

# Elements of Sound and Music Computing in A-Level Music and Computing/CS

*Richard Dobson, January 2013*

## Music

These extracts suggest that the exam boards fall into two broad groups. Some detail extensive and specific application of music technology and ICT to performance and composition. Others acknowledge that such resources can be used, but defining few or no specific requirements.

### AQA

<http://web.aqa.org.uk/qual/gce/pdf/AQA-2270-W-SP-10.PDF>

#### **The Organisation of Sounds**

*Instrumentation and Timbre*

timbre, including the use of technology, synthesised and computer-generated sounds, sampling

#### **3.2 Unit 2 MUSC2 Creating Musical Ideas**

Recordings can be made using acoustic instruments/voices and/or ICT technology

##### 3 Electronic Music

This can include any electronic sound source including loops and samples. Where samples are used, it is expected that there will also be a significant amount of original material composed by the candidate.

#### **3.3 Unit 3 MUSC3 Interpreting Musical Ideas**

(e) a technology-based performance 1 – Sequencing

(f) a technology-based performance 2 – Multi-track/close microphone recording.

A solo is defined as a performance where the candidate's part is:

- a single unaccompanied part
- a part which is accompanied by piano, guitar (or similar), a backing track or a small unit of other players.

#### **Technology 1: Sequencing**

Credit will be given for:

...

- ability to make use of the various facilities available within the hardware and software to produce a valid result.

### **3.5 Unit 5 MUSC5 Developing Musical Ideas**

Brief B: Free Composition or pastiche

Candidates compose a substantial, single, piece in any style or genre, for any voice/instrument or combination of voices and/or instruments using acoustic and/or electronic sound sources. Submissions must be made as a recording on either CD or mini-disc and include an appropriate score and/or chart and/or annotation and a review. Recordings can be made using traditional instruments/voices and/or ICT technology. An annotation is defined as a substantial piece of writing which may include diagrams and/or sections of notation that will accurately describe the process of composition referring to elements such as:

- ...
- timbre and texture
- the process of realisation.

## **Cambridge International**

Document file name: 9703\_y13\_sy.pdf

<http://www.cie.org.uk/docs/dynamic/43785.pdf>

*References to ICT and electronic/computing resources scarcely figure at all in the specification itself, but the teaching notes make it clear that such use is welcomed and encouraged.*

## **4. Syllabus Components**

### **Element 4**

Two contrasting compositions, together lasting not more than 5 minutes, for two or more instruments/voices. Recordings of both pieces, acoustic or electronic, made or directed by the candidate must be submitted on cassette/CD, together with either detailed notes on the genesis of the compositions or full notation.

## **5. Notes on teaching the syllabus**

### **How technology impacts on composing.**

Used imaginatively, technology can be both a tool and sound resource of immense value. It can present a new palette of endless possibilities. Notation programmes are useful for producing a final score, but more genuine composing software enables a level of sophistication in the manipulation of sound resources that can fire the imagination of the young composer. Technology, used at its best, embraces innovation and experimentation, and is not exclusively a means by which familiar or traditional sounds can be

reproduced and combined with apparent ease.

...

Credit will be given to candidates who are able to edit their compositions to produce an expressive realisation using technology.

### **When a written document is more appropriate than a score in Component 4.**

The syllabus prescribes that in Component 4, where the style/tradition is not precisely notatable, a full account of the composing and recording processes must be provided. This is particularly consistent with certain experimental or technological approaches. A commentary may, for example, take the form of a log of technical procedures/editing techniques, or explain the use of unorthodox notation/graphic score.

## **Edexcel**

[http://www.edexcel.com/migrationdocuments/GCE%20New%20GCE/Specific  
ation\\_music\\_Issue\\_4.pdf](http://www.edexcel.com/migrationdocuments/GCE%20New%20GCE/Specific%20music%20Issue%204.pdf)

## **Unit 1 Performing Music**

Students can perform as soloists and/or as part of an ensemble. Teachers and students can choose music in any style.

...

Where no printed staff notation exists (for example, where students offer their own compositions) centres must still supply a score\* in a format appropriate to the style of the music. ...

\*The word score refers to any of the following: a full score in conventional staff notation; a lead sheet or chord chart; track sheets; tables or diagrams.

### **5 Sequenced performances**

Sequenced performances are accepted provided that the final track is performed live, at the correct speed and without further editing.

### **6 Use of accompaniment**

...

Students may perform with a backing track if they wish.

## **Unit 2 Composing**

### **2 The composition**

The composition briefs based on the above topics will make compositional demands in terms of the treatment of ideas, techniques and structures but between them will be sufficiently open-ended to allow students the freedom to work in any style or genre. Thus work may use forms and styles associated with western tonal harmony, other techniques of 20th and 21st century art music, popular music and jazz, world music, the media and the stage, and the various modern applications of technology. The piece may be for any instrument or voice, or combination of instruments and/or voices, and in any style, subject to the requirements of the selected composition brief.

