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| Module Title: Digital Signal Processing UG2 | Code: DIG5069 |
| Credit Value: 30 | Level:5 |

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| Module Leader | Yonghao Leo Wang |
| Module Tutors: | Spyridon Stasis; Nicholas Jillings; Xueyang Wang; Maciej Tomczak; |
| Moodle Course | <http://moodle.bcu.ac.uk/course/view.php?id=16208> |
| Contact Information: | See Moodle “Welcome” block or search in iCity |

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| Module Overview In this module you will be introduced to fundamental Digital Signal Processing (DSP) theory and applications, especially to discover how these DSP techniques being used in audio and music applications. The module will also cover some basic computer science and digital audio networking knowledge to support wider applications of DSP in digital media subject area.  Ideally, the module requires a basic level of engineering mathematics, and intermediate level of programming skills. The current programming platform is Matlab. |

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| Module Learning outcomes:. |
| 1. Demonstrate an understanding of techniques used for interfacing, routing, encoding, and decoding digital audio signals in computer system and computer networks. |
| 1. Analyse audio signals in time and frequency domain using digital signal processing and audio feature extraction techniques. |
| 1. Apply DSP techniques for the alteration and modification of audio and music signals. |
| 1. Use engineering principles to design and implement DSP software for audio applications. |

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| Library & Learning Resources – booklists are available at <https://bcu.rebuslist.co.uk> |

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| Brief description of the module assessment: *You will be expected to complete ALL assessments.* | 1. Develop and demonstrate DSP algorithms for digital audio processing tasks, including presentation, demo, and software coding.  The times and dates of presentation and demo will be given via Moodle. The project code is to be submitted by 23rd of May 2018 (see the marking criteria for a breakdown of the assessment).  Information is for guidance only.  See Moodle for details. |
| Assessment weightings: | 100% |
| Assessment deadline dates: | See Moodle ‘Assessment” block and Moodle calendar for submission points <http://moodle.bcu.ac.uk/calendar/> |
| Re-assessment deadline date[[1]](#footnote-1): | 30th July 2018 |
| Support available for students required to submit a re-assessment: | The Module tutor will be available to provide feedback and guidance on your re-assessment and you are advised to contact them at the earliest opportunity. You will also be notified of support sessions to be arranged during the period preceding the hand in date. The re-assessment Coursework will be available to download from MOODLE and support materials will be available on MOODLE to assist you with the re-assessment. |
| Plagiarism: | You are reminded of the University’s Disciplinary Procedures that refer to plagiarism. A copy of the Disciplinary Procedure is available from [iCity](https://icity.bcu.ac.uk/Student-Services/Complaints-and-Appeals/Student-Disciplinary-Procedure).  Except where the assessment of an assignment is group based, the final piece of work that is submitted must be your own work. Close similarity between assignments is likely to lead to an investigation for cheating.  You must also ensure that you acknowledge all sources you have used.  Submissions that are considered to be the result of collusion or plagiarism will be dealt with under the University’s Disciplinary Procedures, and the penalty may involve the loss of academic credits.  If you have any doubts about the extent to which you are allowed to collaborate with your colleagues, or the conventions for acknowledging the sources you have used, you should first of all consult module documentation and, if still unclear, your tutor. |

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| General Guidance ***Classroom Conduct***  No student has the right to disrupt classes. Such behaviour denies other students the opportunity to benefit from the full educational experience. You may be asked to leave if your behaviour is considered to be unacceptable. It is therefore expected that you should:   * Arrive punctually to all sessions. * Preferably sit to the front of the lecture room. * Avoid talking to other students during taught sessions unless specifically requested to do so. * Concentrate on and engage in the lecture and/or seminar. * Raise a hand before contributing verbally. * Above all, please treat staff and fellow students respectfully   ***Academic Regulations***  Your studies will be governed by the [*University Regulations*](https://icity.bcu.ac.uk/academic-registry/information-for-students/Assessment/Assessment-Regulations)and any exemptions to the regulations that have been agreed to meet professional body requirements, these are specified in your Course Handbook. |

## Learning Schedule

Please note that this schedule is indicative and is subject to change for operational and/or educational reasons. Academic staff constantly monitor and review student progress during the teaching period and will make changes to the schedule as appropriate, notifying you of any changes. Refer to Moodle for updated schedules.

