers), ISBN 0-7487-0510-4
Also
"Physics", J. Breithaupt, MacMillan, ISBN 0-333-73302-9

For Electronics Lectures:
'Mastering Electrical Engineering', Noel M. Morris, Macmillan Master Series, 2nd Edition, ISBN 0-333-54721-7

'Electrical and Electronic Principles', C.R. Robertson, Edward Arnold,
ISBN 0-340-57918-8

For Mechanics Lectures:
'Applied Mathematics I', L. Bostock and S. Chandler, Stanley Thornes (Publishers) Ltd., ISBN 0-85950-019-5

SECTION D: CATALOGUE OF COURSES FOR STAGE 1

D1. MODULE REQUIREMENTS

(YOU WILL BE REQUIRED TO REGISTER YOUR MODULES ON-LINE AT THE START OF TERM IF YOU HAVE NOT ALREADY DONE SO)

Each degree programme is modular. Full time students must study modules amounting to 120 credits per year. Modules consist of multiples of 15 credits. In Physical Sciences most students take a reasonably fixed set of modules, depending only on their named degree. Each module has a code consisting of two letters followed by three digits. The letters indicate the subject area.

BSc in FORENSIC SCIENCE
BSc in FORENSIC SCIENCE WITH A YEAR IN INDUSTRY
105 credits

		Level	Credits
CH308	Molecules, Matter and Energy	C	15
CH309	Fundamental Chemistry for Physical Scientists and Bioscientists	C	15
CH317	Introduction to Medicinal Chemistry	C	15
BI300	Introduction to Biochemistry	C	15
LW312	Legal Process for Forensic Scientists	C	15
PS301	Introduction to Forensic Science	C	15
PS390	Skills for Forensic Sciences	C	15
and 15 credits from the following:			
BI307	Human Physiology and Disease (for students with A-level or equivalent Biology)	C	15
BI305	Fundamental Human Biology (for students without A-level or equivalent Biology)	C	15

BSc in FORENSIC CHEMISTRY
BSc in FORENSIC CHEMISTRY WITH A YEAR IN INDUSTRY
120 credits:

		Level	Credits
CH308	Molecules, Matter and Energy	C	15
CH309	Fundamental Chemistry for Physical Scientists and Bioscientists	C	15
CH317	Introduction to Medicinal Chemistry	C	15
PH307	Disasters	C	15
PS301	Introduction to Forensic Science	C	15
PS390	Skills for Forensic Science	C	15
PS522	Inorganic Chemistry	I	15
LW312	Legal Process for Forensic Scientists	C	15

BSc or MPhys in PHYSICS
MPhys in PHYSICS WITH A YEAR IN THE USA
BSc or MPhys in PHYSICS WITH ASTROPHYSICS
MPhys in PHYSICS WITH ASTROPHYSICS WITH AYEAR IN THE USA
BSc or MPhys in PHYSICS WITH SPACE SCIENCE AND SYSTEMS
MPhys in PHYSICS WITH SPACE SCIENCE AND SYSTEMS WITH A YEAR IN THE USA
BSc or MPhys in ASTRONOMY, SPACE SCIENCE & ASTROPHYSICS
MPhys in ASTRONOMY, SPACE SCIENCE & ASTROPHYSICS WITH A YEAR IN THE USA
105 credits

		Level	Credits
PS370	Skills for Physicists	C	15
PH300	Mathematics	C	30
PH301	Physics	C	30
PH302	Computing Skills I	C	15
PH304	Astrophysics, Space Science and Cosmology	C	15
PH307	Disasters	C	15

BSc in PHYSICS WITH FORENSIC SCIENCE
120 credits:

		Level	Credits
PS370	Skills for Physicists	C	15
PH300	Mathematics	C	30
PH301	Physics	C	30
PH304	Astrophysics, Space Science Cosmology	C	15
PS301	Introduction to Forensic Science	C	15
CH308	Molecules, Matter and Energy	C	15

D2. MODULE DETAILS

The following catalogue of modules provides a reference for the content, aims and objectives, method of assessment and core texts for all modules available to Stage 1 students registered for Physical Sciences degrees.

We are constantly striving to provide the best teaching and learning environment for our students, and modules are reviewed annually to ensure that the content is appropriate for the overall aims of the degrees. There may be some minor changes to the content of some of the modules as a result of such reviews. You will be notified of any amendments at the start of the appropriate term.

MOLECULES, MATTER AND ENERGY

CH308

School of Physical Sciences Convenor Dr M Went ECTS Credits 7.5
Taught in Autumn and Spring Terms Kent Credits 15 at level C

Pre-requisites: None
Co-requisites: None

Subject Specific Learning Outcomes:
Knowledge and understanding of:
1. major aspects of chemical terminology, conventions and units.
2. the nature of electrons and the structures of atoms and molecules including biological molecules.
3. the characteristics of the states of matter and the theories used to describe them.
4. the principles of thermodynamics.

Generic learning Outcomes:
The ability to
5. demonstrate knowledge and understanding of essential facts, concepts, principles and theories
6. solve qualitative and quantitative problems

SYNOPSIS OF THE CURRICULUM:
Atomic and Molecular Structure [7 lectures]
Energetics and quantisation; structure of the atom, energy levels in atoms and electronic configuration of atoms: Pauli exclusion principle, Hund's rule, effective nuclear charge; Periodicity, ionisation energy and electron affinity. Nature of molecules. Electronic structure in molecules; molecular orbitals; using atomic orbitals to make molecular orbitals (linear combination of atomic orbitals); bonding and antibonding, sigma and pi orbitals; hybridisation; delocalisation and resonance.
Gases, Liquids, Solutions and Solids [6 lectures]
Gases laws, intermolecular forces: types of interaction; liquids: classification of liquid types.
Molecular and ionic solids, lattice energies, diffusion in liquids and solids, viscosity, surface tension. Ions in solution, Coulombic interactions, ionic atmosphere, Debye-Hückel theory. Electrolyte solutions, strong and weak electrolytes, ionic strength, pH, ionic conduction: conductance measurements, transport numbers and ionic mobility; electrophoresis.
Thermodynamics [9 lectures]
The rational foundations of thermodynamics, the first law. Thermochemistry: enthalpies of formation and reaction, thermochemical calculations. Molecular interpretation of internal energy: heat capacities, equipartition of energy, population of rotational and vibrational states, Boltzmann distribution. The concept of entropy and the second law, reaction feasibility, Gibb's free energy, chemical potential. Equilibrium and thermodynamics, Van't Hoff equation, equilibrium calculations. Third law of thermodynamics and molar entropies, entropy and disorder. Thermodynamics of protein folding.

Learning and Teaching Methods
Lectures 22h provide an introduction to the basic concepts of chemistry including atomic and molecular structure, properties or gases, liquids and solids, and thermodynamics for Stage 1 science students and hence provide prerequisite and corequisite material for level C and I modules in Forensic Chemistry, Biosciences, Forensic Science and Physics with Forensic Science (outcomes 1-4)
Help Sessions 23h provide the opportunity to discuss the content of the module and practice problem solving and answering exam style questions. Help sessions are also an ideal opportunity for students without an A-level or equivalent background in chemistry to get additional tuition. Help will also be given with basic mathematics.
Private Study 54h reading lecture notes and books (outcomes 1-4), 20h coursework assessments (outcomes 1-6), 6h revision for and attending tests (outcomes 1-6), 25h revision and examinations (outcomes 1-6)

Assessment Methods and how these relate to testing achievement of the intended learning outcomes: 5 coursework assessments: 30% (outcomes 1-6), 2 tests 10% (outcomes 1-6), examination: 60% (outcomes 1-6)

Suggested Reading:
1. Chang, Physical Chemistry for the Chemical and Biological Sciences: Recommended purchase for students with a good A-level chemistry background. Good coverage of biological examples.
2. Atkins, The Elements of Physical Chemistry: A less mathematical approach, but with few biological examples.
3. Winter, Chemical Bonding: Recommended for the Atomic and Molecular Structure component of this module.
4. Jones, Clemmet, Higton and Golding, Access to Chemistry: Background reading for students without A-level chemistry.

FUNDAMENTAL CHEMISTRY FOR PHYSICAL SCIENTISTS AND BIOSCIENTISTS CH309

School of Physical Sciences Convenor Dr S J Holder/ Dr M J Howard ECTS Credits 7.5
Taught in terms 1 & 2 Kent Credits 15 Level C

Teaching Provision: 24 lectures, 5 workshops. Additional background reading on the part of students (up to 5 hours per week, including completion of assignments) is required.

Aims:
To bring students with various levels of previous knowledge to a level of basic organic and bioorganic chemistry sufficient to underpin chemical, biological and forensic science modules at level C and level I. Specifically, to introduce the structural, geometrical and three-dimensional concepts underlying organic chemistry according to commonly encountered functional group classes. To enable students to draw and name commonly encountered functional group classes of simple organic compounds using full stick-wedge-hatch formalisms, IUPAC or common nomenclature. To familiarise students with the basic forms of polar reaction mechanism classes and the electron-pushing ("curly arrows") formalism. To teach the application of ^{1}H NMR, IR and UV-Visible spectroscopies toward the identification and distinction of simple organic compounds.

Outcomes and Skills:

By the end of this module, the student should:
- Be able to name simple organic molecules and, when provided with the name, correctly draw the structure.
- Recognise the common functional groups and their important chemical (polar) reactions.
- Understand the principles behind polar reaction mechanisms of organic compounds, and to describe mechanisms quickly on paper using the curly arrow formalism.
- Recognise important examples of organic chemistry in a biological context and appreciate the relationship between chemistry and molecular structure and biology.
- Possess an introductory understanding of the principles of chemical analysis of organic compounds.
- Be able to predict the ^{1}H NMR and IR spectra expected from simple organic compounds.

SYLLABUS

Functional Group Organic Chemistry and Reaction Mechanisms
12 lectures (Dr S. J. Holder)

- **Carbon:** the carbon atom, atomic and molecular orbitals, sp^3 hybridisation, bonding, drawing/representation of organic compounds.
- **Functional Groups:** overview of functional groups and names.
- **Alkanes;** structure, nomenclature, physical properties, conformations, isomers, cyclic alkanes.
- **Alkenes:** structure, nomenclature, physical properties, sp^2 hybridisation, π-bonding, E/Z-isomers, reactions of alkenes.
- **Alkynes:** structure, sp hybridisation, nomenclature, representative reactions.
- **Organic reactions:** homolytic and heterolytic bond scission and bond formation, curly arrows, polar reactions, electrophilic addition to alkenes.
- **Alkyl halides:** structure, nomenclature, physical properties, synthesis of alkyl halides, reactions of alkyl halides.
- **Nucleophilic substitution reactions:** bimolecular nucleophilic substitution (S_N2), unimolecular nucleophilic substitution (S_N1), elimination reactions (E1 and E2).
- **Chirality:** stereoisomers, enantiomers, diastereoisomers, (R) and (S) notation and definition, properties of enantiomers.
- **Aromatic compounds:** definition of aromatic, Huckel rule, delocalisation, aromatic vs non-aromatic rings, nomenclature, simple reractions.

Chemistry of the Carbonyl Group, UV-Vis, IR and NMR Spectroscopy
12 lectures (Dr M.J. Howard)

- **Aldehydes and ketones:** structure, nomenclature, representative reactions.
- **Carboxylic Acids and Derivatives:** structure, nomenclature, representative reactions.

- **Nucleophilic addition and substitution involving the carbonyl group:** Importance of leaving group for addition (aldehydes and ketones) and substitution (carboxylic acid derivatives). Reaction series and interconversion of carboxylic acid derivatives.
- **Biological examples involving carbonyl groups:** Saccharides, esterification and Krebs cycle.
- **UV-Visible Spectroscopy:** Identification of conjugation and polyaromatic species.
- **Infra-Red Spectroscopy:** Use of the fingerprint region to identify basic organic functional groups.
- **NMR Spectroscopy:** Basic theory of NMR and use of ^{1}H and ^{13}C NMR to identify simple organic molecules and functional groups. Understanding of the basics of spin-spin coupling.

Coursework requirements*:*
Five problem-solving assignments, each associated with a workshop prior to the completion of the assignment.

Assessment Methods:
Coursework: 40%, examinations: 60%.
Assignments (problems): 5 at 8% each.

Reading List:

- **COMPULSORY READING** for Bioscience, Forensic Science and Forensic Chemistry students: McMurry/Simanek, *Fundamentals of Organic Chemistry*, 6th Edition, 2006 (ISBN 0495125903). *5th edition is also be acceptable*

- Recommended for Bioscience students: Wade, *Organic Chemistry, International Edition* 4th Ed., **1998** (ISBN 0-13-010339-X).
- Recommended for Forensic Science and Forensic Chemistry students: Solomons & Fryhle, *Organic Chemistry* 7th Ed., **1998** (ISBN 0-471-19095-0); Fisher & Arnold, *Instant Notes Chemistry for Biologists.*
- Recommended reading for any students new to, or uncertain about, chemistry: A V Jones, M Clemmet, A Higton, E Golding, *Access to Chemistry*, Royal Society of Chemistry, 1999 (ISBN 0 85404 564 3).

INTRODUCTION TO MEDICINAL CHEMISTRY

CH317

School of Physical Sciences Convenor Dr A Kanagasooriam ECTS Credits 7.5
Taught in Autumn and Spring terms Kent Credits 15 at level C

Teaching Provision: 22 lectures

This unit is a pre-requisite for: CH606

Aims : To provide an introduction to medicinal chemistry: the nature of drugs, how they work, and how they are discovered. The aim is to give a broad overview of the subject which could serve as a platform for further treatment at greater depth. Importance is attached to the relationships between chemical structure, chemical properties and drug action.

Learning Outcomes:

1. An appreciation of the importance of medicinal chemistry in the modern world.
2. Knowledge and understanding of the molecular chemical basis of drug action.
3. Understanding of the scientific and legal process of drug discovery.
4. Development of report writing skills.

SYLLABUS:

Fundamentals of Medicinal Chemistry [9 lectures]
What is a drug? Drugs and other xenobiotics; historical perspective to drug discovery. Essentials of drug action; what a drug has to do. Targets for drug action. Activity at the target and other key properties. Pharmaceutical R & D process. Examples of important drugs of the anti-infective type to introduce the importance of selectivity. Relevant basic biochemical principles such as enzyme action will be reviewed.

Chemical principles for Medicinal Chemistry [8 lectures]
Physical chemical aspects. Organic chemical aspects. Further examples of important drugs of the pharmacological type. Throughout the module, relevant basic principles of chemistry such as trends in the periodic table, logarithms and pH will be reviewed.

Drug Discovery [5 lectures]
The changing process of drug discovery. Rational drug design methods. New technologies.

Assessment methods
3 pieces of set work
Coursework 30% Examination 70%

Reading list
Patrick, G.L., An Introduction to Medicinal Chemistry, 2nd Edition, Oxford University Press, 2001.

