

## **Electives for 1<sup>st</sup> year Computer Science and Software Engineering 2023-24**

Since your compulsory class study consists of 60 credits in semester 1 and 50 in semester 2, it is recommended that you choose a 10 credit semester 2 elective to balance your workload. However your choice of elective subject is more important than this, so choose one based on your interest. **You do need to pick an elective.** You only require a 10 credit class but you may instead select a 20 credit class if you are more interested in it. You may not choose more than one elective – there will be an opportunity to pick another elective in year 2.

Below are listed those electives which don't clash with the timetable for your compulsory classes. You should pick an elective from this list and enter it on Pegasus to have it approved and added to your curriculum. You should preferably do this during Welcome and Induction week so that you are given access to the MyPlace page for the class when teaching commences. (You may change elective during the first 2 weeks of teaching if you are not happy with your choice.) Even if choosing a semester 2 elective you should select it on Pegasus now otherwise the class may become full later.

For how to select an elective on Pegasus see section 7 of the First Year First Day Guide emailed to you on 13-9-23 following the CS/SE Year 1 Induction meeting.

Lecture rooms have been included below for semester 1 classes as per the version of the timetable as at 14-9-23.

### **99202 Introduction to Forensic Science, 10 credits, Semester 2** **Presented online, no timetabled teaching slots**

This class introduces students to forensic science, from the crime scene to the courtroom. All material is delivered online via video and podcast. Six modules will be presented over ten weeks, examining four specific evidence types – fingerprints, forensic biology including blood pattern analysis and DNA, impression evidence and drugs of abuse. These will be discussed within the context of a reconstructed murder case to illustrate how such an inquiry can develop over time.

### **59101 Use and Abuse of Drugs in Society, 10 credits, Semester 2** **Lectures Mon 1pm and Fri 1pm**

This is a first year elective class that is intended to give an introduction to the therapeutic use of drugs to treat a number of clinically important medical conditions. Additionally, the abuse of drugs (both recreational and those with therapeutic properties) will also be discussed. This class aims to give students an introduction to the study of Pharmacology. To achieve this, a number of common medical conditions have been selected and the drugs currently used to treat these conditions will be discussed. Particular emphasis will be given to the mechanism by which these drugs produce their beneficial effect. In addition a number of drugs that are commonly abused or pose a serious risk to an individual's health will also be discussed, highlighting the health risks associated with each of these drugs.

### **MM123 Geometry and Algebra, 10 credits, Semester 2**, Pre-requisites: Essential SQA Higher Mathematics (Grade B) or equivalent

#### **Lectures Mon 3pm, Mon 4pm, Thur 3pm and Thur 4pm + tutorials Wed 9am**

To highlight connections between geometry and algebra and how they inform each other. To give an introductory treatment of vectors and matrices, in particular to their role in linear and affine transformations in 2D and 3D

Introduction to geometry and algebra: Cartesian coordinates, changing coordinates, polar coordinates, Pythagoras' theorem. Vectors: definitions and algebra, position vector, length,

scalar product. Matrices: definitions, basic matrix operations, matrix-vector products and geometry, inverse matrix. 2D Geometry: Straight line: implicit, explicit and vector forms; distance and section formulae, intersections. Shapes and curves: polygons, circles, ellipses, hyperbolae, parabolae. Affine transformations: maps between triangles, parallelograms, curves. Translations. Linear transformations: plane rotations, reflections, shears, degenerate transformations. 3D Geometry: The straight line: vector and parametric forms, distance and section formulas, intersections. Planes: vector and Hessian forms, normal vector, vector product, intersections. Transformations: reflections, rotations, stretches, shears, degenerate transformations, the null space.