## **5 Items for submission**

1) A detailed notated score\* appropriate to the style of music submitted. This can be submitted on manuscript paper or as a printout.

\*The word score refers to any of the following: a full score in conventional staff notation; a lead sheet or chord chart; track sheets; tables or diagrams.

## **CCEA**

[http://www.rewardinglearning.org.uk/docs/specifications/GCE\\_Rev\\_Spec\\_Music.pdf](http://www.rewardinglearning.org.uk/docs/specifications/GCE_Rev_Spec_Music.pdf)

### **3.1 Unit AS 1: Making and Appraising Music 1**

#### **Composing (AO2)**

- create, organise and develop musical ideas in line with their chosen brief;
- control and use appropriate instrumental/music technology resources to realise their chosen brief;

### **3.2 Unit AS 2: Responding to Music 1**

#### **Listening and Appraising (AO3)**

Students should be able to:

- comment perceptively on:

...

- the impact of ICT on how music is heard;

### **3.3 Unit A2 1: Making and Appraising Music 2**

#### **Composing (AO2)**

- control and use appropriate instrumental/music technology resources to create an effective realisation of the assignment;

#### **Appraising (AO3)**

- write coherent and reflective commentaries on their

compositions and/or music technology submissions.

### **3.4 Unit A2 2: Responding to Music 2**

Students should ... continue to develop their knowledge and understanding of the impact of ICT on the way music is heard, created and performed.

#### **Optional Area of Study 2 (AO3): New Directions in Twentieth Century Music**

Students should develop knowledge and understanding of new directions in twentieth century music and be able to comment perceptively on a range of appropriate musical examples. Students' study should include the following:

- the development of electronic music and electronic instruments;
- the use of electronically produced or manipulated sounds and the use of technology;
- the rise of electronic studios and new means of creating and disseminating music;

#### **OCR**

<http://www.ocr.org.uk/Images/73368-specification.pdf>

“Both specifications offer scope to develop creativity using music technology and in non-Western traditions, as well as more traditional tonal and non-tonal Western composing skills.”

#### **Communication [p.27]**

If the full instrumental forces are not available for a recording to be made, candidates may make a reduction of all or part of the final draft for piano or other reduced forces, or prepare a synthesized or sequenced demonstration. In order to communicate the expressive aspects of their instrumental writing, candidates may choose to submit a live performance, a carefully edited sequenced realisation, a multi-tracked realisation or a recording which combines live and technical resources.

#### **Section B: Composition [p. 43]**

Whichever option is chosen, candidates define their own brief for their composition, which they must explain fully in a commentary.

The instruments used for the chosen composition may be:

- acoustic;
- amplified;

- a combination of acoustic and amplified instruments; or
- electro-acoustic.

### **3. Film/TV composition [p.51]**

The recording must be accompanied by either:

a full score in a form appropriate to the style, which serves as the principal examination document;

or:

a full commentary on the methods of mixing and producing the master recording, which becomes the principal examination document to be assessed on production values. If this option is taken, the master is assessed on the use of appropriate sound levels, balance between parts, effective stereo image, appropriate equalisation, reverberation or other effect, and use of a full frequency spectrum.

## **WJEC**

<http://www.wjec.co.uk/uploads/publications/3416.pdf>

### **AS Level**

#### **COMPOSITIONAL STYLES**

...

20th century styles (Nationalism, Impressionism, Neo classicism, Expressionism, Minimalism / electronic / aleatoric / musical theatre /jazz / rock and pop styles)

#### **4.2 MU2 Composing**

Candidates are required to submit two contrasting compositions:

(i) one composition must reflect the musical techniques and conventions associated with the Western Classical Tradition;

(ii) free composition.

The total playing time of the submission should be between a minimum of 4 minutes and a maximum of 8 minutes. The use of music technology is to be encouraged in this area of study. However, unoriginal, pre-recorded music samples should be avoided: if used, they must be indicated clearly on the form provided by WJEC to accompany each composition.

#### **Composition 2: free composition.**

Compositions may be submitted on either a cassette, CD or MD recording.

All compositions must be recorded, and presented with a score using appropriate notation.

Recordings submitted without conventional scores must be accompanied by a detailed lead sheet and a thorough explanation of the process of composition, indicating clearly the composer's intentions, musical details of the piece, and a description of the performance details used in the realisation.

## A Level

### **4.5 MU5 (A) Composing**

Candidates are required to submit two contrasting 'style' compositions.

...

(ii) A piece linking with the new Area of Study, which reflects the techniques, characteristics and conventions peculiar to the 20th / 21st century.

#### **(iii) Composition 3: Free composition**

Candidates are required to compose a piece of music lasting between 6 – 8 minutes. Candidates may choose their own brief, compositional style and resources to produce a substantial, imaginative and innovative result. ... it is possible for candidates to use this extended option as an opportunity to relate their ideas and compositional techniques to an Area of Study not previously covered during the course.