Thomas, G, Medicinal Chemistry an Introduction, Wiley, 2000.

Nogrady, Medicinal Chemistry, 2nd Edition, Oxford University Press.

INTRODUCTION TO FORENSIC SCIENCE **PS301**

School of Physical Sciences Convenor Dr. R. E. Benfield ECTS Credits 7.5
Taught in Spring Term Kent Credits 15 at Level C

Teaching Provision: 28 lectures.
Pre-requisites and co-requisites: none

Aims: To define Forensic Science and its practices at scenes of crime. The practices of chemistry, physics and biology that follow from attendance of forensic scientists at scenes of crime will be emphasised. The module will prepare students for specialist forensic modules in Stages 2 and 3.

Learning Outcomes: On successful completion of the module, students will be able to demonstrate knowledge and understanding of:

1. The organisation of scientific support for law enforcement in England and Wales.
2. The principal areas and scientific methods of forensic investigation.
3. The role of the forensic scientist.
4. Legal procedures relating to forensic evidence and the role of expert witnesses.

SYLLABUS

Forensic Science; Evidence and the Scene of the Crime [15 lectures]
What is forensic science? Historical and legal background of forensic science – exchange principles and linkage theory. Forensic science in the U.K – inductive and deductive reasoning. Identification, characterisation, recovery and weighting of trace evidence types. Crime scene searching methodologies; the integrity and continuity of evidence. Introduction to laboratory testing dealing with glass, tool-mark, shoe-mark and tyre impressions.
The management of scientific support at crime scenes. Procedures at crime scenes illustrated by reference to crimes of burglary, murder and sexual offences. Fingerprint history, classification, recovery and chemical enhancement of fingerprints. Blood pattern analysis supporting the advances in DNA techniques. Firearms classification, internal & external ballistics, trajectory, mass and velocity. Firearms injuries at crime scenes. Introduction to DNA analysis and the functioning of the National DNA Database. Sexual offence investigation and body fluid identification. Clinical indicators of death and murder scene investigation.
Presentation of Expert Forensic Evidence [2 lectures]
The British legal system and courts. Prosecution and defence. and the presentation of expert findings in courts. Rules of disclosure and importance documentation. Explanation of the trial process.
Drug Abuse, Alcohol and Forensic Toxicology [6 lectures]
Drugs of abuse and their identification. Drugs, alcohol poisons and their metabolism. Toxicology and the role of the forensic toxicologist. Qualitative and quantitative laboratory analysis.
Document Examination: [2 lectures]
Signature and handwriting identification. Paper, inks and printed documents. Damage characterisation.
Fires and Explosions: [3 lectures]
Arson. Fire and combustion. Flame propagation. Types of explosives and the nature of explosions. The crime scene investigation, sampling and laboratory examination.

Coursework Requirements: 2 assessments including a multiple choice class test.

Assessment Methods: Coursework: 25%, Examination: 75%

Core text: Crime Scene to Court: The Essentials of Forensic Science. 2nd edition. Ed. Peter White, Royal Society of Chemistry, 2004. ISBN: 0854046569.

Recommended texts:
Criminalistics: An Introduction to Forensic Science. 8th edition. Richard Saferstein, Prentice Hall, 2004. ISBN: 0131228897
Forensic Science. A.R.W. Jackson & J. M. Jackson. Pearson, 2004. ISBN: 0130432512.

SKILLS FOR PHYSICISTS

PS370

School of Physical Sciences Convenor Dr G Dobre ECTS Credits 7.5
Taught in Autumn Term Kent Credits 15 at level C

Teaching Provision:
12 basic lectures, 5 computing skills sessions, 16 three-hour Laboratory sessions.

Aims : To develop basic experimental, computing, mathematical and communication skills required in physics

Learning Outcomes:

1. Development of a range of subject-specific and key transferable skills including ICT and communication skills
2. Acquisition of experimental laboratory skills in physics

SYLLABUS

Basic Lectures

How Physical Sciences are taught at Kent [1 lecture].
Communication skills [1 lecture]. How to write reports and articles, popular writing exercise.
Error analysis and data presentation [4 lectures]. Types of errors; combining errors; Normal distribution; Poisson distribution; graphs – linear and logarithmic.
Probability and Statistics [4 lectures]. Probability distributions, laws of probability, permutations and combinations, mean and variance.

ICT and computing skills

Windows operating system, advanced word processing, spread-sheet and internet skills. Bibliographic database searches.

Laboratory experiments (16 3-hour sessions over two terms)

A choice of experiments spanning 16 weekly sessions. Some of the experiments need 2 sessions to complete.

Choice of (among others): Deduction of a law, Wind tunnel, Probability distributions, Geometrical optics on the magnetic board, Computer–aided study of electrical and electronic circuits, Heat engines, Waves, Firing projectiles with the model catapult, mechanical simulation of stabbing action, etc

Assessment Methods: Continuous assessment 100% based on weightings allocated to various components:-
Library quiz; Safety assignment; Communication skills; Probability; error analysis; Computing skills; Write-ups for laboratory experiments.

Core Text: No single core text – instead, various titles are recommended for each of the individual components

SKILLS FOR FORENSIC SCIENCE **PS390**

School of Physical Sciences Convenor Dr L L Boyle ECTSCredits:7.5
Taught in Autumn and Spring Terms UKC credits: 15 at level C

Teaching Provision
2 basic lectures
5 computing skills sessions
15 lectures on quantitative skills for forensic science
12 accompanying examples classes/help sessions
2 lectures on incident-scene assessment and management
1 lecture on incident-scene mapping
5 three-hour chemical skills laboratory sessions
6 three-hour and one six-hour analytical chemistry laboratory sessions.
3 half-day forensic science practical sessions

Aims
To develop the basic experimental, and communication skills required in forensic science.

Learning Outcomes
1. Development of a range of transferable skills including Information and Communication Technology.
2. Acquisition of knowledge and understanding of practical forensic science.
3. Development of knowledge and understanding of quantitative skills critical for study of forensic science to degree level.

SYLLABUS
Basic Lectures
How Physical Sciences are taught at Kent [1 lecture].
Communication skills [1 lecture]. How to write reports and articles, popular writing exercise.

ICT and computing skills
Windows operating system, advanced word processing, spread-sheet and internet skills. Bibliographic database searches.

Quantitative Skills for Forensic Science
Introduction. Using GCSE maths and selected additional topics in the contexts of forensic science and forensic chemistry.
The prefixes used in the metric system of units. Representation of numbers — impact and context, justification, decimal places significant figures, truncation and rounding in calculations, orders of magnitude.
Basic algebra. Changing the subject of a formula. Concentrations, dilutions, interconversions of units.
Examples (density of diamonds, pressure in rifle barrel, molar and ppm concentrations, blood alcohol, R_f values, back-extrapolation of alcohol in blood.
Measurement and Errors. Uncertainty, precision, accuracy: application to the matching of tool marks.
The method of maximum errors (use of the mean and the $\sum$ sign). Application to the determination of the mean and the uncertainty in forensic fibre measurements, refractive index measurements on glass fragments, drug concentration measurements, bomb craters and shot particles.
Basic algebraic propagation of maximum errors.
Averages and simple data analysis.
The concepts of data spread, averages, mean, mode, median, standard deviation and the Q-test.
The treatment and assessment of errors.
Errors involved in making readings. The concept of the signal-to-noise ratio. The magnitude of an error.
The graphical treatment of errors; the use of error bars; the correlation coefficient *r*.
Examples of errors in titrations and in the calculation of concentrations using the Beer–Lambert law.
Exponentials and logarithms.
The exponential function and its algebra; the logarithmic function and its algebra; logarithms and graphical analysis.
Applications to calculations involving pH and forensic applications involving decaying exponentials, the Boltzmann distribution and Gaussian functions.
Basic Probability: the rules of simple probability, probability trees, combinations and permutations.
Applications to blood droplets, glass fragments, shoe colours and fingerprints.
Linear equations and simultaneous equations in the context of multi-component analysis using ultra-violet/visible spectroscopy.

The presentation of data. The use of the program Excel, graphs and correlation.
The equation of the equation $y = mx + c$ in constructing calibration curves.
Quadratic fits and their solution.
Trigonometry with applications to surveys, ballistics, blood spatter and search areas. The Bragg equation.
Revision.

Incident-Scene Assessment and Management

Incident and crime-scene assessment and definition. Securing the scene. Cordon placement and controls. Incident logistical support and specialist backup requirements.
Scene mapping and grid search techniques.
Anti-contamination protocols.
The single incident command structure. Major incident planning. Legal and evidential considerations.

Incident-Scene Mapping

Mapping methods. Use of global positioning systems. 3-dimensional scene-reconstruction.

Practical work

Chemical Skills Laboratory
This includes basic organic chemistry methodology, chemical handling, use of simple test equipment, *etc.*
Analytical Chemistry Laboratory
The experiments include: infra-red absorption spectroscopy; colorimetry; gravimetric analysis and titrations; solvent extraction. Determination of the accuracy of calibrated equipment.
Forensic Science
Two half-day teaching sessions on incident scene assessment and management.
One half-day assignment on mapping — this will be an outdoor, all-weather, exercise on UKC campus.

Assessment

This is a 100% coursework module. By its very nature little can be resubmitted if the module is failed.
Chemical Skills laboratory work. Analytical Chemistry laboratory work. Forensic Science practical work.
Mathematics and Statistics examples class work. Quiz on the use of the Templeman Library (set as homework).
PC practical skills. Assessment of the writing exercise on a popular scientific topic.

Recommended core textbooks

Paul Monk, Mathematics for Chemistry, (Oxford: Oxford University Press; 2006) (Templeman Library shelfmark QA 37.2). [This recommendation is subject to review – check before purchasing].
Richard Saferstein, Criminalistics — An introduction to Forensic Science, (Harlow and Upper Saddle River, New Jersey, Prentice Hall; 7th edition 2001) (Templeman Library shelfmark HV 8073).

Bibliography

Reference may be made to the following works but there is no recommendation to purchase them.
Peter White (editor), Crime Scene to Court — the Essentials of Forensic Science, (Cambridge: Royal Society of Chemistry; 2nd edition 2004) (Templeman Library shelfmark QA 37.2).
The Higher Education Academy Physical Sciences Centre, Quantitative Skills in Forensic Science, http://www.physsci.ltsn.ac.uk/Resources/DevelopmentProjectsReport.aspx?id=204
John Dean, Rob Reed, David Holmes, Jonathan Weyers, Allan Jones and Alan Langford, Practical Skills for Forensic Science, (Harlow and New York: Pearson/Prentice-Hall; 2005) (Templeman Library shelfmark qHV 8073).
Andrew R. W. Jackson and Julie M. Jackson, Forensic Science, (Harlow and New York: Pearson/Prentice-Hall; 4th edition, 2004). (Templeman Library shelfmark HV 8073).
Chemistry Tutor Software (C3) available on PCs in SPS student room G50.
Suzanne Bell, Forensic Chemistry, (Harlow and New York: Pearson/Prentice-Hall; 2006) (Templeman Library shelfmark RA 1057).
http://www.mathcentre.ac.uk/
http://www.mathtutor.ac.uk/
Anthony Croft and Robert Davison, Foundation Maths, (Harlow and New York: Addison-Wesley; 2nd edition, 1997) (Templeman Library shelfmark QA 37.2).
Stephen K. Scott, Workbooks in Chemistry — Beginning Mathematics for Chemistry, (New York: Oxford University Press; 1995) (Templeman Library shelfmark qQA 37.2).
James N. Miller and Jane C. Miller, Statistics and Chemometrics for Analytical Chemistry, (Harlow and New York, Pearson/Prentice-Hall; 4th edition, 2000) (Templeman Library shelfmark QD 75.4.S8).
D. C. Harris, Analytical Chemistry, (Templeman Library shelfmark QD 101.2).
Gary D. Christian, Analytical Chemistry, (Hoboken: Wiley; 6th edition 2003) (Templeman Library shelfmark QD 101.2).

INORGANIC CHEMISTRY

PS522

School of Physical Sciences Convenor Dr M J Went ECTS Credits 7.5
Taught in terms 1 and 2 UKC Credits 15 at level I

Pre-requisites: None
Co-requisites: CH308
This module is a pre-requisite for: PS503

Subject Specific Learning Outcomes: By the end of the module a student should:

1. understand the principles of inorganic chemistry, including the major types of chemical reactions.
2. be familiar with characteristic properties of the elements and their compounds, including group relationships and trends within the s, p, d and f-blocks of the periodic table.
3. understand the preparation, purification and analysis of a range of inorganic compounds using techniques such as ion-exchange chromatography, infra-red and uv-vis spectroscopy.
4. have the ability to interpret data derived from laboratory observations and measurements in terms of their significance and the theory underlying them.
5. have skills in the safe handling of chemical materials and in the conducting of standard laboratory procedures involved in synthetic work in relation to inorganic systems.

SYNOPSIS OF THE CURRICULUM

General Background [4 lectures]
Atomic structure. Electronegativity. Periodicity. Hard and soft acids and bases. Types of chemical bond. Lewis structures. Physical properties of ionic and covalent compounds. The structures of covalent main group compounds predicted by valence shell electron pair repulsion theory (VSEPR).

d-Block (Transition Metal) Chemistry [10 lectures]
Stereochemistry of metal complexes: geometrical, optical, structural, ionisation/hydration, linkage, coordination isomerism.
Bonding in transition metal complexes. Crystal field theory: crystal field splitting, factors effecting crystal field splitting, the spectrochemical series, low spin and high spin complexes, crystal field stabilisation energy (CFSE), hydration energy of M^{2+} ions, site selection in spinels and the Jahn Teller effect. Preparation and reactivity of transition metal complexes. Colours of complexes: d↔d spectra, spin and Laporte selection rules, intensities of absorptions. Measurement of ligand field splitting energy. Charge transfer absorptions.
Diamagnetism, paramagnetism, magnetic moment. Experimental measurement of the number of unpaired electrons in a complex.
Some aspects of the chemistry of 3d transition metals; comparison with 4d and 5d series.
Thermodynamic and kinetic stability of metal complexes. Stability constants. The chelate effect. Lability of ligands.

f-Block Chemistry [3 lectures]
Comparison with the d-block elements. Position of lanthanides and actinides in the periodic table. Electronic configuration, oxidation states and chemistry. The lanthanide contraction. Separation of lanthanide elements. f↔f spectra. Chemistry of actinides: uranium.

s- and p-Block (Main Group) Chemistry [7 lectures]
A brief overview of the properties and chemistry of the elements in Groups 1, 2, 13-18. Topics included are occurrence, extraction, purification and uses; ionisation energy, oxidation states, the diagonal relationship, donor-acceptor complexes, pi-bonding, toxicity and forensic applications.

Laboratory: [5 half days]
Experiments in preparative and analytical inorganic chemistry, to include: the separation of nickel and cobalt by ion-exchange chromatography; measurement of the ligand field splitting energy in a titanium (III) complex; preparation and properties of complex ions; isomerism in coordination complexes.

