Unit Title	Major Engineering Project (FMP)
FHEQ Level	6
Unit Code	DTT18303
Credit Value	60
Unit Type	Compulsory: Taught

Learning Hours

Staff – Student Contact Hours		Independent Study Hours	
Classes	90	Independent Study	180
Supervised access to resources	30	Preparation for Assessment	150
	(120)	Unsupervised Access to Resources	150
Total			600

Unit Description

This unit is the culmination of your specialised project-based learning. This unit represents a major undertaking and commitment to being prepared for a career in the television broadcasting industry; hence this is a 60-credit unit.

In addition to engineering and technology topics (such as signal processing and control systems) you will be taught technical report writing, project management, budget management and related mathematical skills: general transferrable skills and applied engineering skills.

You will select a project that reflects the culmination of your learning with respect to technologies and solutions deployed within the global television broadcasting industry. The blended learning approach in this unit combines theoretical topics with practical tutorials. This unit is taught alongside Emerging technologies and standards to provide a comprehensive and correlated understanding of contemporary broadcast practice. You will showcase your projects at the annual Ravensbourne Degree Show to industry professionals.

The Five Principles underpin the Mindsets and Skillsets Manifesto and are the foundation upon which all course curriculum frameworks and unit specifications are based. The relevant Principles as stated below have been mapped against the Learning Outcomes relevant to each course unit and at each level (see Programme Specifications for full description of the Five Principles):

1. Cultivate / Where the individual thrives.
2. Collaborate / Where disciplines evolve.
3. Integrate / Where education engages industry.
4. Advocate / Where purpose meets practice.
5. Originate / creativity meets technology.

Unit Indicative Content

- Advanced approaches to hardware, software, firmware, and application design
- Test and measurement, and debugging
- Additional engineering topics: mechanical principles, servo motors and control, materials science, loudspeaker design, robotics, and drones
- Additional systems principles: AR, VR, object-based audio, and gaming platforms
- Additional computer science principles: AI, HCI, pattern recognition & computer vision (machine vision), computer audition (machine listening), and the applied mathematical underpinnings
- Transferrable maths skills
- Transferrable professional presentation skills
- Advanced engineering technical report writing skills
- Transferrable skills in the field of project management, including budget management

Unit Aims

1. To develop broadcast engineering as a skill (course aim)

2. To develop critical thinking skills (course aim)

3. To engender professionalism appropriate to the television industry (course aim)

4. To develop hardware and software knowledge suitable for television broadcasting (course aim)

5. To develop diagnostic and problem solving skills in a technology context (course aim)

6. To develop advanced engineering project skills

7. To create a project deliverable: hardware, software, firmware, application, or research

8. To underpin engineering project skills with quantitative analysis and mathematical skills

9. To develop transferrable skills especially for project management, including financial management

10. To consolidate technical report writing skills (LO5)

Unit Learning Outcomes

LO1: **Research/Inspiration**

Select and evaluate information gathering techniques using a wide range of sources, providing visual, contextual and industry case-study research as appropriate.

Based on **ORIGINATE** principle.

LO2: **Concept/Ideation**

Critically appraise and evaluate appropriate research materials to generate workable concepts or strategic project deliverables that inform and underpin project development.

Based on **ORIGINATE** principle.

LO3: **Development/Prototyping**

Investigate potential pathways that result in appropriate solutions, informed by a systematic understanding of the principles of the engineering project process.

Based on **INTEGRATE** principle.

LO 5: **Presentation/Report Writing for Influence**

Communicate projects creatively, quantitatively, and professionally, whether in visual, oral or written form. Methods of presentation are appropriate to the audience/client and the purpose of the work.

Based on **ADVOCATE** principle.

LO7: **Employability**

Effectively employ professional transferrable and employability skills, including the ability to manage time and work to clear briefs and deadlines, respond to set goals, and communicate effectively.

Based on **CULTIVATE** principle

LO8: **Professional Identity**

Align your professional identity as a practitioner with a viable career context.

Based on **CULTIVATE** principle.