**PH161 Universe and Everything, 10 credits, Semester 2**, Pre-requisites: Higher Physics and Mathematics or equivalents

**Lectures Mon 1pm**

General Introduction: Mathematical nature of the Universe, The Game Analogy, Fundamental Forces and Particles, The size of things, Atoms, Thermodynamics and the 2nd Law, Equipartition Quantum Physics: Ultraviolet catastrophe and Planck's solution, Stability of atoms, Matter waves, Wave-particle duality, Loss of determinism, Schrodinger's cat, Measurements, Lack of local realism, Identical particles. Relativity: Space, Time, Twin paradox,  $E=mc^2$ , Gravity, Principle of equivalence, General relativity, Black holes. Cosmology: Big Bang, Obler's paradox, Cosmological principle, Size of the universe. Missing mass and the future of the Universe Nonlinearity: Bifurcations, Complexity, Self-organisation, Chaos, "loss of determinism", Strange Attractors, Fractals.

**PH160 Introduction to Astronomy, 10 credits, Semester 1**, Pre-requisites: National 5/Standard Grade Physics and Higher Mathematics,

**Lectures Mon 1pm + Thur 1pm in JA325**

Part 1: Observational Astronomy 1. Scale, time, distance, light, spectroscopy 2. Telescopes 3. Celestial mechanics 4. The solar system Part 2: Planets & The Solar System 1. Gravity and the solar system 2. Origin of the solar system 3. The terrestrial planets 4. The Jovian planets & the outer solar system 5. The Sun and Exoplanets Part 3: Stars, Galaxies & Cosmology 1. Stellar Appearances 2. Stellar Evolution 3. Galaxies 4. Cosmology

**PH162 How Things Work, 10 credits, Semester 1**, Pre-requisites Higher Physics and Mathematics or equivalents

**Lectures Mon 1pm in GH811 + Fri 1pm in GH512 + tutorials Wed 9 in GH511 (tutorials start week 3)**

1. Energy and matter: the role of 'laws' in the physical sciences, classical thermodynamics, energy transformations, the concept of temperature. 2. Mechanics: history (Aristotle to Newton), units and dimensions, scalar and vector quantities, simple vector calculations, derivatives, limits and 'instantaneous' acceleration. Linear motion, Newton's Laws of Motion, the work done by a force, mass and weight, force diagrams. 3. Forces in solids and fluids: rotation, compression, extension, shear, tensile and compressive forces in structures, bridges, torques and levers, scales, balances and equilibrium, Archimedes' principle, flotation and ship stability, density and specific gravity, Argo floats and ocean gliders. 4. Circular motion: angular velocity, angular acceleration, pseudoforces, centrifugal and centripetal forces, the Watt governor. 5. Momentum: linear and angular momentum, momentum conservation, changes in momentum caused by unbalanced forces, gymnasts, skaters and colliding bodies. 6. Gravity and gravitational forces: Newton's calculation of the moon's orbit, the Cavendish balance, motion under the influence of gravity, projectiles, air resistance and lift, golf balls, satellite orbits, remote sensing, forces in accelerating systems (e.g. lifts), parabolic flight. 7. Friction: physical mechanisms, friction coefficients, static and sliding friction, friction on sloping surfaces. 8. Harmonic motion: optical, mechanical and electromagnetic examples, equations of simple harmonic motion, combining wave functions, interference, natural frequency and resonance, damping, dangers of resonance in structures, hydraulic dampers, use of resonant frequency in the caesium clock. 9. Waves:

longitudinal and transverse waves, standing and travelling waves, absorption, reflection, refraction, diffraction, fundamentals and harmonics. 10. Acoustics: frequency ranges, pressure and velocity components, waves in pipes, musical instrument acoustics (string and wind examples), pitch control, ultrasonic non-destructive examination, echo-sounding, side scan sonar, animal echo-location, ultrasonic imaging. 11. Wave optics: light and electromagnetism, speed of propagation, relativity, light and distance in astronomy, diffraction and lens resolution, particle sizing by laser diffraction, haloes and glories, optical interferometry, interference colours (thin films and animals), circular and linear polarisation, polarisation by transmission and reflection, radio and microwaves. 12. Geometric optics: Laws of reflection and refraction, total internal reflection, prisms and waveguides, lenses and mirrors, imaging, ray tracing, the mammalian eyeball, the thin lens equation, optical dispersion, the compound microscope, refracting and reflecting telescopes, numerical aperture and resolving power. 13. Optical phenomena: rainbows and supernumary arcs, puzzles in quantum optics, photons and energy. 14. Electricity and magnetism: charge, current, electrical potential, conductors and insulators, Ohm's Law, Joule's Law, electrical power transmission, electrostatics, Coulomb's Law, electric fields, galvanism, the electrochemical series, batteries, corrosion and sacrificial anodes. Magnetic field generation by electric currents, electromagnets, solenoids, relays, force on a current carrying conductor, the electric motor, the dynamo and alternator, large scale electric power generation, thermodynamic efficiency, wind and tidal turbines, wave energy, pump storage schemes. 15. Semiconductors: P and N type semiconductors, the P-N junction, the semiconductor diode, wave rectification, the photodiode, light emitting diodes, solid state lighting, electronic imaging using CCD and CMOS arrays.