Learning and Teaching Methods
Lectures 24h which provide the opportunity to learn and understand the theory and knowledge required for outcomes 1-4. Problems set during lectures will give practice in problem solving and answering examination questions and provide opportunities for discussion of the module topics. (outcomes 1-4)
Laboratory classes 15h which provide hands-on experience of preparative inorganic chemistry and experiment report writing (outcomes 1-5)
Private study 50h reading lecture notes and books (outcomes 1-4), 30h laboratory write-ups (outcomes 1-5), 11h problem solving (outcomes 1-4) 20h revision (outcomes 1-4)

Assessment Methods and how these relate to testing achievement of the intended learning outcomes: Laboratory: 24% (outcomes 1-5), Problems: 16% (outcomes 1-4), Examination: 60% (outcomes 1-4)

Suggested Reading:

Cotton, Wilkinson and Gaus, Basic Inorganic Chemistry.
Greenwood and Earnshaw, Chemistry of the Elements.
Winter, d-Block Chemistry
Jones, d- and f-Block Chemistry
Henderson, Main Group Chemistry

MATHEMATICS I

PH300

School of Physical Sciences Convenor Dr G Dobre ECTS Credits 15
Taught in Autumn and Spring Terms Kent Credits 30 at level C

Teaching Provision: 48 lectures; 24 workshops. Guidance on weekly assessments is given in workshops, and students are expected to spend and extra 1-2 hours a week finalising their work for submission.

Aims:

1. To provide students with the necessary mathematical tools to enable a deeper understanding of physics.
2. To lay a firm foundation in maths to facilitate confident progress into the more advanced mathematical subjects.

Learning Outcomes:

1. The ability to understand and apply the more widely used mathematical techniques in physics.

SYLLABUS

- Derivatives and Integrals: Derivatives of elementary functions, chain rule, product rule, Integrals of elementary functions, Evaluation by substitution, Integration by parts, Area under the graph of a function
- Elementary Functions: Binomial coefficients, expansions and series, Maclaurin series, Taylor series, Exponential functions, Hyperbolic functions, Inverse functions.
- Functions of a single variable: Linear and quadratic functions, polynomials, rational functions, limits, infinite series, approximation of functions.
- Complex numbers: Quadratic equations, Argand diagram, modulus, Argument, complex exponential, de Moivre's theorem, roots of polynomials.
- Vectors: Basic properties, linear dependence, scalar and vector products, triple products, vector identities.
- Matrices: Matrix representation, systems of equations, products, inverses, determinants, solution of linear systems, eigenvalues and eigenvectors, transformations.
- Differential Equations: Solving differential equations, separable equations, linearity, homogeneity, first and second order equations, particular integrals. Boundary and initial values, auxiliary equations with complex roots, coefficients and terms, examples from physics.
- Partial Derivatives: functions of two variables , directional derivatives, function of a function, Taylor expansions, stationary points.
- Differentials and Integrals: perfect differential, chain rule, multiple integrals, integrals over areas, change of order of integration.
- Introduction to Vector Calculus : Gradients, Divergence, Gauss's theorem, Curl, Stokes' theorem.
- Polar Coordinates : Cylindrical polar coordinates in two and three dimensions, integrals, spherical coordinates, solid angle.

Assessment Methods: Weekly assessments 20%, 4 Tests 20%, Final Examination 60%.

Core Texts:

K.A.Stroud, Engineering Mathematics, 5th Ed.

PHYSICS

PH301

School of Physical Sciences Convenor Prof. A Podoleanu ECTS Credits 15
Taught in Autum and Spring Terms Kent Credits 30 at level C

Teaching Provision: 48 lectures, 24 workshop sessions (including 4 tests).

Aims:
1. To provide an introduction to the foundations of physics.
2. To form a basis on which the physics modules in the later years can be built.

Learning Outcomes:
1. An understanding of the laws and concepts of mechanics, waves, electromagnetism, electricity and thermodynamics and their application to the study of properties of solids and gases, electrical circuits and optics.
2. The ability to solve problems in basic physics topics.

SYLLABUS

Many of the topics will have been encountered in an A-level or equivalent physics course, but more rigorous mathematical treatments are included. Topics covered are:

Vectors. Motion along a straight line, motion in a plane with constant acceleration, uniform circular motion. Newton's laws of motion. Work, kinetic energy, power, potential energy, conservation of energy. Momentum, conservation of momentum, elastic collisions, centre of mass. Rotational motion, moment of inertia, torque, angular momentum, conservation of angular momentum. Newton's law of gravitation. Vibrations of an elastic spring, simple harmonic motion, simple pendulum. Damped oscillations, forced oscillations, resonance. Equilibrium. Elasticity. Forces between atoms or molecules, interatomic potential energy curve. Types of molecular bonds. Fluid mechanics. [16 lectures]

Temperature and thermal equilibrium, temperature scales, thermometers, thermal expansion. Quantity of heat, calorimetry, heat transfer mechanisms
Ideal gas equation, kinetic theory of ideal gas, molecular speeds. Molecular collisions. Heat capacities of gases and solids, latent heat. First law of thermodynamics. Adiabatic processes, heat engines, refrigerators. Second law of thermodynamics, Carnot cycle. Entropy. [8 lectures]

Electric current. Resistivity, resistance. Electromotive force and circuits. Energy and power in electric circuits. Theory of metallic conduction. Resistors in series and in parallel. Kirchhoff's rules. Electrical measuring instruments. RC, RL, LC and LRC circuits. Phasors and alternating currents. Reactance. LRC series circuits. Series and parallel resonance Potential dividers ,Thevenin's theorem, Maximum power transfer, Potentiometer, Bridge circuits, The transformer. [8 lectures]

Mechanical waves, periodic waves, wave equation. Transverse and longitudinal waves. Standing waves, normal modes. Sound waves, Doppler effect. Nature of light, reflection, refraction, total internal reflection. Dispersion, Polarisation. Huygens' principle. Reflection at plane and spherical surfaces. Thin lenses, magnification interference and coherent sources, diffraction from a single slit, circular apertures, resolving power, phase and group velocity, wave packets. [10 lectures]

Quantization and wave-particle duality. Summary of classical physics: particles and waves, interference and diffraction phenomena. Quantization concepts: Planck hypothesis, photoelectric effect, Compton scattering, Rutherford scattering and the nucleus, Bohr model of the atom. Wave-particle duality: de Broglie relation, electron diffraction, Schroedinger equation, Heisenberg uncertainty principle (brief). Quantum effects/applications, quantum tunnelling, electron microscope, H atom and electron orbitals, electrons in solids, lasers. [6 lectures]

Assessment Methods: Coursework (Workshop + tests) 30%, Formal Examination 70%

Core Texts:

Tipler,P.A., Physics, 5th Edit, W H Freeman (QC21)
Background reading:
Schaum;s Outline of Electric Circuits, J. Edminster & M. Nahvi (Eds), McGraw Hill Pub Co., 2004, ISBN 0071422412 (On order so no copies are in the library yet. Before buying please wait until the lecturer advises you if these are required).
(Earlier editions of the set texts are available in the Library: Edminster, J., Electric circuits, (QC4001))

COMPUTING SKILLS I

PH302

School of Physical Sciences Convenor Dr J Miao ECTS Credits 7.5
Taught in Autumn and Spring Terms Kent Credits 15 at level C

Teaching Provision: 36 classes.

Aims:

1. To provide an introduction to Fortran 90.
2. To provide students with the capacity to solve computational problems they will meet in the rest of their undergraduate programme and beyond.

Learning Outcomes:

1. The ability to program in Fortran 90.
2. The ability to devise simple computational algorithms.

SYLLABUS

- Introduction to the concept of programming languages, and to Fortran in particular.
- Introduction to the UNIX operating system: including text editors, the directory system, basic utilities, the edit-compile-run cycle.
- Introduction to Fortran 90, including the use of variables, constants, arrays and the different Fortran data types; iteration (do-loops) and conditional branching (if statements).
- Modular design : subroutines and functions, the intrinsic functions.
- Simple input/output, such as the use of format statements for reading and writing, File handling, including the Fortran open and close statements, practical read/write of data files. The handling of character variables.
- Use of library routines such as NAG.
- Easy Graph plotting via a shell-script that utilises GNUPLOT.

Assessment Methods: Continuous assessment 100% (including 2 tests).

Core Texts:

Ellis, T.M.R., and Philips, R., Fortran 90 programming. (QA76.73.F25)
Lamb, L., Learning the vi Editor. (QA76.76.T49)
Fortran 95/2003 Explained, Pub OUP, ISBN 10-0-19-852693 (On order so no copies are in the library yet. Before buying please wait until the lecturer advises you if these are required).
(Earlier editions of the set texts are available in the Library: Metcalf, M. and Reid, J., FORTRAN 90/95 Explained, Oxford Science Publications.)

Note: The contents of this module may be changed during the year.

ASTROPHYSICS, SPACE SCIENCE AND COSMOLOGY

PH304

School of Physical Sciences Convenor Dr J Miao ECTS Credits 7.5
Taught in Autumn Term Kent Credits 15 Level C

Teaching Provision: 30 lectures, 4 workshops, 2 class tests.

Aims:
1 To provide a basic grounding in Astrophysics suitable for those continuing on Physics with Astrophysics or Space Science degrees or taking higher level modules, while providing a coherent and self-contained overview of the subject at a level appropriate for any Physics student.
2 To provide a descriptive introduction to the popular subjects of Particle Physics and Cosmology which would not otherwise be studied until the final year of specialist courses.
3 To provide an awareness of the role of velocity change in spacecraft manoeuvres around the Earth and how space missions provide the tools for exploration of the Solar System.

Learning Outcomes:
1 A knowledge and understanding of the properties of objects in the Solar System, how they evolve, and their relevance to phenomena observed on the Earth.
2 An understanding of the physical and dynamical properties and evolution of stars and the structure of our galaxy, through interpretation of astronomical observations.
3 A qualitative understanding of fundamental particles and fields.
4 Knowledge and understanding of the observations and theory underpinning the current acceptance of the Big Bang; understanding of special relativistic principles.
5 Ability to calculate delta-V using the rocket equation, discuss how a rocket works and analyse space missions to see how they yield science.

SYLLABUS:
Introduction to Planetary Science [4 Lectures]. Celestial phenomena. Survey of the Solar System: Orbital theory, periods, Kepler's Laws; Earth-Moon system, seismology, tides. Terrestrial and gas giant planets; primitive and secondary atmospheres; evolution; asteroids, meteorites, comets; outer solar system; evolution. Sun: Energy source, structure, radiation, solar wind.
Introduction to Astronomy [6 lectures]. Positions and motions of stars. Stellar Luminosity and magnitudes: magnitude system, apparent and absolute magnitudes, colours, luminosity and bolometric magnitude. Stellar temperatures, luminosity and radii. Stellar spectra: spectral classification; line strengths and formation. Hertzsprung-Russell diagram; luminosity classes. Stellar structure and evolution: Hydrostatic equilibrium; Mass-Luminosity relation; Russell-Vogt theorem; nucleosynthesis. Evolution of low and high mass stars; stellar lifetimes; stellar remnants. Stellar systems: Open and globular clusters; stellar populations; Cepheids.
Introduction to Special Relativity and Cosmology [10 lectures]. Interstellar gas and dust; structure, disk and halo population. The local group; galaxy classification. The distance scale; redshift; Hubble constant. Special relativity: Feynmann light clock and time dilation, Lorentz contraction and simultaneity derived with light ray signals, Lorentz transformation, invariant interval, light cones. Special relativistic paradoxes. Cosmological principle; Space expansion; concept of critical density; closed open and flat cosmologies and the problem of missing matter. Cosmic background radiation & anisotropy. Age-temperature relation; the early universe and Helium synthesis.
Introduction to Particle Physics [6 lectures]. Particle Physics: Discovery of elementary particles. Force Mediators: forces and fields in classical physics; their replacement in quantum physics by exchange of virtual particles governed by the uncertainty principle; Feynman diagrams; Yukawa's prediction of pion as mediator of strong force; discovery of pion and muon. Accelerators: cyclotrons, synchrotrons and colliding beams. Four basic interactions; composite nature of p and n implies a more fundamental strong interaction; QCD and gluons; W boson. Relativistic time dilation in cosmic ray mesons.
Introduction to Space Science: [4 lectures]. Rocket equation. Basic components of spacecraft. Use of a typical interplanetary mission to illustrate how one learns about the science of another object in the Solar System.

Assessment Methods: Continuous assessment (including class test) 30%, Final examination 70%.

Core Texts
Tipler. P.A., Physics (fifth edition). W.H.Freeman & Co. , 2003, (qQC21.2, 6 copies)
Zeilik, “Astronomy: The Evolving Universe”, CUP
Background reading: Any general astrophysics text e.g Kaufmann, W.J., The Universe. (qQB43.2)

Note: The contents of this module may be changed during the year.

DISASTERS

PH307

School of Physical Sciences Convenor Prof A V Chadwick ECTS Credits 7.5
Taught in Autumn Term Kent Credits 15 Level C

Teaching Provision: 10 lectures and 10 seminars

Prerequistes: None

Co-requisites: None

Objectives: To study of particular cases in which disasters occur (for example, shipping disasters, the Chernobyl explosion, earthquakes), either as a result of human participation or in the "natural" course of events.

LEARNING OUTCOMES:

1. Development of a perspective on scientific reasoning.
2. Knowledge of the scientific basis of disasters.
3. Knowledge of the human impact of disasters.
4. Knowledge of the economic impact of disasters.
5. Ability to judge scientific and technical reports in the media.

GENERIC LEARNING OUTCOMES:

6. Ability to research information sources for primary data.
7. Skills in presenting scientific material in an essay format.
8. Interpersonal skills, relating to the ability to interact with other people and to engage in seminar work.

SYLLABUS:

Hurricanes, volcano eruptions, earthquakes, shipping disasters, stock market crashes, viruses crashing important servers world-wide and the Chernobyl explosion are all topics which can partly be understood from a scientific viewpoint. In a fairly clear sense, they represent situations in which the usual smooth-running laws of science breakdown (perhaps in the way that wars represent a breakdown in the usual diplomatic relations between states), but in recent years methods have been developed which give some insight into catastrophic events. This module will cover a number of phenomena, many of them well known and well publicised giving a clear account of each and discussing the scientific, technical and human contributions to the disaster. The module is given by physicists and chemists but the general tone and language is not at all technical. The questions we shall ask are: How are these disasters caused? Are they avoidable? What is their impact on human society? The module will be structured on a number of case studies, illustrating very different features by searching for common elements. This course includes a lecture on the general theme of the limitations of “scientific” evidence.