Learning and Teaching Methods

- Project briefings – in order to prepare students for the aims, content, delivery, learning outcomes, and assessments
- Seminars (including guest lecturers)
- 1:1 practical workshops (with specialist tutors)
- VLE activities such as transferrable skills tutorials and tests
- Individual and small group work
- Autonomous study
- Continual individual and small group formative feedback
- Summative assessment throughout unit that demonstrates degree to which learning outcomes are being met

Assessment methods and tasks

Brief description of assessment methods

Assessment tasks	Weighting (%) *(one grade or multi-grade unit)*
1. Project pitch presentation (3 minutes including Q&A) in Term 1	10%
2. Presentation of Interim Project Report (5 minutes, 1-to-1 presentation) in Term 2	10%
3. Final Engineering Project Report (3500 words) in Term 3	40%

4. Quantitative & Mathematical Analysis Appendix (1000 words) in Term 3	20%	
5. Project demonstration with supporting collateral (2 minutes demonstration, 8 minutes Q&A) in Term 3 at annual Ravensbourne Degree Show	20%	

Indicative Assessment Criteria

Assessment criteria are the basis on which the judgment of the adequacy of the work is made. A more detailed assessment criteria will be specified in the brief. This should be written in line with the Learning Outcomes, the purpose and aims of the unit.

Assessment 1 is a short presentation to pitch the project proposal. The presentation will be assessed through the following criteria:

1. Ability to pitch an engineering project proposal in order to get approval to proceed or feedback to modify proposal. **LO1**
2. Evidence of research into project viability in terms of required skills, context within television practice, risk, budget, and timescale. **LO8**

Assessment 2 is a 1-to-1 presentation with tutors of the Interim Project Report. The presentation will be assessed through the following criteria:

3. Evidence of progression in terms of acquiring advanced skills and knowledge, budget management, maintaining deadlines, risk mitigation, and presentation & report writing skills. **LO5**, **LO2**

Assessment 3 is the main body of work and comprises the Engineering Project Report describing your FMP. The report will be assessed through the following criteria:

4. Evidence of professional technical report skills conforming to established guidelines. **LO5**, **LO1**, **LO8**
5. Evidence of project deliverables as a prototype, proof-of-concept, service, application, programme, product, solution, or research findings. **LO2**, **LO3**
6. Development of project management skills with respect to time management, achieved goals, and financial management. **LO7**
7. Evidence of advanced knowledge of underlying principles associated with project hardware and/or software. **LO2**

Assessment 4 is an appendix to the Engineering Project Report and contains the quantitative analysis of appropriate aspects of the engineering project, and supporting mathematical information and proofs, such as: financial analysis, detailed data analysis, modelling, detailed signal processing analysis, software algorithms, and mathematical aspects of the design process. The appendix will be assessed through the following criteria:

8. Evidence of appropriate quantitative analysis in the contest of the project parameters. **LO5**
9. Consolidation of critical thinking skills in providing insights and conclusions meaningful to an engineering and technological audience. **LO1**

Assessment 5 is the culmination of your engineering development prior to commencing professional practice and takes the form of demonstrating your project to an audience including industry professionals. The demonstration will be assessed through the following criteria:

10. Evidence of advanced depth of understanding of all aspects of the engineering project. **LO3**, **LO7**, **LO8**
11. Demonstration of project deliverable in an appropriately creative manner, utilizing professional presentation skills, and with appropriate oral, visual, or written collateral. **LO5**

Essential Reading list

1. Cook M. 2016. Arduino Music and Audio Projects, APress
2. Few S. 2012. Show Me the Numbers: Designing Tables and Graphs to Enlighten, Analytics Press
3. Segaran S. 2016. Electronic Projects for the Raspberry Pi: Book 1 - Interfacing to LED displays, speakers and simple sensors: Volume 1, Ohms Book Publishing.
4. Tozer E. P. J., 2012. Broadcast Engineer's Reference Book, CRC Press.
5. Westerfield M. 2013. Building iPhone and iPad Electronic Projects: Real-World Arduino, Sensor, and Bluetooth Low Energy Apps in techBASIC, O'Reilly

URLs

1. https://www.raeng.org.uk/education
2. https://www.theiet.org/students/resources/tech-report-writing.cfm
3. https://www.pmi.org/learning/library/basic-analytical-principles-project-management-1824
4. https://www.raeng.org.uk/publications/other/ingenious-evaluations-a-guide-for-grant-holders
5. https://toggl.com/project-management-methodologies
6. https://ntrs.nasa.gov/archive/nasa/casi.ntrs.nasa.gov/20040081092.pdf
7. https://www.ijee.ie/articles/Vol22-2/15_Ijee1738.pdf
8. https://www.fastcompany.com/3067455/why-amazon-is-the-worlds-most-innovative-company-of-2017