### **4.6 MU6 (A) Appraising**

Area of Study 3: Music in the 20th / 21st Century

...

In addition, candidates will be required to apply the knowledge gained through their study of the above to other styles of 20th and 21st century music, such as:

- electronic music
- aleatoric music
- ...

## **6 KEY SKILLS**

Key Skills are integral to the study of AS/A level Music and may be assessed through the course content and the related scheme of assessment as defined in the specification. The following key skills can be developed through this specification at level 3:

...

- Information and Communication Technology
- Problem Solving

...

# A-Level Computing/Computer Science

AQA

<http://store.aqa.org.uk/qual/gce/pdf/AQA-2510-W-SP.PDF>

## 3.1.3 Fundamentals of Data Representation

### Representing Images, Sound

Describe how bit patterns may represent other forms of data including graphics and sound.

### Sound files

The need for compression and basic techniques for compression.

### Sampled Sound and Nyquist-theorem

Sampling resolution, sampling rate.

### Sound Synthesis

Describe MIDI and its advantages for storing sound digitally<sup>1</sup>.

### Streaming audio

Explain what it is and why it is used.

### Analogue and Digital Data, Analogue and Digital Signals

Differentiate between analogue and digital data and analogue and digital signals.

### Analogue to Digital Converter (ADC)

Describe the principles of operation of an analogue to digital converter.

Cambridge International (2014)

Document file name: 9691\_y14\_sy.pdf

<http://www.cie.org.uk/docs/dynamic/52389.pdf>

[RWD: there are very few references to sound in this specification, even where they might reasonably be expected.]

---

<sup>1</sup> In fact, neither MIDI data nor a MIDI file contains any audio data. It is hoped this element will be re-specified in a later revision. Remarkably, no other examination board mentions MIDI.



## **1.8 Handling of data in information systems**

Candidates should, within a context, be able to:

- (a) describe manual and automated methods of capturing and inputting data into a system, including form design, keyboard entry, barcodes, Optical Mark Recognition (OMR), magnetic stripe cards, Optical Character Recognition (OCR), sensors and data logging, touch screens, chip and pin
- (d) describe possible output formats such as graphs, reports, interactive presentations, sound, video, images and animations stating the benefits and drawbacks of each format

## **2.1 Designing solutions to problems**

- (b) design and document data capture forms, screen layouts, report layouts or other forms of input and output (e.g. sound) for a given problem

## **3.7 Simulation and real-time processing**

- (a) describe real-time applications (process control)
- (b) explain the use of sensors for detecting physical signals (temperature, pressure, motion, light intensity)

## **CCEA (draft)**

[http://www.rewardinglearning.org.uk/docs/entitlement\\_framework/specs/](http://www.rewardinglearning.org.uk/docs/entitlement_framework/specs/)

(no specific references to sound and music)

## **Edexcel**

(to be published 2013)

## **OCR**

[http://www.ocr.org.uk/download/kd/ocr\\_9613\\_kd\\_gce\\_spec.pdf](http://www.ocr.org.uk/download/kd/ocr_9613_kd_gce_spec.pdf)

### **3.1.3 Data: Its representation, structure and management in information systems**

- describe possible forms of output such as graphs, reports, interactive presentations, sound, video, images, animations, stating the advantages and disadvantages of each with reference to the target audience.

### **3.1.4 Hardware**

- h. describe a range of common peripheral devices in terms of their features, advantages, disadvantages and uses: ... speakers, microphones...

### **3.2.1 Designing solutions to problems**

- b. design and document data capture forms, screen layouts, report layouts or other forms of input and output (e.g. sound) for a given problem.

## WJEC

<http://www.wjec.co.uk/uploads/publications/12188.pdf>

### 1.4 rationale

Computing integrates well with subjects across the curriculum.

... computing is as relevant to a student studying Arts subjects, as it is to one studying Science subjects.

### CG1.1 Hardware and communication

- Describe analogue and digital data, their appropriateness for different applications, why conversion between the two is required and identify situations where conversion is required.

### CG3.2 Operating Systems

- Describe methods of data transfer including the use of buffers to allow for differences in speed of devices.

Explain why double buffering is used<sup>2</sup>.

### CG3.9 System design

- Human-Computer interface.

Discuss contemporary approaches to the problem of communication with computers, including text based interfaces, forms dialogue and free-format dialogue and graphical user interfaces (GUI), sound, dedicated keys, soft keys, pointing devices, voice synthesis and handwriting recognition.

### CG3.10 Typical applications of computers and communications systems

Internet, Intranet, Extranet

Describe common contemporary applications, including web logs, instant messaging, virtual learning environments and e-commerce: the downloading of music, on-line auctions, on-line-banking, on-line shopping.

---

<sup>2</sup> This element is included here as it is very well exemplified by the time-critical process of streaming audio data to/from a soundcard.