Learning and teaching methods:
Lectures: ***10h*** 10 1-hour lectures in a single term. Each lecture provides the basic information on a particular disaster.(outcomes 1-5)
Seminars: ***10h.*** 10 1-hour seminars in a single term. Each seminar follows a specific lecture and involves discussion of a disaster, consideration of impacts, human issues, etc. (outcomes 1-6, 8)
Private study: ***30h***. Reading lecture notes. ***50h.*** Preparation of material for seminars, researching primary sources, ***50h.*** Preparing materials and writing essays (outcomes 1-7).

Methods of Assessment: 100% coursework - two 2,500 word essays - (50% of final mark each) [outcomes 1-7].

Preliminary Reading:

J W N Sullivan, *Limitations of Science* (QC21)
Leo Tolstoy, *War and Peace,* (epilogue) (PS 3366.V6);
Nevil Shute, *Sliderule,* Heinemann, 1957

INTRODUCTION TO BIOCHEMISTRY

BI300

Biosciences Convenor Professor M.A. Geeves ECTS Credits 7.5
Taught in Autumn Term Kent Credits 15 Level C

Co-requisites: Fundamental Human Biology for Biology students who have no 'A' level in Biology.

Subject Specific Learning Outcomes: On successful completion of this module students will have:

1. A basic understanding of the composition, structure and function of the major groups of molecules in cells; nucleic acids, proteins, carbohydrates and lipids.
2. A basic understanding of the principles of thermodynamics as applied to living cells.

Learning and Teaching Methods: Lectures: 24h; Practicals: 20h; Workshops/Supervisions: 3h. Self Study: Practical preparation and write-ups: 16h; thermodynamics: 16h; Molecular graphics: 5h; Writing up lectures notes, background reading, preparation for tests 36h; Revision: 30h.

Lectures:

Introduction. What is Biochemistry? The chemical elements of living matter. The central role of carbon. The underlying principle in the use of monomers to construct macromolecules. The nature of weak interactions in an aqueous environment.

Nucleic Acids. Types - DNA and RNA. Chemical structure, properties of phosphodiester linkage, primary structure. Nucleic Acids. Secondary structure - Watson Crick DNA model, A and Z DNA. Tertiary structure - circular DNA, supercoiling. Stability of nucleic acids - sugar phosphate chain, base pairing, base stacking. Biological functions of Nucleic Acids. Overview of replication, transcription and translation. Role of RNA - types, post-transcriptional processing, tRNA structure, ribosomes.

Proteins. Amino acids - structure, classification, properties. Peptides and peptide bond. Secondary structure. Structural proteins. Tertiary structure - role in function. Factors determining secondary and tertiary structure. Quaternary structure. Protein Function - Myoglobin versus Haemoglobin. Haemoglobin variants. Subcellular fractionation. Protein isolation and purification. Use of Molecular Graphics packages.

Energetics of life. Basic definitions - Energy, First Law of Thermodynamics, Enthalpy, Entropy, Second Law of Thermodynamics. Free Energy and Chemical Reactions. Free energy and equilibrium constant, temperature dependence, applications.

Carbohydrates. Monosaccharides, stereoisomers, conformation, derivatives. Disaccharides, glycosidic bond stability and formation (α and ß). Polysaccharides. Storage (e.g. starch, glycogen), structural (e.g. cellulose, chitin, glycosaminoglycans bacterial cell walls). Glycoproteins.

Lipids: lipids, fatty acids, triacylglycerols, glycerophospholipids, sphingolipids, glycosphingolipids, steroids, waxes. Membranes: lipid bilayers, hydrophobic effect, fluid-mosaic model, membrane-bound proteins. Membrane transport systems: passive transport, ionophores, active transport, double-membrane systems, porines.

Practicals:

1. Preparation and identification of nucleic acids.
2. Protein isolation.
3. Analysis of the sugar composition of honey and TLC separation of lipids.
4. Assessed practical.

Workshops:

1. Molecular modelling using Chime.
2. Problems in thermodynamics

Methods of Assessment: MCQ assessment of proteins & nucleic acids and molecular graphics (12.5%); Assessed laboratory practical (12.5%); MCQ assessment of Carbohydrates and lipids (12.5%); Assessed thermodynamic problems (12.5%); Summer exam (50%) 2hr exam 40 compulsory MCQ questions and choice of 1 from 3 essay/calculation questions.

Core text:

Nelson, D.L. & Cox, M.M. Lehninger Principles of Biochemistry, 4th Edition.

General

Garrett, R.H. & Grisham, C.M. Biochemistry, or
Matthews, C.K., Van Holde, K.E. & Ahern, K.G. Biochemistry, or
Voet, D. & Voet, J., Biochemistry, or
Zubay, G., Biochemistry.

Electronic Structure & Bonding

Winter, M.J. Chemical Bonding

FUNDAMENTAL HUMAN BIOLOGY

BI305

Biosciences Convenor Dr. K.E. Foster ECTS Credits 7.5
Taught in Autum and Spring Terms Kent Credits 15 Level C

Pre-requisites: Science at GCSE level (or equivalent)

Subject Specific Learning Outcomes: On successful completion of this module students will have knowledge of:

1. The basic structure and function of eukaryotic cells.
2. The basic chemistry of macromolecules.
3. How cells divide and pass information to the next generation.
4. The major systems of the body - blood, muscle and bone, digestive tract, kidneys and nerves.
5. How the body is co-ordinated and controlled.
6. The basic functioning of the immune system and causes of disease.

Learning and Teaching Methods: Lectures: 20h; Tests: 2h; Feedback sessions: 1h; Revision workshops: 1h. Self Study: Essay preparation: 20h; Multiple choice preparation: 40h; Reading, revision: 66h.

Lectures:

Lectures will be based largely on the main textbook and will introduce the precise terminology and current conceptual beliefs natural scientists use to describe the human body and explain its functions.

1-3. Cell structure and function.
4-5. Cell division.
6. Differentiation.
7. Bones.
8. Muscles and movement.
9. Infection and Immunity I.
10. Infection and Immunity II.
11. Blood - Circulation and Transport of Gases
12. Digestion - Digestive Tracts and Enzymes.
13. Absorption and Assimilation - Transepithelial Transport, Metabolism and Storage.
14. Excretion I - Catabolism, Waste Products and the Kidney.
15. Excretion II - Kidney Structure/Function and its Regulation.
16. Coordination and Control - Homeostasis, Sensors, Effectors and Feedback Loops.
17. Hormones - Endocrine Glands and their Targets.
18. Hormone Action - Hormone Types, Receptors, Intracellular Effects.
19. Nerves I - Nervous System and Nerve Cell Structure/Function.
20. Nerves II - Senses, Reflexes, Effectors and Integration.

Methods of Assessment: Final Marks for the module will be made up from two elements: Continuous Assessment - two tests (20% each), each comprising multiple choice questions and one short essay question, and end of year exam (60%).

Recommended textbook:

Mader, Sylvia, S. `Human Biology', (10th edition), 2007, McGraw-Hill - recommended text (under review).

Dictionary of Biological Terms (various alternatives exist) - recommended purchase for all students unfamiliar with biological terms or limited familiarity of English versions of these.

Related texts in UKC library as reference material also video cassettes housed in the Templeman library.

HUMAN PHYSIOLOGY AND DISEASE

BI307

Biosciences Convenor Professor W.J.Gullick ECTS Credits 7.5
Taught in Autum and Spring Terms Kent Credits: 15 Level: C

Pre-requisites: A Level Biology or equivalent OR BI305 Fundamental Human Biology

Subject Specific Learning Outcomes: On successful completion of this module students will:

1. Be able to describe the main physiological systems of the body and the basic anatomical structure and histology of the principal organs in these systems.
2. Understand the role of the main physiological systems in the maintenance of whole body homeostasis.
3. Be able to describe the consequences of alteration of normal physiological states and the evolution of disease.

Learning and Teaching Methods: Lectures: 21h; Feedback: 1h; Multiple-choice test: 2h. Self Study: Reading lectures notes, books, revision: 96h; Tests: 30h.

Lectures:

This module will consider the anatomy and function of normal tissues, organs and systems and then describe their major pathophysiological conditions. It will consider the etiology of the condition, its biochemistry and its manifestation at the level of cells, tissues and the whole patient. It will cover the diagnosis of the condition, available prognostic indicators and treatments.

Lectures:

Introduction to Cells, Cell Injury and Disease Terminology. The Vascular System and Inflammation. Fever. Normal Tissue Turnover and Wound Healing. The Immune System and Diseases of Immunity. Normal Tissue Development and Neoplasia. Blood and Blood Disorders. The Vascular System and Vascular Disorders. The Heart and Heart Disease. The Lungs and Respiratory Disease. Lecture on the histology of tissues. The Gastrointestinal Tract and Gastrointestinal Disease. Diseases of the Liver and Pancreas. The Normal Kidney and Kidney Disorders. Hormones and Endocrine Diseases. The Skeletal and Muscular Systems and their Disorders. Reproductive Systems and their Disorders. The Central Nervous System. Movement, Sensation and Mental Function. Pain. Trauma.

Methods of Assessment: This module will be assessed by examination (60% of the overall mark for the module) and course work (40% of the overall mark for the module). The examination will be a 2 hour unseen paper held at the end of the year and will require students to show an understanding of the theoretical content of the module. The course work component will be two multiple-choice tests (20% each of the overall mark for the module). These assessments are formative and will allow students to obtain feedback on their learning throughout the duration of the module. The multiple-choice tests will enable students to show that they have understood and can apply the theoretical knowledge delivered in the lectures.

Marks will be entered for assessment purposes. In the final 2 hr exam, the paper will contain a multiple choice section of 30 questions and a choice of one essay type answer from 3 questions. Essay section carries 50% of exam mark (30% of module overall) and multiple choice section 50% (30% of module mark).

Required and recommended reading:

Nowak, J.T. and Handford, A.G. (2004) Pathophysiology: Concepts and Applications for Health Care Professionals (3rd Edition) New York, McGraw-Hill.

Students will be strongly advised to purchase a copy of this textbook. Sixteen copies are available in the library.

LEGAL PROCESS FOR FORENSIC SCIENTISTS

LW312

KLS Convenor Helen Carr ECTS Credits 7.5

Taught in Autumn term Kent Credits 15 at level C

THIS MODULE IS RESTRICTED TO STUDENTS TAKING FORENSIC SCIENCE DEGREES

Forensic science is science pertaining to the law, specifically courts of law. A grounding in the legal environment and in the ability to analyse and evaluate aspects of it are crucial to the subject. The module acquaints students with the basic principles, structures and procedures of the legal system in England and Wales. The module develops a range of skills, and emphasises self-directed methods of learning. Tasks include visits to (criminal) courts and reporting thereon, interviewing role play, drafting legal papers and making oral submissions. There is a heavy emphasis on teamwork, and group collective responsibility for module exercises. It may be possible for students to work in the Kent Law Clinic.

Introductory Reading:

G. Slapper and D. Kelly The English Legal System (Cavendish, 8th ed, due out July 2006)

Method of Assessment:
There is no examination at end of term. Students are assessed on written, oral and practical work during the term . There are two written pieces (each by a group of students) of 4,000 words each, and one (group) oral submission of up to 30 minutes - with each student speaking for up to five minutes. Both the execution of the work and its assessment are carried out primarily on a group basis (with about three students in each group). Usually, each student in a group receives the same mark for a piece of assessed group work as the other students in that group. Each of the three pieces of work will carry one third of the marks comprising the final assessment.

Contact Hours:
Lectures - 20 hours approximately.
Seminars - 10 hours approximately.

SECTION E: TEACHING AND EXAMINATION PROCEDURES

E1. LECTURES AND COURSEWORK

ATTENDANCE AND DILIGENCE
Much of the basic material is covered in lectures and you will find it very difficult to make a success of a science degree programme unless you attend all lectures. Consequently, ***attendance at lectures in Physical Sciences modules is compulsory.***

Attendance at laboratory and other practical classes, workshops, seminars and examples classes is ***compulsory***. Most modules have an element of continuous assessment, which may take the form of problem sheets, essays, class tests, laboratory write-ups or oral contributions. All written course work and examination answers must be clearly legible and submitted in clear, standard English. Work which does not conform to such standards may not be marked. Marking criteria for coursework such as dissertations, project reports and essays will be published during the year.

Marks
Continual assessment marks are recorded on the University's Course Management & Student Data System (CMSDS). You may access your own records to check progress during the year.
If you believe that you have been awarded the wrong mark for a piece of assessment (ie you have the original returned work which shows a different mark to that on the system) you should collect a Change of Mark Form from the student administration office or download from the PASS pages of the department's website and take it to the person who marked your work. If appropriate, they will complete the form authorising student administration to amend the mark on the system. No marks will be amended without authorisation from the member of staff responsible for the assessment in question.

DEADLINES AND EXTENSIONS
The deadlines for submission of written work will be clearly defined. Work submitted after the deadline will not normally be marked and will be returned to the student with a mark of zero. If you are unable to submit coursework by the published deadlines due to reasons of sickness or personal circumstances then, in order for any allowances to be made, you must adhere to the following procedures:

Short Term Absence
If you have missed lectures, labs, workshops or examples classes due to a short term illness (less than 5 days), or for any other reason, you should complete an Undergraduate Absence Form within 2 weeks of your return to study and return it to the student administration office. Forms are available from the student administration office (room 209) or on the Web at
http://www.kent.ac.uk/physical-sciences/main/undergraduate/pass/index.htm
and will need to be signed off by your tutor.

Longer Term Absence
All longer term illnesses (more than 5 days) and absences should be reported to your tutor as soon as it practicable, so that he/she can help you to manage your studies and advise you on the best course of action for your individual circumstances.
You will be asked to provide a medical certificate or other means of verifying the reason for your absence, and should complete an Undergraduate Absence Form, within 2 weeks of your return to study, to accompany your documentation, and return it to the student administration office. Forms are available from the student administration office (room 209) or on the Web at
http://www.kent.ac.uk/physical-sciences/main/undergraduate/pass/index.htm.

Illnesses and difficult or distressing events are a normal part of life. Students are expected to manage these and continue with work or study. Such difficulties are not normally accepted in mitigation for failure to submit coursework, to attend an examination or for impaired performances in coursework or examination.

Concessionary evidence submitted during the course of the academic year will either be discharged by the disregarding of specific marks on specific modules at the time of the concession only when authorised by your tutor, or considered by the Concessions Panel and then the Board of Examiners (which is empowered to condone failed modules and adjust degree classifications, depending on the nature and seriousness of the concession). It is important

to note that your tutor's ability to recommend disregarding items of coursework is strictly limited, and will be used accordingly.

All concessionary evidence submitted to your tutor, or in certain special cases the Senior Tutor, is treated as confidential and will be handled accordingly.

MONITORING OF PROGRESS
The progress of students is continually monitored via coursework submission (and examination) and a failure to fulfil your obligations regarding attendance and diligence can result in a student being required to withdraw from the University (section 5.2 of the Regulations for Taught Programmes of Study). Students so required have the right to make representation to the Faculty Review Panel before a decision on such a recommendation is confirmed. Requests for a review should be submitted in writing to the Faculty Officer. Such a request should outline the grounds for a review.

