PHYSICS AND MUSIC AT CARDIFF UNIVERSITY

Introduction
At Cardiff we offer a degree programme designed to meet the needs of an increasing number of students who combine music with science subjects at A-level and who wish to continue this combination through to degree level. It is run jointly by the School of Music and the School of Physics and Astronomy. The scheme involves a substantial element of music in all three years but is biased towards the science side and leads to a BSc Honours degree.

The links between music and physics are especially close at Cardiff, where for more than 30 years there have been strong research interests in the physics of musical instruments and involvement in electronic and computer music systems. Both schools have well-equipped electronic music studios where much of the course experimental and composition work takes place.

Both the schools lie close to Cardiff’s civic centre – one of the finest in Europe. There is easy access to libraries, the Students’ Union and to the city centre.

Few cities are better equipped than Cardiff to offer students a wide range of musical experience to back up their formal university education. St David’s Hall is one of the finest concert halls in Europe and features regular performances by local orchestras such as BBC National Orchestra of Wales, as well as national and international orchestras and renowned solo artists. The new Wales Millennium Centre is home, amongst others, to the Welsh National. The Music School itself has a regular concert programme and The Sherman Theatre, Chapter Arts Centre and Cardiff International Arena provide further opportunities to experience both traditional and alternative artistic presentations.

Programme Structure
Cardiff degree programmes have a modular structure. In each of the three years you will take 8 modules in Physics and 4 in Music (4 and 2 in each of the two semesters). This weighting of 2 to 1 throughout is reflected in the assessment scheme.

In the first year your eight Physics modules are:
- Atoms, Nuclei & Matter; Dynamics and Relativity; Vibrations and Waves; Electricity & Magnetism; Computing on the Net; Maths for Physical Scientists I & II; Investigative Physics I.

In Music you choose four modules from the following list (choices shown in this leaflet are subject to any constraints of timetabling and prerequisites - you will need to refer to the School of Music’s module catalogue and timetable for more detailed information):
- Practical Musicianship (2 modules)

  Autumn single modules: Composition 1a; Introduction to Tonal Analysis; Harmony; Beethoven; Making Music History; A survey of Early Music.

  Spring single modules: Composition 1b; Counterpoint; What’s in an -ism?; Fundamental Acoustics *; The Symphony from Beethoven to Mahler; Formal Functions in Classical Music; Contemporary Musics/Contemporary Cultures.

* these modules are recommended for Physics/Music students.
At the end of the first year you will have the choice of continuing with Physics and Music (as most students do) or switching to one of the single-honours Physics degree schemes (see the School of Physics and Astronomy brochure), subject to satisfactory exam performance.

In the 2nd and 3rd years your 8 Physics modules are:

**Year 2:**
- Electronics & Instrumentation
- Quantum Mechanics
- Practical Physics
- Theoretical Physics
- Electromagnetism
- Physics Applied
- Thermal Physics
- Acoustics & Studio Techniques

**Year 3:**
- Applications of Quantum Mechanics
- Electromagnetic Theory
- Optics & Fourier Transforms
- Physics & Music Project (double module)
- Statistical Mechanics
- Chaos & Non-Linear Systems
- Sound Synthesis

In Music you choose four modules each year from the following lists:

**Year 2:**
- Autumn Semester: Orchestration I; Electro-Acoustic Composition I *; Composition II (double module); Harmonic Practice; Practical Musicianship II (double module); Analysing 20-th Century Music; Aesthetics & Criticism I (double module); HISTORICAL STUDIES: Piano Music from Mozart to Liszt; From Worksongs to Bebop; Music in France since c.1900; Russian Music up to 1914.
- Spring Semester: The Orchestra in History; Electro-Acoustic Composition I (repeat of Autumn module); The Editing of Music; Contrapuntal Practice; Performance Practice; Introduction to Schenkerian Analysis; Seminar Studies; HISTORICAL STUDIES: British Music in the 20th Century; Opera from Handel to Weber; Czech Orchestral Music; Jazz in the Modern World.

**Year 3:**
- Autumn Semester: Electro-Acoustic Composition II *; Fugue (double module); Practical Musicianship; Case Studies in Performance Practice; Project in Music Analysis; Dissertation (double module); Seminar Studies; HISTORICAL STUDIES: Popular Culture (post-1945); The Life and Music of Wagner; The Birth of Modernism.
- Spring Semester: Electro-Acoustic Composition II (repeat of Autumn module); Practical Musicianship IV (Performance); Palaeography; 20th Century Contrapuntal Practice; Analysis IV; HISTORICAL STUDIES: Stravinsky and Modernism; Mozart; Polish Music and the Search for Identity.

**Practical Work**

In the first-year Physics laboratory you progress through a series of structured experiments. In Year 2 these include elements of acoustics, electronic sound and studio techniques. In your final year you would be encouraged to devise your own project. There is a wide range of possibilities here, including experimental work on the physics of musical instruments, the psychology of sound perception and musical performance, computer-music composition and the techniques of sound recording. In addition, all Physics and Music students are encouraged to make informal use of the studio facilities throughout their time in Cardiff, for example, through their own individual sound-composition experiments. You might also get involved, if you wish, in helping to organise the sound systems for musical events in the Students’ Union.
Practical work in the School of Music may relate to instrumental and vocal studies. You can choose to receive half an hour per week free tuition on voice or your principal instrument throughout the programme. In addition to its full-time staff the School is visited by many part-time practical staff, including teachers of piano, singing, guitar and all orchestral instruments, most of whom are principal players in one of Cardiff’s two professional orchestras. All students undertaking the practical musicianship modules are required to attend the main orchestra or choir, and participation in smaller groups and ensembles is encouraged. Each session staff and students present a series of concerts and contribute to the annual programme at St David’s Hall.