**MM106 Essential Statistics, 10 credits, Semester 1**, Pre-requisites Mathematics Higher B, or Advanced Higher C or A-level C. *Note that last year only a few spaces were available to students picking this as an elective – so first come first served in terms of my approval on Pegasus but the hosting department may still then indicate after that, early on, that a change of elective may be required.*

**Lectures Wed 9am in MC301 + labs and class tests at a number of alternative times**

To present some basic ideas and techniques of statistics while introducing some essential study skills (e.g. basic IT, note-taking, study skills for mathematics and statistics). This course will also introduce students to the R statistical software.

Student induction: Course structure, fundamental skills, basic IT, and R statistical software.

Data presentation: Frequency tables, histograms, mean, standard deviations, quartiles.

Probability: Expected value, mean, variance, normal distributions. Sampling distributions, estimation, confidence intervals, t-distribution. Hypothesis testing: Significance levels, p-values, z-test, t-test (mean and proportion only). Tests for Association: Chi squared (one sample) and correlation

**23101 Pharmaceutical Sciences and Drug Development, 10 credits, runs across both semesters**

**Lectures Wed 9am in RC345 in sem 1 + Wed 9am in sem 2 probably in TG310**

This class aims to give students within the Faculty of Science an introduction to modern drug development. To achieve this, the steps involved in taking a candidate compound to clinical use will be discussed, covering issues such as selection of compound, animal and human testing, formulation, clinical testing and the licensing process. In addition an introduction to drug discovery will be provided beginning with a historical perspective covering a range of natural products and continuing to modern day design of synthetic substitutes. The mechanism of action of a number of commonly used drugs will also be discussed in order to explain how drugs produce their biological effect.

## **SF105 Multi-disciplinary Perspectives of Sustainable Development (Sem 2), 20 credits, Semester 2,**

**Presented as an online module, no timetabled sessions**

What do you know about the UN's Sustainable Development Goals (SDGs) agenda? Did you participate in the Glasgow climate strike in September 3 years ago? Global issues urgently require a shift in our lifestyles and a transformation of the way we think and act. To achieve this change we need new skills, values and attitudes that lead to more sustainable societies. That is why we have developed a unique online module: SF 106 (first semester run)/SF105 (second semester run) Multidisciplinary Perspectives of Sustainable Development (20 credits) which is available as an elective. Staff from all 4 Faculties have contributed to the module and will give you an insight into the exciting research being undertaken in the University to address these global challenges.

Through a series of videos and directed reading, the module will introduce you to the 17 SDGs, and will explore four particular goals in depth, namely:

SDG 3 Good Health and Wellbeing

SDG 6 Clean Water and Sanitation

SDG 10 Reduced Inequalities

SDG 13 Climate action.

Working in multidisciplinary groups, with online and face-to-face support, you will gain an understanding of the different ways in which various disciplines in Business, Engineering, Humanities and Social Sciences, and Science, can contribute to addressing these challenges. In addition to developing academic skills, you will also have the opportunity to develop reflective skills and the ability to collaborate with, and communicate effectively with, students from other disciplines.

Assessment of the module will be based on the production of an educational resource, which can be used to further develop understanding of the SDGs, from each group.