COMPLAINTS PROCEDURE
As a student you are entitled to receive competent teaching on all courses you take. If you, as an individual or as one of a group of students, feel that the basic requirements of good teaching are not being met, or that there are other issues to do with a module or its teacher(s) which you feel give grounds for complaint, you should raise the matter immediately. In many cases you will be able to sort out any problems on the spot by talking them through with the teacher(s) of the module. The Convenor of a module is the person who will normally consider any complaints not resolved in this way. Another possible route is to talk to your tutor. In the event that this process fails to generate a satisfactory solution, and especially in cases where the issue affects several students in your peer group, you should ask your elected year-group representatives to take the matter to the Staff Student Liaison Committee to be aired more widely. The Director of Undergraduate Studies and/or the Head of Department may become involved in order to help resolve unusually intractable issues. The key fact is that, as a department, we are committed to taking all constructive input seriously and to taking remedial action where this is found to be necessary.
Student feedback questionnaires, which are distributed at the end of each section of a module, enable your teachers to pick up suggestions for future improvement. The results from the questionnaires are discussed at the Teaching Committee module review meetings, where student representatives are present. If you wish at the end of a module/academic year to make a case that the inadequacies of the teaching have affected your overall performance, it is important that you raised any complaint you may have had about that module, or about an associated teacher, immediately it became a matter of concern to you.

The School's Personal and Academic Support System also has a grievance procedure, for students who may feel it necessary to request that they are allocated a different tutor. This can be found online at:
http://www.kent.ac.uk/physical-sciences/main/undergraduate/pass/index.htm

E2. EXAMINATIONS

REGISTRATION FOR EXAMINATIONS
All students are required to confirm that they have been correctly entered for end of year examinations. Notices about the arrangements for this will be posted throughout the campus towards the end of the Autumn Term.

USE OF CALCULATORS
Students are required to use calculators in their studies. However there are restrictions in examinations to prevent students from having access to information which might give them an unfair advantage. The present rules about calculators in examinations are that students will be allowed to use noiseless, non-mains, single-line display, non-programmable calculators without ascii memories in examinations. This definition means that the use of graphical calculators is prohibited.

FOUNDATION YEAR EXAMINATIONS
Please refer to Sections B and C.

STAGE 1 EXAMINATIONS
Before you can proceed to Stage 2 you must pass Stage 1. Each module is assessed separately with the contribution of written examination and continuous assessment explained in the module outlines (Section D). Written examinations take place in Summer Term. If you fail the module you may be offered the opportunity for re-assessment in August of the same year. You should note that in such circumstances it is rarely possible to repeat coursework, in particular laboratory classes. Continuous assessment marks will be carried forward to the re-sit examination. Students are allowed a

maximum of two re-sit opportunities, but may be offered the chance to repeat individual modules, or the whole year, if funding is available.
Modules which are assessed by 100% coursework (PS370, PS390, PH302, PH307) are designed so that you acquire skills through successful completion of assignments during the year. There is no end-of-year written examination. Consequently, if you fail one of these modules there is no opportunity to take a resit examination in August. No alternative assessment in August is permitted because these modules are designed to teach you skills within a specific context, throughout the academic year.

PASS MARK FOR STAGE 1
To pass the Stage 1 Examination candidates must be awarded 120 credits. The pass mark for all modules is 40%.

CREDIT FRAMEWORK

INFORMATION FOR ALL STUDENTS

Introduction

The University uses a 'credit framework' for all of its taught programmes of study, similar to the credit systems adopted by many other universities in the UK. This is intended to make it easier for students to obtain exemption from part of a University of Kent programme on the basis of study elsewhere and similarly for students to transfer credit obtained at this University to another university or college.

This section of the Handbook aims to explain those aspects of the credit framework, which will be of interest to students. However, it should be regarded as an informal guide only. The full Credit Framework Regulations may be found on the University web site at http://www.kent.ac.uk/registry/quality/credit/index.html

Outline of the Credit Framework

In order to be eligible for the award of a certificate, diploma or degree by the University, you must take an approved programme of study, obtain a specified number of credits, the number required depending on the award in question, and meet such other requirements as may be specified for the programme of study in question. Each programme of study comprises a number of modules, usually at different levels and each worth a specified number of credits.

Programme specifications for each SPS degree course may be found on the University web site at:
http://www.kent.ac.uk/stms/staff-student/prog-specs.html

In order to be awarded the credits for a module, you must normally demonstrate, via assessment, that you have achieved the learning outcomes specified for the module. Limited credit may also be awarded where assessment has been affected by illness (condonement) or where you have demonstrated in other modules that all programme learning outcomes have been achieved (compensation).

Most programmes of study are divided into stages, usually equivalent to one year of full time study. You must satisfy prescribed requirements for each stage of a programme before being permitted to proceed to the next stage.

Many programmes of study lead to 'classified' awards. For example, undergraduate Honours degrees are awarded with First Class, Upper Second Class, Lower Second Class or Third Class Honours and Certificates may be awarded with Merit or with Distinction.

Example: a student taking a three year full time undergraduate honours degree programme is required to obtain a total of 360 credits of which at least 90 must be at level 'H' or above (Stage 3 modules are normally at level 'H') and at, most, 150 may be at level 'C' (Stage 1 modules are normally at level 'C'). Many three-year full time honours degree programmes comprise 120 level C credits in Stage 1, 120 level I/H credits in Stage 2 and 120 level H credits in Stage 3. At least 90 credits must be obtained in Stage 1 before progression to Stage 2 is permitted and at least 90 credits must be obtained in Stage 2 before progression to Stage 3 is permitted.

Programmes of Study

Each programme of study comprises an approved set or sets of **modules** and is divided into a number of **stages**. Each module is at a specified **level** and successful completion of the module results in the award of a specified number of **credits at that level**. The University defines these terms as follows:

Credits: one credit corresponds to approximately ten hours of 'learning time' (ie including all taught or supervised classes and all private study and research). Thus obtaining 120 credits in an academic year of 30 weeks requires approximately 1,200 hours of learning time, equivalent to approximately 40 hours per week.

Module: a module is a self contained component of a programme or programmes of study with defined learning outcomes, teaching and learning methods and assessment requirements. Each module normally corresponds to a multiple of 15 credits ie to 15, 30, 45… credits though the Faculty may approve exceptions where it is satisfied that there is good reason to do so.

Level: each module is at one of the following levels:

F	Foundation
C	Certificate
I	Intermediate
H	Honours
M	Masters

The level descriptors adopted by the University for these levels may be found in Annex 2 of the Credit Framework Regulations.

Stage: Most programmes of study are divided into a number of stages and you must achieve specified requirements in each stage except the final stage before being permitted to progress to the next stage. For undergraduate honours degree programmes, a stage will normally consist of modules amounting to 120 credits.

Awards: In order to be eligible for the award of a certificate, diploma or degree by the University, you must obtain at least the minimum number of credits specified for that award at the specified levels. These requirements are set out in Annex 4 of the Credit Framework Regulations. Individual programmes or groups of programmes will normally specify additional requirements which must be met for the award of the qualification in the subject concerned, for example by requiring specified modules to be taken and passed.

Award of Credits

Successful Completion of Module
If you successfully demonstrate via assessment that you have achieved the specified learning outcomes for a module you will be awarded the number and level of credits prescribed for the module. Assessment methods vary between modules and assessment is designed so that achievement of the pass mark or above will demonstrate achievement of learning outcomes. Module specifications will state whether the pass mark has to be achieved overall and/or in prescribed elements of assessment. The pass mark is 40%.

Condonement
If you fail a module or modules due to illness or other mitigating circumstances, the Board of Examiners may condone the failure and award credits for the module(s), up to a limit of 25% of each stage of a programme of study, provided that there is evidence to show that you have achieved the **programme** learning outcomes and provided that you have submitted written medical or other evidence to substantiate any claim of illness or other mitigating circumstances. The marks achieved for such modules will not be adjusted to take account of the mitigating circumstances, but transcripts will indicate modules for which credits have been awarded via condonement and the marks will not be used in the calculation of overall grades. Each programme rubric specifies the modules in which failure cannot be condoned.

Compensation
If you fail a module or modules but your marks for such modules are within 10 percentage points of the pass mark (ie 30% or above), the Board of Examiners may nevertheless award you the credits for the module(s), up to a limit of 25% of each stage of a programme of study, provided that your average mark for the stage is 40% or above and provided that there is evidence to show that **programme** learning outcomes have been achieved. The marks achieved for such modules will be adjusted to the minimum pass mark and transcripts will indicate modules for which credits have been awarded via compensation. Each programme rubric specifies modules in which failure cannot be compensated.

Progression
When you have completed a stage of a programme of study other than the final stage, the appropriate Board of Examiners will decide whether you may progress to the next stage of the programme of study, or to another programme of study.

The normal requirement for progression from one stage of a programme of study to the next is that you should have obtained at least 75% of the credits for the stage and should have obtained credits for those modules which the programme specification indicates must be obtained before progression is permitted.

Referral
If you are not permitted to progress to the next stage of a programme, or if, on completion of the programme, you fail to meet the requirements for that award, the Board of Examiners may permit you to undertake further assessment in failed modules. The Board of Examiners will specify which elements of assessment you are required to undertake.
If you are so referred in a module you may be required to, or may elect to, **repeat** the module, before progressing to the next stage of the programme, provided that it is being taught in the year in question, or you may choose to take a different module provided that the requirements of the programme of study are still met, but must do so before progressing to the next stage of the programme. At most two such opportunities per module will be permitted, the first of these to be automatically permitted unless denied for disciplinary reasons and normally available during the long vacation following the initial failure.

Trailing and Retrieving Credit
If you are permitted to progress to the next stage of a programme but have not been awarded full credit for the previous stage, you will still need to obtain credits for modules for which you have so far not been awarded credit in order to meet requirements for the award of the certificate, diploma or degree for which you are registered. You will be permitted to 'retrieve' such credits, up to a maximum of 25% of the credits for the stage, in one of two ways as follows:
By undertaking further assessment, for example a re-sit examination, before the start of the next academic year. If you are permitted to retrieve credit in this way you may elect to **repeat** the module, provided that it is being taught in the year in question, or you may choose to take a different module, provided that the requirements of the programme of study are still met.

By progressing to the next stage of the programme and simultaneously undertaking such further requirements as the Board of Examiners specifies in relation to the failed modules. This is known as **trailing** credit. Where credit is trailed, the Board of Examiners may permit the you to repeat the failed module(s) provided it/they are available and the timetable permits or to take alternative module(s) as permitted by the programme specification or may specify assessment to be undertaken satisfactorily for the award of the credits in question. If you trail credit in this way and again fail to obtain the credits, the credit may **not** be trailed to the next stage of the programme eg you will not be permitted to progress to Stage 3 of a programme unless you have obtained **all** Stage 1 credits and met the minimum progression requirements in Stage 2.

In an intellectually progressive science degree, each year's study builds on the previous year and requires successful completion of all of the previous year's study as a pre-requisite. For this reason, the Boards of Examiners will NOT permit the trailing of modules in any Forensic Science or Physics degree programmes except at their discretion in exceptional circumstances.

Application of the Condonement, Compensation and Trailing Provisions
The application of condonement, compensation or trailing provisions is limited to a maximum cumulative total of 25% of the credit for any stage.

The provisions for the condonement or compensation of failure or for the trailing and retrieving of credit will be applied only if you have failed modules amounting to 25% or less of the credit for the stage.

Deferral
If you have been unable to complete assessment requirements or your performance has been affected by circumstances such as illness, and where there is written evidence to support this, the Board of Examiners may permit you to undertake some or all of the assessment for some or all of the modules comprising the stage at a later date and as for the first time. If you have met requirements for progression to the next stage of the programme, you may be permitted to 'trail' the deferred assessment ie to proceed to the next stage and simultaneously undertake the deferred assessment as for the first time.

Award and Classification of Qualifications
Certificates and diplomas may be awarded 'with Merit' and 'with Distinction' and Honours degrees are awarded with First, Upper Second, Lower Second or Third class Honours. Full details of the requirements for these awards may be found in the Credit Framework Regulations at

http://www.kent.ac.uk/registry/quality/credit/index.html.

Candidates for the Stage 1 Examination who have been awarded 120 credits will also be awarded an overall grade. The following divisions will be used:

Distinction	70% and over
Merit	60% to 69%
Pass	Below 60%

EUROPEAN CREDIT TRANSFER SYSTEM

The University has adopted the European Credit Transfer System (ECTS) in the context of our participation in the Erasmus programme and other European connections and activities.

What is ECTS?
ECTS, the European Credit Transfer System, was developed by the Commission of the European Communities in order to provide common procedures to guarantee academic recognition of studies abroad. It provides a way of measuring and comparing learning achievements, and transferring them from one institution to another.

ECTS credits
ECTS credits are a value allocated to module units to describe the **student workload** required to complete them. They reflect the **quantity** of work each module requires **in relation to** the total quantity of work required to complete a full year of academic study at the institution, that is, lectures, practical work, seminars, private work - in the library or at home - and examinations or other assessment activities. ECTS credits express a **relative value**.

In ECTS, 60 credits represent the workload of a year of study; normally 30 credits are given for a semester and 20 credits for a term. It is important that no special courses are set up for ECTS purposes, but that all ECTS courses are mainstream courses of the participating institutions, as followed by home students under normal regulations.

It is up to the participating institutions to subdivide the credits for the different courses. Practical placements and optional courses which form an integral part of the course of study also receive academic credit. Practical placements and optional courses which do not form an integral part of the course of study do not receive academic credit. Non-credit courses may, however, be mentioned in the transcript of records.

Credits are awarded only when the course has been completed and all required examinations have been successfully taken.

ECTS students
The students participating in ECTS will receive full credit for all academic work successfully carried out at an ECTS partner institutions and they will be able to transfer these academic credits from one participating institution to another on the basis of **prior agreement** on the content of study programmes abroad between students and the institutions involved.

The ECTS Grading Scale
Examination and assessment results are usually expressed in grades. However, many different grading systems co-exist in Europe. Interpretation of grades varies considerably from one country to another, if not from one institution to another.

The ECTS grading scale has thus been developed in order to help institutions translate the grades awarded by host institutions to ECTS students. It provides information on the student's performance additional to that provided by the institution's grade; it **does not replace the local grade**. Higher education institutions make their own decisions on how to apply the ECTS grading scale to their own system.

1. Each institution awards marks/grades on the basis of its normal procedures and system and these marks form part of the student transcript.
2. The ECTS scale is designed as a "facilitating scale" to improve transparency but not to interfere with the normal process of awarding marks within each institution or attempt to impose uniformity. The ECTS grading scale ranks the students on a statistical basis.
3. Within the broad parameters set out below each institution makes its own decision on the precise application of the scale.