### Semester Two

| **Teaching** | | **Date** | **Lecturer** | **Topic** | **Tutorial / Lab Topic** | **Assignment \*** | |
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| **Wk** | | **(Mon)** |  |  |  | **Set** | **Due In** |
|  | 29/01/18 | |  | Inter-semester Activity |  |  |  |
| 1 | 05/02/18 | | 1&2 | 1. Computer Architecture 2. Digital signal coding transmission | 1. DSP Audio Tut 01 Introduce to MATLAB programming for Audio. 2. DSP Audio Tut 02 Digital Audio Representation. |  |  |
| 2 | 12/02/18 | | 3&4 | 3. ADC/DAC 4. Digital audio representation | 1. DSP Audio Tut 03\_Create sound and sptool. 2. DSP Audio Tut 04\_Convolution reverb method. |  |  |
| 3 | 19/02/18 | | 5&6 | 5. Linear system and convolution 6. Convolution properties and fast implementations | 1. DSP Audio Tut 05 Conditional Control and Audio Distortion. 2. DSP Audio Tut 06 Noise Signal and filtering. |  |  |
| 4 | 26/02/18 | | 7&8 | 7. Spectrum Analysis 8. DFT, FFT algorithm and application | 1. DSP Audio Tut 07 Design fitler and remove noise 2. DSP Audio Tut 08 Audio Envelope and pitch shift |  |  |
| 5 | 05/03/18 | | 9&10 | 9. Spectrum Analysis 10. DFT, FFT algorithm and application | 1. DSP Audio Tut 09 Chirp and STFT 2. DSP Audio Tut 10\_FIR and IIR filter design 2017 | Set |  |
| 6 | 12/03/18 | | 11&12 | 11. Digital Filters (FIR, IIR and structure) 12. FIR and IIR filter Design and Theory Z-transform | 1. DSP Lab11\_Windowing effect on filter 2. DSP Lab12\_FFT\_IFFT details |  |  |
| 7[[2]](#footnote-2) | 19/03/18 | |  | Employability work (Guest Lectures) 1. DSP related jobs 2. Industry talk | Working on audio project tasks |  |  |
|  | 26/03/18 | |  | *Easter vacation* |  |  |  |
|  | 02/04/18 | |  | *Easter vacation* |  |  |  |
| 8 | 09/04/18 | | 13&14 | 13. Parametric filter, STFT and applications. 14. Spectrum analysis and filter applications (Guest lecture from Jason) | 1. DSP Lab13 Multistage filter and cost 2. DSP Lab14 Real-time filter and delay |  |  |
| 9 | 16/04/18 | | 15&16 | 15. DSP audio algorithm case study 1 16. DSP audio algorithm case study 2 | 1. DSP task WAV file and pitch shifting 2. DSP task sound analysis and audio envelop |  |  |
| 10 | 23/04/18 | | 17&18 | 17. DSP audio algorithm case study 3 18. DSP audio algorithm case study 4 | 1. DSP Task Further Chirp signal and clipping 2. DSP Task Parametric EQ Design |  |  |
| 11 | 30/04/18 | | 19&20 | 19. Assessment support session coding 1 20. Assessment support session coding 2 | 19. Assessment support session coding 1 20. Assessment support session coding 2 |  |  |
| 12 | 07/05/18 | | 21&22 | 21. Presentation support session 1 22. Presentation support session 2 | 21. Presentation support session 1 22. Presentation support session 2 |  |  |
| 13 | 14/05/18 | | 23&24 | *Presentation of coursework during the week no formal Lectures* | *Presentation of coursework* |  |  |
|  | 21/05/18 | |  | *Coursework to be submitted on Wednesday 12:00 23rd May* | *Coursework to be submitted on Wednesday 12:00 23rd May* |  | Due |
|  | 28/05/18 | |  | *Exam / assessment week* |  |  |  |

\* Assignment Set and Due week indication above is for guidance only. See Moodle course and calendar [moodle.bcu.ac.uk/calendar/](http://moodle.bcu.ac.uk/calendar/view.php) for details.

Re-Sit coursework will be submitted by 12 mid-day on 30th July 2018 and Re-Sit exams will be held in the w/c 30th July 2018.

1. **Resubmission deadline(s)** *are only relevant if you are unsuccessful in your first attempt – please see* [*University Regulations*](https://icity.bcu.ac.uk/academic-registry/information-for-students/Assessment/Assessment-Regulations) *on resubmission policy and procedure.* [↑](#footnote-ref-1)
2. Note there may be some timetable adjustments this week due to additional employability activities [↑](#footnote-ref-2)