MODULE SPECIFICATION TEMPLATE

1. The title of the module: Introduction to Electronics
2. The Department which will be responsible for management of the module

**School of Advanced Construction and Engineering**

1. The Start Date of the Module  **September 2010**
2. The number of students expected to take the module  **30**
3. Modules to be withdrawn on the introduction of this proposed module and consultation with other relevant Departments and Faculties regarding the withdrawal **Nil**
4. The level of the module **Certificate [C]**
5. The number of credits which the module represents **15**
6. Which term(s) the module is to be taught in (or other teaching pattern) **Semester 1**
7. Prerequisite modules: **None**
8. The programmes of study to which the module contributes

**Foundation Degree in Engineering, HNC in Engineering**

1. The intended subject specific learning outcomes and, as appropriate, their relationship to programme learning outcomes

**On completion of this module the students will be able to:**

1. **Select and use appropriate methods of measuring signals and describe types and sources of noise.**
2. **Design, test and evaluate the operation of a range of amplifiers.**
3. **Design circuits incorporating feedback and describe and test the effects of applying feedback.**
4. **Describe, construct and evaluate a range of oscillator circuits.**

**These learning outcomes directly relate to the listed programme learning outcomes A1, A2 & A3 of the programmes listed in section 10.**

1. The intended generic learning outcomes and, as appropriate, their relationship to programme learning outcomes

**The following generic learning outcomes directly relate to the listed programme learning outcomes B12, B14, C20 & D32 of the programmes listed in section 10.**

**On completion of this module the students will be able to:**

1. **Analyse and solve problems using the appropriate methods.**
2. **Identify, classify and describe the performance of systems and components through the use of analytical methods and modelling techniques.**
3. **Work competently in an engineering laboratory environment using a wide range of equipment.**
4. **Present quantitative and qualitative information, together with analysis, argument and commentary, in a form appropriate to the intended audience, including appropriate acknowledgements and referencing of sources.**
5. A synopsis of the curriculum

* **Signals and noise: logarithmic units; decibels and their relationship to power, current and voltage: Reference levels: dBA, dBW, dBm; Types and sources of noise: thermal, radiated, mains – borne, sparking, noise reduction techniques; Signal to noise ratio; noise factor; noise temperature.**
* **Types of amplifier: power; tuned; operational: Performance: frequency response; gain/bandwidth product; distortion; input and output impedances: Analysis: use of quantitative methods; equivalent circuits; computer modelling: Modification to circuit design: manufacturers data; circuit calculations: Revised specifications: use of alternative components to reduce cost and / or imp[rove performance**
* **Circuits with feedback: types of feedback; voltage; current; series; shunt. Circuit performance: effect of feedback on gain, bandwidth, distortion, noise, gain stability, input and output impedances. Circuits: single stage transistor amplifier; operational amplifier. Investigation: practical measurements; computer simulation.**
* **Oscillators: conditions for oscillation; feedback equation; gain – phase relationship. Build and evaluate: e.g. Wien Bridge; LC coupled; phase shift; transistor or operational amplifier. Specification: interpretation of factors such as frequency, stability, frequency drift, distortion. Investigation int crystal oscillators: advantages; uses.**

1. Indicative Reading List

* **Maddock R J. Electronics for Engineers (Prentice Hall, 1994) ISBN 05822 15838**
* **Green D C. Electronics IV (Pearson, 1995 ISBN 9780582245174**

1. Learning and Teaching Methods, including the nature and number of contact hours and the total study hours which will be expected of students, and how these relate to achievement of the intended learning outcomes

The module is designed to offer a -base of study of fundamental digital techniques and design methodology in the solution of combinational and sequential logic problems.

**Students will be expected to spend 150 hours of study apportioned as follows:**

* **50 contact hours: involving a mix of taught lessons to explain the theoretical and practical aspects of the module**
* **40 hours practical activity**
* **60 hours private study**

1. Assessment methods and how these relate to testing achievement of the intended learning outcomes

**The module will be assessed by coursework only.**

**The coursework (100%) comprises three equally weighted assignments**

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| **Subject specific learning outcomes** | **Assessment Criteria** |
| * 1. **Select and use appropriate methods of measuring signals and describe types and sources of noise.**   2. **Design, test and evaluate the operation of a range of amplifiers.**   3. **Design circuits incorporating feedback and describe and test the effects of applying feedback.**   4. **Describe, construct and evaluate a range of oscillator circuits.** | * + Use logarithmic units and reference levels to express measured values of gain and attenuation   + Describe the types and sources of noise in electronic systems and methods of noise reduction   + Explain the concepts used to describe the effects of noise and make practical measurements   + Analyse the operation of different types of amplifier   + Compare the analysis with the measured values   + Modify circuit design to meet the revised specification   + Deduce an expression for the closed loop gain of a system with feedback   + Describe types of feedback and determine the effects on circuit performance when feedback is applied   + Design a circuit employing negative feedback   + Investigate the effects of applying feedback to single and multi-stage circuits   + Describe the circuit conditions and the methods used to achieve sinusoidal oscillation   + Build and evaluate a sinusoidal oscillator to a given specification   + Explain the advantages of crystal oscillators |
| **Generic learning outcomes** |  |
| **Analyse and solve problems using the appropriate methods.** | Analyse a design problem  Use the appropriate analyses to determine an effective solution to the problem |
| **Identify, classify and describe the performance of systems and components through the use of analytical methods and modelling techniques.** | Analyse the performance of a design solution against the design requirement  Use modelling techniques to indicate the effectiveness of the solution |
| **Work competently in an engineering laboratory environment using a wide range of equipment.** | Use the appropriate handling and operating procedures for devices and equipment |
| **Present quantitative and qualitative information, together with analysis, argument and commentary, in a form appropriate to the intended audience, including appropriate acknowledgements and referencing of sources.** | Construct appropriate reports covering all activities undertaken  The report to include reasoned analysis, commentary and argument  Full acknowledgement and referencing according to the standard format shall be included |

Implications for learning resources, including staff, library, IT and space.

**This module will be taught and supported by appropriately qualified lecturers who have experience in supervising research projects.**

**All the items stated in the Indicative Reading List are available at the Medway Campus, Learning Resource Centre. The Centre also gives access to digital media and electronic resources, and internet access via either the College network, or wireless access to the MKC-Public network.**

**Practical sessions will take place in the Analogue Lab which is fully equipped to accommodate the requirements of learning outcomes. A full-time Technician supports the laboratory activities.**

1. A statement confirming that, as far as can be reasonably anticipated, the curriculum, learning and teaching methods and forms of assessment do not present any non-justifiable disadvantage to students with disabilities

**The learning outcomes, teaching and learning methods and assessments are accessible to, and achievable by, all students. Specific requirements for disabled students to undertake work placements will be made as appropriate. Any student with disabilities will not face any foreseen disadvantage or difficulties that cannot be reasonably addressed.**

**Statement by the Director of Learning and Teaching:** "I confirm I have been consulted on the above module proposal and have given advice on the correct procedures and required content of module proposals"

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| ................................................................  Director of Learning and Teaching | ..............................................  Date |

**Statement by the Head of Department:** "I confirm that the Department has approved the introduction of the module and will be responsible for its resourcing"

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| .................................................................  Head of Department | ..............................................  Date |