ECTS GRADING SYSTEM	
ECTS Grade	**% of successful students normally achieving the grade**
A	10
B	25
C	30
D	25
E	10
FX	A distinction is made between the grades FX and F that are used for unsuccessful students. FX means: "fail- some more work required to pass" and F means: "fail – considerable further work required".
F	

DIPLOMA SUPPLEMENT

What is the Diploma Supplement?
The Diploma Supplement was developed to provide students with a document that will be attached to a higher education qualification and improve international recognition of academic and professional qualifications (diplomas, degrees, certificates etc).

The supplement provides a description of the nature, level, context, content and status of the studies a student pursued and successfully completed. All graduating students of the University of Kent receive a Diploma Supplement.
Why is the Diploma Supplement required?
Countries are constantly updating their qualification systems to encompass new qualifications that arise as a result of technological, political and economic changes. With people now taking greater advantage of work and study opportunities abroad, the need for a means of providing recognition of qualifications has become essential. As a result, further information about the level and function of a qualification is required to provide transparency.

The Diploma supplement aims to meet these demands by:
- Promoting transparency within Higher Education
- Taking into account changes in qualifications
- Aiding mobility and access to further study and employment abroad
- Providing fair and informed information relating to qualifications

What information does the Diploma Supplement contain?
The Diploma supplement comprises eight sections.

1. **Identification of the qualification holder:** Name, date of birth, student institution identification number/code.
2. **Identification of the qualification and its originating institution:** Name of qualification, name and type of awarding institution, language(s) of instruction and examination.
3. **Information on the level of qualifications:** Level of qualification, access requirements, main fields of study for the qualification.
4. **Information on the contents and results obtained:** Mode of study, normal length of programme, programme requirements, courses/modules/units studied, individual grades obtained, ECTS grade, grading scheme and grade distribution, award classification.
5. **Function of the qualification:** Qualification title, further study opportunities (e.g. postgraduate), any professional status conferred.
6. **Additional Information:** Any additional information and further sources as relevant.
7. **Certification of the Supplement:** Date and signature, official stamp or seal.
8. **Information on the National Higher Education system of the country issuing the diploma:** Overview of the educational system and awards structure of the awarding country.

What does the Diploma Supplement offer to students?
The Diploma Supplement aims to provide students with information relating to their programme of study that is both easily understood and comparable abroad. It provides an accurate description of a student's academic curriculum and competencies acquired during the period of study that may be relevant for further study and employment opportunities abroad.

Who should I contact if I have any queries?
If you have any queries relating to the Diploma Supplement, please contact the Student Records Office

CONCESSIONARY EVIDENCE AND THE RIGHT TO APPEAL
If you are ill during examinations or there are other serious circumstances impairing your examination performance, you may make written representations for the consideration of the Board of Examiners. Such representations must be made within one week of the examination concerned and submitted to the Student Administration and the Senior Tutor. Personal and other problems can also be considered if a case is received in writing.

There is no appeal against the academic judgement of the Examiners, but students may be able to appeal in certain circumstances. The student should discuss this with the Director of Undergraduate Studies in the first instance.

Details of appeals procedures may be found at: http://www.kent.ac.uk/registry/quality/credit/creditinfoannex9.html.

CHEATING IN THE EXAMINATIONS
The University's "General Regulations for Students" are issued to every student on admission to the University. They are also published at: www.kent.ac.uk/regulations/

Regulation III.4(ii) of the General Regulations for Students states that 'Except where allowed by the examination instructions, no candidate may introduce into the examination room any book, manuscript or other object or material relevant to the subject of the examination'.

Regulation III.4(v) states: 'Any candidate suspected of using or attempting to use any unfair means, including copying, or attempting to copy from the work of another candidate in the examination room, will be reported immediately by the Invigilator to the Secretary and Registrar. Such a person will render himself liable to disciplinary action, which may include failure in the whole or in part of the examination'.

The University regards cheating or attempting to cheat as an extremely serious offence. Students who are found to have cheated may fail the examination overall.

PLAGIARISM AND DUPLICATION OF MATERIAL

ACADEMIC INTEGRITY AND HONESTY AT UNIVERSITY.
What is academic integrity?
While you are at university, you are expected and required to act honestly regarding the work you submit for assessment in your courses. General Regulation V.3: Academic Discipline states that:

> **Students are required to act with honesty and integrity in fulfilling requirements in relation to assessment of their academic progress.**

General Regulation V.3 specifies that any attempts to:

- cheat,
- plagiarise,
- improperly influence your lecturer's view of your grades,
- copy other assignments (your own or somebody else's) or
- falsify research data

will be viewed as a breach of this regulation.

The full details of this regulation including disciplinary procedures and penalties are available at:
http://www.kent.ac.uk/registry/quality/credit/creditinfoannex10.html

Most students do not have any problems understanding the rules and expectations about acting honestly at university, although some are not familiar with academic expectations and *plagiarism*.

What is plagiarism?
General Regulation V.3 states that plagiarism includes:

> **reproducing in any work submitted for assessment or review (for example, examination answers, essays, project reports, dissertations or theses) any material derived from work authored by another without clearly acknowledging the source.**

In addition, certain departments or subjects may define plagiarism more narrowly.

The School of Physical Sciences' policy for handling plagiarism can be found at: *http://www.kent.ac.uk/physical-sciences/main/undergraduate/pass/index.htm*; **please read this carefully: ignorance of the policy will not be accepted as mitigation for an offence.**

This means that if you read, study or use any other work in your assignment, you must clearly show who wrote the original work. This is called referencing and correct referencing will help you to avoid accusations of plagiarism.

What is referencing?
Referencing means acknowledging the original author/source of the material in your text and your reference list. Examples of source material which should be referenced include:

- exact words (written or spoken)
- summarised or paraphrased text
- data
- images (graph, tables, video, multimedia etc)
- pictures or illustrations
- ideas or concepts
- theories
- opinion or analysis
- music or other performance media
- computer code
- designs, drawings or plans.

A variety of referencing styles are in use at the University of Kent. Specific style guides can be accessed from your department, library or UELT website.

Good referencing and avoiding plagiarism are pre-requisites to good writing. If you are unsure about essay writing in general or want to make sure that you will receive the good marks you deserve, you can visit the Student Learning Advisory Service based in the UELT building. For details see: http://www.kent.ac.uk/uelt/learning/index.html

AWARD OF CERTIFICATE
Any candidate who successfully completes Stage 1 of a Bachelor's degree programme but who does not proceed to Stage 2 will be eligible for the award of a Certificate in the appropriate subject.

E3. TRANSFER OF DEGREE PROGRAMME AND/OR MODULES

TRANSFER OF MODULES
Any change to the modules for which a student is registered requires the approval of the convenors concerned together with the Director of Undergraduate Studies. All such applications must be made on the official module transfer form, which can be obtained from the Departmental Administration Office. Students are advised to discuss such changes with their tutor in the first instance. Module transfers will not normally be permitted after Week 3 of the Autumn Term.

TRANSFER OF DEGREE PROGRAMME (INCLUDING BETWEEN DIFFERENT SPS DEGREES)
Any transfer of degree programmes is subject to the approval of both of the Directors of Undergraduate Studies concerned. If you are transferring to a degree programme which requires a compulsory module you are not already taking you should normally make the change before the end of the third week of the Autumn Term.

The Education (Mandatory Awards) Regulations provide that a Local Education Authority can refuse to agree to the transfer of a mandatory grant (and thus, in effect, to a student changing his/her degree course) if either

(a) its consent to the change has not been given within 12 months of commencement of the award, i.e. before the beginning of the second year of study, or

(b) the new degree course is of longer duration than the course for which the student originally registered.

In the present financial climate there is increasing evidence that consent to such changes may be refused if either of the above provisions have not been met. Students are, therefore, strongly advised to ensure that any change of degree course is formally approved by the Faculty and the LEA informed by the student within the 12 month period. Students who have already completed a Foundation Year should complete any transfer of their degree registration before the start of the Autumn term in Stage 1.

Students who initially register for a 3 year B.Sc. degree and wish to change to a 4 year M.Phys. degree should inform their LEA before the start of the second year courses. Transfers may also be made at a later stage but the financial support will not normally be approved for the full 4 year programme.

Students wishing to transfer to another Faculty should consult their tutor in the first instance and then see the Director of Undergraduate Studies.

NB. If you wish to transfer degree programmes and/or modules you must fill in an official transfer form from the Departmental Administration office (room 209).

STUDENTS WISHING TO INTERMIT

It is important that you seek help if you are experiencing problems with your studies.

If you seek a period of intermission you are strongly advised to check the financial consequences with your sponsors. It is very important that your sponsor is consulted.

PLEASE NOTE THAT IF YOU HAVE NOT HAD PERMISSION TO INTERMIT, YOUR FEES WILL NOT BE ADJUSTED – AND YOU WILL BE CHARGED FULL FEES FOR ACCOMMODATION AND TUITION.

Students take time out from their degree (known as intermitting) for a variety of reasons, mainly personal, but sometimes academic or financial. If you feel you need some time out, go and see your tutor, or perhaps the University Counselling Service, if appropriate. Intermitting does not change the duration of your degree it just gives you the opportunity to take some time away from University should you need to. The University does not encourage people to take longer than normal to complete their studies but is willing to discuss this with you. Whatever is decided you will need to speak to your funding body to ensure that any funding you receive is not affected by intermission.

Intermission is normally given for a complete academic year, or occasionally part of an academic year. Your Departmental Senior Tutor will ultimately be responsible for authorising your period of intermission. However, **no intermission will be granted after the end of student examination registration, i.e. end of Friday 25 January 2008.**

Possible reasons for leave to intermit are:

1. **Personal Grounds** - Family or personal reasons (other than illness) prevent you from continuing your studies
2. **Financial Grounds** - Where your financial situation prevents you from continuing your studies.
3. **Medical Grounds**:
   (a) Absence from the University due to medical or emotional reasons, or other such extenuating circumstances.
   (b) Illness or extenuating circumstances, which are having a negative impact on your studies.
   (c) Illness or extenuating circumstances that have interrupted your studies

   When the reason for intermitting is medical, then your Departmental Senior Tutor will request medical evidence. They will not ask for supervision reports. Before you return from intermission, you will be required to provide another medical certificate to testify that you are fit to return to your studies.

A few things to remember:

- Intermitting does not change the number of terms you will spend at the University, or your examination results.
- Intermitting is intended to relieve you of a disadvantage, not put you at an advantage to other students.
- If you intermit within 4 weeks of the start of full term (and you are privately funded) then you will be entitled to full return of your university fees for that term and for the remainder of the academic year. If you are LEA funded then 1 December is the cut-off date.
- If you subsequently want to change the period for which you have been permitted to intermit, you must seek approval from your Departmental Senior Tutor.
- If you have to go out of residence quickly for medical reasons, make sure you are seen by a doctor at the time so they can give you a medical certificate that reflects the severity of your condition.
- Make sure that your LEA is informed if you intermit

If you wish to intermit you should discuss the matter with your tutor in the first instance. Final permission will be granted by the Department Senior Tutor where there are good medical, financial or personal reasons, or where intermission can be shown to be in your academic interests. Further details at http://www.kent.ac.uk/physical-sciences/main/undergraduate/pass/index.htm.

WITHDRAWING FROM THE UNIVERSITY

Students wishing to withdraw from the University should contact their tutors in the first instance. If you are considering withdrawing from the University, please do not just depart as this can create problems for yourself in relation to your LEA and also with regard to any future application for higher education, whereas these problems can be largely avoided if you go through the proper channels. Students are reminded that if they withdraw from the University they should return their student ID card to Kent Hospitality.

SECTION F: STUDENT INFORMATION

F1. STUDENT SUPPORT

PERSONAL ACADEMIC SUPPORT SYSTEM

Academic Advice and Progress Monitoring

SPS has established and published (on its web site) a clear system of academic support and advice on progress for all its students – the personal academic support system, PASS.

The academic support and advice provided by SPS ensures that students can consult a named person (usually either their tutor or the Administration Office staff) in the department on:

- Module choice and programme structure
- General academic guidance
- Academic problems/difficulties
- Progression routes
- Individual progress
- Change of module or programme
- Further/Advanced study
- Other academic issues

SPS has also established a system of monitoring student diligence and performance. Although it must remain primarily the student's responsibility to ensure that he/she contributes fully to his/her education and training by attending timetabled classes and undertaking the private study associated with them, the monitoring system helps to ensure:

- that under-performance is identified at a relatively early stage;
- that academic progress is monitored within each module;
- that academic progress for each student is monitored across all modules;
- that students whose progress or diligence is not adequate, are interviewed by their tutor and subsequently, if necessary, by the Senior Tutor (who, ultimately, is able to request that the University terminates the student's registration).

In addition, the PASS handles those disciplinary cases where a failure of due academic integrity is suspected – this includes all aspects of plagiarism ('copying').

Once again, given that ignorance of this system cannot be used as an 'excuse', you are strongly urged to consult and read the material available on the PASS pages of the SPS web site

References

SPS ensures that an appropriate mechanism is in place to provide references upon reasonable request (e.g. for employment after graduation). It is usual to ask your tutor to supply one of these, and often the final year project supervisor will provide a second reference; the Administration Office are able to supply "standard" letters (e.g. to provide evidence of your student status, or to contact your LEA/funding agency). You will be responsible for completing a Personal Development Statement so that an accurate reference may be written.

Change of Address

Please inform the Administration Office (room 209, second floor) if you change your address, either in person, by email to spsadmin@kent.ac.uk or on-line in your personal pages on the Web.

Staff/Student Liaison Committee

The department has a Staff/Student Liaison committee, which acts as a forum for the exchange of views and comments on all aspects of the department's activities. Every matter raised receives a formal reply. Elections for the student members of the committee are held early in Autumn Term, and the names of members of the SSLC and minutes of their meetings are posted on the departmental website. Students are drawn from the SSLC to participate in the main SPS decision-making bodies (the Teaching Committees and the Staff Meeting), and a student representative from each Staff/Student Liaison Committee in the faculty also serves on the Faculty Learning & Teaching Committee and the Faculty Board.

The SSLC's web pages are at:
www.kent.ac.uk/physical-sciences-local/admin/staff-student-liaison/index.htm

Student study room (G48)

The department has a dedicated student study room on the ground floor of the department. The room contains a number of networked PCs, pigeonholes and noticeboards and a small collection of books and journals. Please help to keep the room tidy and in good condition for the benefit of all SPS's students.

Library

The Templeman Library contains multiple copies of all recommended text books for Physical Sciences modules. Some are included in the Short Loan Collection to allow quick access for all students.