**Tutorials**

Students meet regularly in small groups with members of academic staff to discuss all aspects of their studies in an informal setting. In addition, personal tutors are assigned to help with non-academic matters.

**Assessment**

This is mainly by written papers, but many modules involve a large element of continuous assessment from tests, laboratory work or music assignments. The academic year is divided into two semesters with exams taking place at the end of each, in January and May. The final Honours classification is based on all Year 2 and Year 3 modules, but these are weighted 1:2 respectively.

**Careers**

Graduates of the Physics & Music course have gone on to a great variety of things, including working in the recording and broadcasting industry, postgraduate studies in music and in science (e.g. medical physics and forensic science) and school and college teaching.

**School Activities and Facilities**

The School of Physics and Astronomy has an international reputation as a leading centre for research in solid-state physics, astronomy and astrophysics and astronomical instrumentation. It has also an active research group working on the acoustics, mechanics and psychoacoustics of stringed musical instruments.

The School has a purpose-built suite of sound studios and acoustical laboratories (including an anechoic chamber), designed to top professional standards. Our teaching studios are equipped with digital synthesisers with MIDI interfaces and computer control, plus links to the University’s network of computers and the internet. In addition we have older, analogue synthesis apparatus. There are a number of multitrack and twin-track tape recorders and comprehensive facilities for digital recording, editing and mixing sound.

A substantial amount of equipment was donated to us by Yamaha as a result of some of our research work on the FM synthesis technique – the basis of their “DX” series of synthesisers. This includes a TX802 and a TX81Z FM synthesiser, an RX5 digital rhythm unit, a QX3 16-track MIDI sequencer, and a SPX90 II digital effects unit. In addition we have an 8-track Tascam 688 Midistudio, up-to-date PC computers and printers with Cubase VST and other sequencing, voice-editing and music-printing software packages. All of this equipment is available, for use both informally and as a basis of formal project work, to all students on the Physics and Music course.

The School of Music is one of the largest and best equipped in Britain. It is housed in a specially designed building which has its own concert hall, seating around 400, which is open to the public.

The hall contains a two-manual pipe organ (by J B Walker & Sons), a chamber organ and two full-sized concert grands by Steinway and Bösendorfer. There is also a concert harpsichord, a large
collection of percussion instruments and over 50 upright pianos, housed in some 25 practice rooms, to fulfil student requirements. The School has a recording booth servicing the concert hall equipped with ADAT, DAT and cassette recording. In addition there are three Mac-based electronic studios. Studio One is centred on the ProTools hard-disk recording system and is for use in Year 3. Studio Two is for the Year 2 module and is a MIDI studio with mostly Roland equipment plus a newly installed Akai S6000 sampler. Studio Three is a smaller MIDI workstation. There is also a Mac computer lab on the top floor of the music building with several workstations equipped with MIDI keyboards. All use the Vision sequencing package together with Sibelius; the School also maintains Finale and Mosaic.

The music library, centrally situated on the building’s ground floor, contains an impressive collection of scores, source material, books and periodicals, as well as microfilm and microfiche viewers. Here you will also find listening facilities and a comprehensive collection of records, CDs and audio and video cassettes for student use.

Student Activities
There are strong Physics and Music Societies, run by the students, which organise popular lectures, concerts and concert trips, industrial visits, social events and other activities throughout the year. The schools are conveniently sited for full participation in the activities of the Students’ Union and for sporting facilities such as squash courts and gymnasiums.

Accommodation
Full details of University accommodation and other facilities are given in the University Prospectus. All students who firmly accept a place at Cardiff are guaranteed a place in University accommodation during their first year, if they wish it.

Entry Requirements
Entrants must normally have A-levels in Physics, Music and maths. Application should be made through UCAS, specifying Code FW33. Applicants will normally be asked to audition and sit a short, written paper for Music. Applicants are usually invited to visit the University during the period November to March prior to the academic year of intended entry. This provides an opportunity to see all of the facilities, meet current students and discuss the course with members of staff at first hand. Enquiries and informal visits are welcome at any time. Please write or phone for further information.

Specific enquiries may be directed either to Dr Bernard E Richardson, School of Physics and Astronomy (Tel. 029 20876710) or to Dr Clair Rowden, School of Music (Tel. 029 20870462), at the addresses below.

Brochures describing the full range of degree schemes in both schools and the University prospectus are available on request.

For latest updates see: http://www.astro.cf.ac.uk/ and http://www.cf.ac.uk/music/

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Head of School of Music: Professor David Wyn Jones, School of Music, Cardiff University, 31 Corbett Rd., Cardiff CF10 3EB.

N.B. The information in this leaflet describes the degree scheme at present. Minor modifications may be made from time to time as we update and improve our syllabuses.