## **BF119 Introduction to Marketing and Entrepreneurship, 20 credits, Semester 2**

**Lectures Thur11 + Thur 12 + tutorials and workshops at a number of alternative times**

The aim of this class is to provide students with a solid foundation and understanding of the theories and principles underlying marketing and entrepreneurship. A combination of marketing and entrepreneurship will be taught throughout the semester to enhance understanding of the way the two disciplines address issues related to both the macro- and micro-environment contexts of markets and entrepreneurship. Marketing is a complex process involving many different skills and activities, but it is based upon simple principles: understanding what customers want and need, being able to collect and process information relevant to the marketing environment and being able to put together and implement plans to take the business forward. In this class, you will be exposed to concepts and ideas from economics, sociology, psychology, geography and other social sciences, all in the context of the competitive business environment. Entrepreneurship too is a complex process involving many different skills and activities, though it is based upon a 'mind-set and process by which an individual or group identifies and successfully exploits a new idea or opportunity'. For this part of the class, you'll be working in teams to learn about the ideation process, which forms the foundations of new venture creation, in our Creative Challenge.

## **Language Electives**

Courses in French, Italian, Mandarin and Spanish may be available but note that these would give you a very heavy semester 1 workload. Single semester modules worth 20 credits are offered at both Beginners/False Beginners and Post-Higher levels in some of these languages in semester 1. Below is text provided by Modern Languages. Please note that there are induction sessions towards the end of induction week and the start of week (as indicated below) which must be attended if you are interested in taking one of these

classes. You must also check that the class timetable fits with your CIS compulsory class semester 1 timetable.

What is on offer?

One semester modules worth 20 credits are offered at both Beginners/False Beginners and Post-Higher levels in FRENCH and SPANISH. There is the possibility to take a follow-up module in the second semester.

The Introduction to French / Italian / Spanish / Mandarin 1A sessions (Beginners / Re-starters) will give you a solid knowledge of the basic grammar and vocabulary and are designed to enable you to reach a good communicative level in the language. This is an intensive course aiming to bring students up to a good communicative level in one semester. A follow up course, Introduction to French / Italian / Spanish 1B, runs in semester 2 and is an accelerated course aiming to bring students to a level enabling them to enter into a level 2 (second year) language class.

If you have an SQA Higher or equivalent, you can join French /Spanish 1A, which reinforce the basics as well as develop a deeper understanding of the linguistic system and a cultural awareness of the countries where this language is spoken. A follow up course, French / Spanish 1B, runs in semester 2 and will further develop students linguistic knowledge and cultural awareness to prepare them for the study of the language at second year level.

How does it work?

The teaching is usually carried out through a variety of lectures, tutorials and small group oral classes offering you the opportunity to practice the language in tutorial groups (20/25). Both the beginners/False-Beginners and Post-Higher classes offer three contact hours per week. The timetable is generally flexible and groups offer a variety of timetables (see below).

How do I enroll for one of these classes?

You will be able to enrol via Pegasus subject to approval from your Adviser of Study, but it is essential you attend the relevant FIRST MEETING of the class you are interested in, in order to get the final timetable for each class:

**Class codes and First meetings:**

**French 1A /1B R1107 / R1108 Friday 15 September 2023 1pm – 2.30pm MC319**

**Introduction to French 1A / 1B R1109 / R1110 Thursday 14 September 2023 3pm – 4pm MC319**

**Introduction to Italian 1A / 1B R3110 / R3111 Monday 18 September 2023 4pm – 5pm GH702**

**Spanish 1A / 1B R4107 / R4108 Tuesday 19 September 2023 1pm – 2pm RC512**

**Introduction to Spanish 1A / 1B R4109 / R4110 Friday 15 September 2023 11am – 12noon TG227**

**Introduction to Mandarin 1A R5101 Thursday 14 September 2023 5pm – 6pm MC319**

If you require more information about these courses, please contact: Å the Department of Humanities support team: [hass-courses-hum@strath.ac.uk](mailto:hass-courses-hum@strath.ac.uk)