Computing facilities

All undergraduate students are provided with a login to one or more servers on the campus network. These provide a range of facilities including electronic mail, access to the world wide web, word processing, spreadsheet and display software, in addition to a range of more specialised packages. Computers are an essential tool for scientists, for communication, data analysis and scientific programming, and tuition is provided as an integral part of the courses offered in the department. Networked PCs or terminals can be found in the department's student study room and laboratories, the colleges, library and computing centre. Instructions on access to all computing services, email, the world wide web and commonly used software is provided in the "Student Resource Book" provided by the University Computing Service.

e-mail
Please note that e-mail has become one of our primary routes for communication within SPS; as an integral part of our continuing move towards the "electronic office" environment it is regarded as your individual responsibility to check your e-mail at least once every day, and to ensure that the 'inbox' has sufficient free space to allow for the reception of e-mails and documentary attachments. It is strongly suggested that you try to provide a minimum of 1 Mb of space within your 'inbox' at any one time (- although the mail server will make a small number of repeated attempts to send a message to you if your inbox is overly full, so you have a few days leeway before the incoming message would be lost). The serious consequence of failing to do this is that you will miss important notices (e.g. regarding lecture venue changes, coursework submission requirements, etc.).

Please note that we regard a failure to read, and where necessary respond to e-mail communications as evidence of a lack of diligence – it can therefore be used as such within any disciplinary process that may arise.

School of Physical Sciences website

The website contains a range of information about the department, course material, specimen examination papers, research and minutes of relevant meetings such as those of the Staff-Student Liaison Committee. It can be found at http://www.kent.ac.uk/physical-sciences/ .

STUDYING AT KENT

Information on living and studying at Kent can be found at http://www.kent.ac.uk/student/

Accommodation

Please have a look at the Living section of the student portal website.
Accommodation Office, Tanglewood, Giles lane.
Tel No: 01227 766660 Fax No: 01227 823965.
Email: hospitality-enquiry@kent.ac.uk Website: www.kent.ac.uk/hospitality.

Careers Advisory Service
Please have a look at the Support section of the student portal.
Careers Advisory Service, Tel No: 01227 (82)3480 or (82)3481
Website: http://www.kent.ac.uk/careers/

The Chaplaincy Department
Please have a look at the Support section of the student portal.
The University Chaplaincy, Keynes College.
Tel No: 01227 824000
Email: chaplaincy@kent.ac.uk.

The Counselling Service
Please have a look at the Support section of the student portal.
The University Counselling Service, Room C2.4, Darwin College.
Tel No: 01227 823206.
Email: counselling@kent.ac.uk. Website: www.kent.ac.uk/counselling.

The Disability Support Unit
The serivice supports all disabled students during their time at the University and can assist with the following:

- applying for money to pay for specialist equipment (e.g. computers) and helpers (e.g. notetakers). See Disabled Students' Allowance page.
- arranging signers, notetakers and other support workers
- helping you find out if you have dyslexia.
- talking to your lecturers about particular help you may need in lectures and seminars
- discussing any special arrangements you need for exams.
- contacting other departments about specific assistance you may require.

Disability Support Unit, Keynes College, University of Kent at Canterbury,
Kent CT2 7NP (Via Keynes main entrance, Rooms Hg7-9.)
Open Monday to Friday: 9.30am to 1pm (please call in or make an appointment)
2pm to 5pm (appointments only)
Phone: 01227 823158 (voice or textphone).
Email: accessibility@kent.ac.uk Fax: 01227 823158
Useful Websites:
Disability Support Unit: www.kent.ac.uk/guidance/disabilityanddyslexiasupport.htm
Skill: National Bureau for Students with Disabilities: www.skill.org.uk
British Dyslexia Association: www.bda-dyslexia.org.uk

English Language Unit
The English Language unit at the university offers regular listening/speaking and writing classes in the English language. These are free of charge to registered students.
If you are interested, contact the English Language Unit (room G34, telephone extension 7648) between 2.00 - 4.00 pm Monday to Friday.

Equal Opportunities
The Kent Equal Opportunity Policy rejects all forms of discrimination, and comprehensive Student Guidelines outline ways of ensuring fair and consistent behaviour and provisions. These should be consulted if an issue arises which might have an e.o. dimension. The Guidelines cover recruitment, assessment, curriculum, accommodation and support services. Any member of staff is welcome to discuss these with the Equal Opportunity Officer if a particular concern arises. Alternatively, you may wish to consult the Departmental Equal Opportunity Representative. The Guidelines are available on Website:
www.kent.ac.uk/registry/personnel/policies/equal-opps/index.htm.
Harassment and Bullying is covered by the Harassment Policy which includes sexual, racial or disability harassment and homophobic behaviour, as well as personal harassment, e-mail misuse and stalking. Whether the relationship is student/student or student/staff, Harassment Contacts offer confidential support to help the student understand the stages of the Harassment Procedure, and to chose their preferred course of action. Students and staff may also contact the Equal Opportunity Officer direct. Each student should have received a paper copy of the procedure at Registration, which lists the Contacts. It is also available on the website below.
The Equal Opportunity Office, Personnel, The Registry,

Tel No: 01227 764000 ext.7825 or 3956. Email: stdev@kent.ac.uk
Website: www.kent.ac.uk/equalityanddiversity/

The International Office
The International Office manages a small Overseas Hardship Fund – this fund is small and can only make small grants which are very much in the nature of emergency funds. It is not funding to cover fees or accommodation costs. Hardship Application forms can be obtained from the International Office and must be accompanied by bank statements and other supporting information.
Any overseas student who has problems with the payment of fees or accommodation costs should, in the first instance, make an appointment to discuss their problems with the Income Office. It is important to keep up a dialogue with the Income Office if the imposition of supplementary charges are to be minimised or avoided.
Overseas Short-term students (not full degree students) from outside the EU should keep in touch with the International Office if they need assistance as we have a special administrative responsibility for them.
All Overseas (non-EU) students are strongly advised to complete their registration with a general practitioner (or the Medical Centre) if they live on or near the campus as soon as possible after arrival. Do not leave this until after an emergency happens as it may mean that treatment is not covered under the National Health Service. Completion and return of the medical form at the beginning of registration is not sufficient. The student must go to a General Practitioner and formally register.
The International Office, Registry, Tel No: 01227 (82)3905
Email: International-office@kent.ac.uk Website: www.kent.ac.uk/registry/intoffice

Masters
College Masters are responsible for the welfare and non-academic discipline of all the students in their college. They are a source of help and advice about students' general experience at the university including such concerns as accommodation, financial matters and relationships with other students, members of staff and members of the public. They are often the first point of contact when agencies external to the university have an interest in student matters. Anything revealed by students to Masters is treated in the strictest confidence. Masters' offices are open during normal working hours.
Master of Darwin College, Tel No: 01227 (82)7650 or Tel No: 01227 (82)3049
Master of Rutherford College, Tel No: 01227 (82)3175 or Tel No: 01227 (82) 3470
Master of Keynes College, Tel No: 01227 (82)7453 or Tel No: 01227 (82)7010
Master of Eliot College, Tel No: 01227 (82)3320 or Tel No: 01227 (82)3141

The Oaks Day Nursery
The Oaks provides childcare for staff and students. It is a very well used and popular resource and it is advised to book places well ahead of time.
The Oaks Day Nursery, Giles Lane. Tel No: 01227 766686 or 764000 ext. 7676

Security Services
Please have a look at the Living section of the student portal.
Email: estates@kent.ac.uk: Website: http://www.kent.ac.uk/estates/security/

University Nursing Service
Please have a look at the Support section of the student portal.
The University Nursing Service, Eliot College, University of Kent. Tel No: 01227 823503

The Sports Centre
Please have a look at the Having Fun section of the student portal.
The Sports Centre. Tel No: 01227 (82)7430 Website:www.kent.ac.uk/sports/index.html

Student Learning Advisory Service
If you need help with managing your time, writing essays or learning new exam preparation techniques, have a look at the Support section of the student portal.

Students Union Support Services
Please have a look at the links from the Students Union website.
Students Union, Mandela Building, Tel No: 01227 824200
Students Union webpages: www.kentunion.co.uk

Information and Guidance Unit
If you have any concerns or questions before embarking on a course of study, from financial problems to disabled access, why not talk to a member of staff? The University has an Information and Guidance Unit specially set up to help you with your queries; you can call, email or drop into the Canterbury office. Staff are also able to meet with students at Medway and the University's centre in Tonbridge.

You can contact the Unit for guidance on many aspects of study including the following:

- Impartial guidance about learning opportunities across Kent and Medway
- Part-time study options
- Information on learner support e.g. key skills, study support
- How to choose your course
- How to prepare for your course
- Funding and fees
- Leaflets on University services

For more specialist enquiries, we can direct you to the relevant person or department within the University, such as the Disability Unit or the Learning Support Team.

If you would like to speak with a member of the Information and Guidance Unit please call freephone 0800 975 3777. You can also email information@kent.ac.uk
The Unit is situated in the Information, Recruitment and Admissions Office within the registry building on the Canterbury campus and is open 9am-5pm, Monday to Friday.

University Medical Centre
The University Medical Centre, Giles Lane. Tel No: 01227 (82)3583 or 01227 765682
Emergency calls out of hours 07860 518859 (night/weekends)
NHS Direct 24 hour advice and information Tel no: 0845 4647 or www.nhsdirect.nhs.uk
Email: medsecs@kent.ac.uk Website: http://www.kent.ac.uk/medical/index1.htm

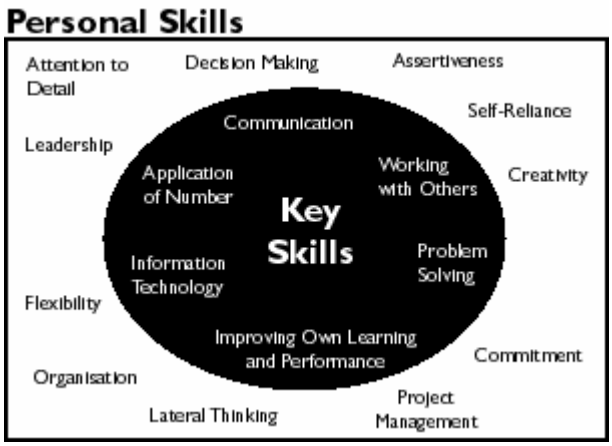
F2. SCHOOL OF PHYSICAL SCIENCES KEY SKILLS STATEMENT

What are Key Skills?

Key skills developed in one context are useful in many others. They are personal and professional skills which enable you to perform effectively in University studies, graduate employment and your personal life. While there is no nationally agreed list of key skills, they are generally accepted as including:

- communication
- information technology
- numeracy
- problem solving
- team building
- improving one's own learning and performance

You will not necessarily acquire all of these skills from your degree course. Extra-curricular activities, part-time and vacation employment provide many opportunities for developing skills. The level at which you practise the different skills will probably vary and will depend on you as a person and on what you intend to do with your future.



Why do I need Key Skills?

Employers need staff who not only are good at science but also can operate as part of a team, have the potential to manage others, and can communicate clearly with a wide variety of people.

- These skills give you the confidence and ability to get more out of your degree studies, your University life and your vacation employment.
- Whether you go on to a higher degree or into paid or unpaid employment you will need to take responsibility for your own future learning and development.
- With the increased number of graduates, many more now enter careers not directly related to their academic studies and key skills are vital in enabling graduates to be effective in a new field.
- Business organisations have changed greatly, reacting to new technology, deregulation, recession, global competition and many other factors. The changes are happening fast and include delayering, customer-focusing, contracting-out and increased use of IT. If you are seeking such employment you will need the skills to cope with these new challenges and you will need to be flexible.
- Employers could not be clearer in the message they are sending out - they need graduates who can be useful to their business as soon as they arrive. They are looking for "effective students", ones who know their own abilities, academic and interpersonal, and can apply them.
  "The pace of change is reflected in the demands of employers for graduates who are *flexible and adaptable* … [and can] apply existing capabilities to new situations… [Graduates must be prepared to] take responsibility for their career and personal development and should be able to manage the relationship with work and learning throughout all stages of their lives."
  Skills for Graduates in the 21st Century, the Association of Graduate Recruiters.
- The traditional graduate trainee schemes are disappearing. One of the growth areas identified by the AGR (Association of Graduate Recruiters) in their report 'Skills for Graduates in the 21st Century' is graduate employment in the small and medium size enterprises (SME's). These organisations do not have the support structures of the large companies and graduates need to be self-reliant.

How can I develop Key Skills during my course?

- become aware of the variety of key skills
- plan your own skills development
- participate fully in all course activities
- participate in the Student Union Development programme
- attend selected development programmes coordinated by UELT http://www.kent.ac.uk/uelt/
- Utilise the Kent Personal Development Planner on http://spider.ukc.ac.uk/PDP/sitefiles/Keynote_PDP-sitefiles/index.htm and the Skills Menu provided by the careers advisory service on www.kent.ac.uk/careers/sk/skillsmenu.htm
  This is an important part of Personal Development Planning.

The following examples indicate some of the opportunities available to practise a particular skill during your degree course. With these in mind you should be able to set yourself realistic development targets. When you have looked up a particular skill, why not stop and think about how you could develop it

- through your coursework
- through your extra-curricular activities
- through part-time or vacation work.

Written communication

The ability to write concisely and convey meaning in a manner appropriate to different readers, presenting a persuasive argument.

How to develop the skill

- report writing
- essay writing
- poster designing
- writing for (student) newspaper
- secretary of societies - recording minutes of meeting

Oral communication

The ability to verbally express ideas to others or give a presentation in a clear and ordered manner, including use of PowerPoint and overhead projectors. Perhaps, simply, giving accurate instructions, or, more influentially, being a spokesperson.

How to develop the skill

- participation in tutorial groups/examples classes/workshops
- presentations to other students and academics
- committee work in societies, department or faculty
- volunteer for a Kent SU programme e.g. Student Tutoring Programme or Course Representation
- high flyers programme

Negotiating

The ability to influence another person and reach agreement on a contentious topic, through mediation or bargaining.

How to develop the skill

- Student Rep. on Staff/Student committee
- settling accommodation problems with landlord
- negotiating on behalf of Societies/Colleges

Numeracy

The ability to understand and interpret facts or ideas expressed in figures and non-verbal data. Enables you to estimate, spot accounting errors and manage a budget.

How to develop the skill

- processing laboratory data
- examples class and workshop problems
- UELT Maths and Statistics - Boosting Skills and Confidence workshops
- managing your own finances
- treasurer of Societies/College committee
- charity fundraising

Information retrieval

Locating, collecting, classifying and summarising information (including data) in a systematic way.

How to develop the skill

- researching and reading for essays, course work, tutorial assignments and projects
- SPS skills modules
- Templeman Library: Library Skills Workshops
- using information databases including the Web
- vac work e.g. in research or information management

Computer literacy
Knowing how to use a popular word processing, spreadsheet and database package, and how to use email and the Web.
How to develop the skill

- computer packages in coursework
- wordprocess academic work
- learn new computer packages through academic studies, vac. work, independently or take the European Computer Driving Licence
  http://www.kent.ac.uk/is/computing/training/ukc-students
- use email
- access the SPS Web-based PC-skills guides

Decision making
Evaluating available information, identifying options and reaching effective conclusions. Making decisions which can be realistically implemented and taking responsibility for them.
How to develop the skill

- practical assignments
- participating in employers' vacation placements/workshops
- holding office with responsibility for events or budgets
- making career decisions
- choosing optional courses

Teamwork
Working with others to effectively achieve a goal; involving co-operation, being sensitive, listening to other team members, sharing ideas.
How to develop the skill

- workshops and laboratory classes
- project work - sharing observations and analysis
- vacation work
- voluntary work
- team sports
- committee work - Students Union, Societies, Colleges
- charity fund-raising

Improving One's Own Learning and Performance
The ability to assess your own strengths and weaknesses and to take action to improve personal competencies such as study skills (improving your concentration, note taking, exam revision), *time management* (prioritising tasks), *stress management* (adaptability, flexibility). Involves thinking ahead, requires tenacity and encourages autonomy.
How to develop the skill

- organisation of practical/laboratory work
- working under pressure to meet deadlines, e.g. submitting coursework on time
- networking
- getting a good balance between your studies and extra curricular activities
- adapting to changes in your life, e.g. from home to university
- assessing your own skills development and improving your skills
- Attending UELT workshops
- VALUE programme http://www.kent.ac.uk/uelt/learning/value/index.html

Project management
The ability to set objectives and time scales, to monitor them and see them through to completion. Working under pressure to meet deadlines.
How to develop the skill

- degree course project work
- vacation project work
- voluntary project work - e.g. through committees or S.U. work

Planning
Reflecting and setting attainable goals; scheduling the sequence of work to achieve your goals.
How to develop the skill

- planning course work and leisure activities
- planning skills development and completing your skills action plans
- setting long-term goals e.g. planning your career, organising overseas travel or a year out

Critical analysis
The ability to evaluate information and, for most effective use, abstract just the relevant data.
How to develop the skill

- in academic studies e.g. reading, problem solving
- in committee work

Commercial awareness

Having an interest in and understanding of some of the economic considerations in business.

How to develop the skill

- participation in Student Science Societies
- use vacation work to find out about how businesses are run
- use the Web to find out information on companies
- reading newspapers, the Economist, popular science journals

Problem solving

The ability to identify the key issues of a problem, and to then use your knowledge and understanding to find a creative and appropriate solution. This may involve conceptual thinking, analytical thinking, strategic thinking, thinking on your feet, innovativeness and improvisation.

How to develop the skill

- workshops and tutorials
- research project work
- attending employers' vacation placement/workshops
- management business games
- organising (social) events for college or student society
- dealing with accommodation problems or travel plans
- work-based projects in vacations
- volunteer for a Kent SU programme eg Rag

Personal Development Planning (PDP)

Personal Development Planning (PDP) is part of the HE Progress File. The Progress File contains within it:

- Institutional records of learning and achievement (transcripts);
- An individual's own personal development records and reflections of their learning, achievements, plans and goals;
- Personal development planning - a process that is undertaken by the individual to reflect upon their own learning and achievement and to plan for their own educational, academic and career development.

The term personal development planning is used in order to emphasise that this is an active learning process undertaken by individuals for themselves.

What is PDP intended to do?

PDP is intended to help students:

- Become more effective, independent and confident self- directed learners;
- Understand how they are learning and relate their learning to a wider context;
- Improve their general skills for study and career management;
- Articulate their personal goals and evaluate progress towards achievement;
- Be more effective at monitoring and reviewing their own progress;
- Recognise and discuss their own strengths and weaknesses;
- Be better prepared for seeking employment, or self-employment, and be more able to relate what they have learnt to the requirements of the employer;
- Be better prepared for the demands of continuing professional or vocational development, when they enter employment.

Implementation at the University of Kent

PDP at the University of Kent is conducted via an on-line system, rather than a paper-based system. This system, called “Keynote”, allows for students to download and save pages and print out their own word documents. The system is student owned and operated. A student creating any PDP documentation owns the document. The individual student decides what might be shown to, or discussed with, a tutor or academic advisor.

The “Keynote” system is at:
http://spider.kent.ac.uk/PDP/sitefiles/Keynote_PDP-sitefiles/index.htm

and further details about PDP are at: http://www.kent.ac.uk/uelt-local/PDP/

SECTION G: TEACHING AND STAFF ROOM LOCATIONS

G1. DETAILS OF TEACHING ROOMS 2007/2008

Please Note: No smoking, eating or drinking is allowed in any teaching room.

ROOM	ROOM TYPE	LOCATION
CORNWALLIS - COMPUTING BUILDING		
♿ COLT2(100)	Lecture theatre	Ground floor
♿ CC01(18)	Terminal room	Ground floor
♿ CC02(32)*	Terminal room	1st floor
♿ CC03(18)	Terminal room	Ground floor
♿ CC04(16)	Terminal room	Ground floor
* Wheelchair access via lift in Computing Octagon		
CORNWALLIS - GULBENKIAN WING		
♿ COLT1(300)	Lecture theatre	Ground floor
♿ CGU2(24)	Classroom	Ground floor
CGU3(24)	Classroom	1st floor
CGU4(58)	Lecture theatre	1st floor
CORNWALLIS - INSTITUTE OF MATHEMATICS & STATISTICS		
♿ MathsLT(80)	Lecture theatre	Ground floor
CORNWALLIS - NORTH EAST WING		
♿ CNESem08(30)	Seminar room	Ground floor
CORNWALLIS - NORTH WEST WING		
♿ CNWSem1(16)	Seminar room	Ground floor
♿ CNWSem2(16)	Seminar room	Ground floor
♿ CNWSem3(30)	Seminar room	Ground floor
♿ CNWSem4(30)	Seminar room	Ground floor
♿ CNWSem5(30)	Seminar room	Ground floor
♿ CNWSem6(30)	Seminar room	Ground floor
♿ CNWSem7(30)	Seminar room	Ground floor
CNWSem8(18)	Seminar room	3rd floor
CNWSem9(16)	Seminar room	3rd floor
♿ CNWsem10(24)	Library	Ground floor
♿ CNWsem11(18)	Seminar room	Ground floor
♿ CNW Lab 2(15)*	Classroom	2nd floor
* Wheelchair access via the lift in Cornwallis George Allen		
GILES LANE TEACHING ANNEX (at rear of Biology)		
♿ GLS1(20)	Seminar room	Ground floor
♿ GLS2(16)	Seminar room	Ground floor
♿ GLS3(40)	Seminar room	Ground floor
♿ GLS4(18)	Seminar room	Ground floor
♿ GLS5(18)	Seminar room	Ground floor
♿ GLS6(25)	Seminar room	Ground floor
♿ GLS7(30)	Seminar room	Ground floor
♿ GLS8(18)	Seminar room	Ground floor
♿ GLS10(40)	Seminar room	Ground floor

GRIMOND BUILDING

GLT1(198)	Lecture theatre	Ground floor
GLT2(142)	Lecture theatre	Ground floor
GLT3(98)	Film theatre	Ground floor
GS1(20)	Seminar room (Film Studies only)	Ground floor
GS2(20)	Seminar room (Film Studies only)	Ground floor
GS3(24)	Classroom	Ground floor
GS4(18)	Seminar room (Film Studies only)	Ground floor
GS5(20)*	Seminar room	1st floor
GS6(22)*	Classroom	1st floor
GS7(22)*	Classroom	1st floor
GS8(18)*	Seminar room	1st floor

* Wheelchair access via lift

LABORATORIES

Biology

BLT1(120)*	Lecture theatre	1st floor
BLT2(37)*	Lecture theatre	1st floor
I316(20)*	Seminar Room	3rd floor

* Wheelchair access via lift

INGRAM

PSLT(60)	Lecture theatre	Ground floor

Electronics

EleLT(91)	Lecture theatre	Ground floor
ElecSem1(20)	Lecture room	Ground floor
ElecSem2(10)*	Seminar room	1st floor
ElecSem3(38)*	Seminar room	1st floor
Multimedia Lab A(40)	Terminal	Ground floor
Multimedia Lab B(40)	Terminal	Ground floor
Multimedia Lab C(20)	Terminal	Ground floor

* Wheelchair access via lift

Marlowe

MarLT1(150)	Lecture theatre	Ground floor
MarLT2(50)	Lecture theatre	Ground floor

DARWIN COLLEGE

♿ DLT1(96)	Lecture theatre	Level 1, A block
♿ DLT2(54)	Lecture theatre	Level 1, A block
♿ DLT3(55)*	Lecture theatre	Level 4, Tower block
D.Twr.Rm.(25)	Seminar room	Level 5, Tower block
♿ DS1(26)*	Seminar room	Level 3, A block
DS2(20)	Seminar room	Level 6, Tower block
DS7(26)	Seminar room	Level 5, Tower block
♿ DS8(15)	Seminar room	Missing Link
♿ DS9(16)	Seminar room	Missing Link
♿ DS10(12)	Seminar room	Missing Link
♿ DS11(12)*	Seminar room	Level 2, G/H block
♿ DS12(12)*	Seminar room	Level 2, O/P block
♿ DS14(12)*	Seminar room	Level 4, Tower block
♿ D.Peter Brown Room(40)	Seminar room	Missing Link

* Wheelchair access via lift

ELIOT COLLEGE

Main college

♿ ELT2(114)*	Lecture theatre	Floor 3, N block
♿ E.Dr.St.(40)*	Drama Studio	Floor 3, N block
♿ E.Chilver Room(16)	Seminar room	Cloister
E.Holland Room(16)	Seminar room	Cloisters
E.Lyons Room(35)	Informal room	Top floor
E.Peter Bird Room(15)	Seminar room	Cloisters
♿ E.Pollard Room(16)	Seminar room	Cloisters
♿ E.Whitehouse Room	Seminar room	1st floor

* Wheelchair access via causeway

♿ ES1(30)	Seminar room	Floor 4, N block
♿ ES2(22)	Seminar room	Floor 4, N block
♿ ES3(20)	Seminar room	Floor 4, N block
KLS Meeting Rm	Informal Room	Floor 4, E Block

Extension

♿ EX7(20)	Seminar room	Upper floor
♿ EX8(20)	Seminar room	Upper floor
♿ EX9(20)	Seminar room	Upper floor
♿ EX10(20)	Seminar room	Upper floor
♿ E.Dice Room	Seminar room	Upper floor

Becket Court

E.BCSem 16(20)	Seminar room	Ground floor
E.BCSem 17(20)	Seminar room	Ground floor

KEYNES COLLEGE

♿	KLT1(344)	Lecture theatre	Lwr grnd floor
	KLT2(60)	Lecture theatre	Lwr grnd floor, N block
	KLT3(60)	Lecture theatre	Lwr grnd floor, N block
♿	KLT4(130)*	Lecture theatre	Psychology Dept
♿	KLT5(90)	Lecture theatre	1st floor L Block
♿	KLT6(92)	Lecture theatre	1st floor L Block
♿	KLSR4(40)	Classroom	Ground floor, N block
♿	KS1(24)*	Seminar room	1st floor, N block
♿	KS2(16)*	Seminar room	1st floor, N block
♿	KS3(12)*	Seminar room	1st floor, N block
♿	KS5(16)*	Seminar room	1st floor, N block
♿	KS6(24)*	Seminar room	1st floor, N block
♿	KS7(24)	Seminar room	Ground floor, M block
♿	KS8(25)*	Seminar room	Psychology Dept
♿	KS9(20)*	Seminar room	Psychology Dept
♿	KS10(15)*	Seminar room	Psychology Dept
♿	KS11(24)	Seminar room	1st floor L Block
♿	KS12(30)	Seminar room	1st floor L Block
♿	KS13(45)	Seminar room	1st floor L Block
♿	KS14(45)	Seminar room	1st floor L Block
♿	KS15(45)	Seminar room	1st floor L Block
♿	KS16(40)	Seminar room	1st floor L Block
♿	KS17(40)	Seminar room	1st floor L Block
♿	KSA1(40)	Terminal room	1st floor, N block

* Wheelchair access via lift opposite College Reception

RUTHERFORD COLLEGE

Main college

♿	RLT1(200)*	Lecture theatre	Floor 3, W block
♿	RLT2(40)*	Lecture theatre	Floor 3, W block

* Wheelchair access via causeway to main entrance

♿	RS4(20)	Seminar room	Floor 4, W block
♿	RS5(20)	Seminar room	Floor 4, W block
♿	RS6(16)	Seminar room	Floor 4, W block
	CIS Rooms	Workshops	Floor 3, W block
♿	R.Cl.15(16)*	Seminar room	Cloisters
♿	R.Cl.16(16)*	Seminar room	Cloisters
♿	R.Cl.17(16)*	Seminar room	Cloisters
♿	R.Cl.19(16)*	Seminar room	Cloisters
♿	R.Cl.20(16)*	Seminar room	Cloisters
♿	R.Cl.21(16)*	Seminar room	Cloisters

* Wheelchair access via west exit or kitchens

Extension

♿	RX9(18)	Seminar room	Upper floor
♿	RX10(30)	Classroom	Upper floor
♿	RX11(27)*	Seminar room	Lower floor
♿	RX12(27)*	Classroom	Lower floor

* Wheelchair access via courtyard garden

G2. STAFF ROOMS AND E-MAIL ADDRESSES

NAME	E-MAIL	ROOM No in Ingram Building
Dr R E Benfield	R.E.Benfield@kent.ac.uk	313
Dr S Biagini	S.Biagini@kent.ac.uk	317
Dr L L Boyle	L.L.Boyle@kent.ac.uk	315
Dr M J Burchell	M.J.Burchell@kent.ac.uk	119
Professor A V Chadwick	A.V.Chadwick@kent.ac.uk	219
Dr G Dobre	G.Dobre@kent.ac.uk	107
Dr D Froebrich	df@star.kent.ac.uk	117
Dr S Gibson	TBA	TBA
Dr S J Holder	S.J.Holder@kent.ac.uk	319
Mr M Johnson	M.R.Johnson@kent.ac.uk	105
Dr A Kanagasooriam	ajssk@kent.ac.uk	111
Dr P J Lindan	P.Lindan@kent.ac.uk	217
Dr J Q Miao	J.Miao@kent.ac.uk	115
Dr G Mountjoy	G.Mountjoy@kent.ac.uk	215
Professor R J Newport	R.J.Newport@kent.ac.uk	213
Dr A Podoleanu	A.G.H.Podoleanu@kent.ac.uk	301
Dr D O Smith	D.O.Smith@kent.ac.uk	G44/G42
Professor M D Smith	M.D.Smith@kent.ac.uk	101
Dr C J Solomon	C.J.Solomon@kent.ac.uk	109
Dr M J Went	M.J.Went@kent.ac.uk	311

Head of Department

Professor P Strange	P.Strange@kent.ac.uk	201

Departmental Administrator

Mr J.R. Redmond	J.R.Redmond@kent.ac.uk	211a

Student Administration

Ms K L Harty Mrs M A Fowler	spsadmin@kent.ac.uk	209