If in doubt about which level to select or for any further information, please contact the appropriate contact person in the Department of Humanities using the links below. · French 1A/1B (post-Higher): Mr Cédric Moreau, [c.moreau@strath.ac.uk](mailto:c.moreau@strath.ac.uk) · Introduction to French 1A/1B (beginners / false-beginners): Ms Joan Lefever, [joan.lefever@strath.ac.uk](mailto:joan.lefever@strath.ac.uk) · Introduction to Italian 1A/1B: Ms Francesca Perazio, [francesca.perazio@strath.ac.uk](mailto:francesca.perazio@strath.ac.uk) · Spanish 1A/1B: Ms Vanesa Sabala, [vanesa.sabala@strath.ac.uk](mailto:vanesa.sabala@strath.ac.uk) · Introduction to Spanish 1A/1B: Dr Mar Parra, [mar.parra@strath.ac.uk](mailto:mar.parra@strath.ac.uk) · Introduction to Mandarin 1A: Dr Hui Li, [hui.li@strath.ac.uk](mailto:hui.li@strath.ac.uk)

When are sessions running?

The final timetables for each class are usually given at the first meetings but the information below will give you an idea of the way classes are organised:

ITALIAN

R3110 Introduction to Italian 1A – 3 HOURS / WEEK

Students will have to attend 4 core hours and have the following options:

Core hour A: Monday at 4pm or Monday at 5pm

Core hour B: Tuesday at 5pm or Wednesday at 12 noon

Core hour C: Friday at 1pm or Friday at 5pm (TBC at the first class meeting)

Core hour D: Wednesday at 11am or Friday at 12 noon or An alternative day/time agreed at the first class meeting.

FRENCH

R1109 Introduction to French 1A - 3 HOURS / WEEK:

Group A: Monday 12noon, Thursday 1pm, Friday 1pm

Group B: Monday 1pm, Tuesday 11am, Wednesday 12noon

Group C: TBC

R1107 French 1A, 3 HOURS / WEEK:

Lecture: Monday 1pm – 2pm

Tutorial: students are required to choose ONE group only

Group A: Tuesday 10am – 11am

Group B: Tuesday 10am – 11am

Group C: Tuesday 11am – 12noon

Group D: Tuesday 1pm – 2pm

Group E: Tuesday 2pm – 3pm

Oral class: students are required to choose ONE group only

Group 1: Monday 11am – 12noon

Group 2: Monday 11am – 12noon

Group 3: Tuesday 10am – 11am

Group 4: Tuesday 11am – 12noon

Group 5: Tuesday 1pm – 2pm

Group 6: Wednesday 11am – 12noon

Group 7: Wednesday 11am – 12noon

Group 8: Wednesday 12noon – 1pm

SPANISH

R4109 Introduction to Spanish 1A - 3 HOURS / WEEK

Tutorial one: Monday 12noon or Tuesday 1pm or Tuesday 2pm

Tutorial two: Wednesday 11am or Wednesday 12noon or Wednesday 1pm

Tutorial three: Friday 11am or Friday 12noon or Friday 1pm

R4107 Spanish 1A - 3 HOURS / WEEK:

Lecture: Tuesday at 1pm – 2pm

Tutorial: Student's are required to choose ONE tutorial only

Group 1: Wednesday 10am – 11am

Group 2: Wednesday 10am – 11am

Group 3: Wednesday 11am – 12noon

Group 4: Friday 10am – 11am

Group 5: Friday 12noon – 1pm

Oral Class: Student's are required to chooses ONE group only

Group 1: Monday 10am – 11am

Group 2: Monday 11am – 12noon

Group 3: Monday 12noon – 1pm

Group 4: Monday 2pm – 3pm

Group 5: Tuesday 12noon – 1pm

Group 6: Wednesday 12noon – 1pm

Group 7: Thursday 11am – 12noon

Group 8: Friday 9am – 10am

Mandarin

R5101 Introduction to Mandarin 1A

Students will have to attend three seminars on:

Monday 5pm – 6pm

Tuesday 5pm – 6pm

Thursday 5pm – 6pm

Oral Class: Students will also have to attend one oral class. Students are required to chooses ONE group only

Group 1: Wednesdays 5pm – 6pm

Group 2: Wednesday 6pm-7pm