

UNIVERSITY OF KENT

MODULE SPECIFICATION TEMPLATE

SECTION 1: MODULE SPECIFICATIONS

1. Title of the module
EL305 Introduction to Electronics
2. School or partner institution which will be responsible for management of the module
Engineering and Digital Arts
3. Start date of the module
4. The number of students expected to take the module
5. Modules to be withdrawn on the introduction of this proposed module and consultation with other relevant Schools and Faculties regarding the withdrawal
6. The level of the module (e.g. Certificate [C], Intermediate [I], Honours [H] or Postgraduate [M])
C
7. The number of credits and the ECTS value which the module represents
15
8. Which term(s) the module is to be taught in (or other teaching pattern)
Autumn
9. Prerequisite and co-requisite modules
None
10. The programmes of study to which the module contributes

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BEng Computer Systems Engineering
BEng Computer Systems Engineering with a Year in Industry
BEng Electronic and Communications Engineering
BEng Electronic and Communications Engineering with a Year in Industry
MEng in Computer Systems Engineering
MEng in Computer Systems Engineering with a Year in Industry

11. The intended subject specific learning outcomes

On successful completion of the module, students will have:

1. Been introduced to the fundamentals of electric circuits;
2. An understanding of the basic laws of electric circuits;
3. An ability to analyse simple electric circuits;
4. An understanding of basic operational amplifier parameters;
5. An understanding of basic operational amplifier circuits;
6. Practical ability to use a computer package to analyse electric circuits;
7. Practical ability to design and test simple operational amplifier circuits.

These outcomes are related to the programme learning outcomes in the appropriate curriculum maps as follows:

CSE/CSEwInd: A2, B1,B3,B4, C1,C2,C4,C6.

ECE/ECEwInd: A2, B1,B3,B4, C1,C2,C4,C5.

12. The intended generic learning outcomes

On successful completion of the module, students will be able to analyse numerical problems and to use computers as an engineering tool.

This outcome is related to the programme learning outcomes in the CSE/CSEwInd and ECE/ECEwInd curriculum maps as follows: D1, D3-D7.

13. A synopsis of the curriculum

Lecture Syllabus

INTRODUCTION TO ELECTRIC CIRCUITS

Resistors, voltage, current, power, Ohm's law. Ideal and non-ideal voltage and current sources. Maximum power transfer in DC circuits and load matching. Kirchoff's voltage and current laws, series and parallel connection, voltage divider. Node voltage analysis of DC circuits. Mesh analysis. Superposition, Thevenin's and Norton's theorems. Transfer functions, attenuation, gain, decibel. Equivalent circuits for subsystems.

Capacitors, inductors, and RC circuits. Harmonic signals, magnitude and phase, voltage and current vectors, voltage-current relationships. Impedance and admittance.

Simple filter circuits. Series and parallel resonant circuits.

PRACTICAL OPERATIONAL AMPLIFIER CIRCUITS

Operational amplifier (op-amp), ideal and practical representation. Op-amp comparators and level detection.

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Negative feedback. Non-inverting, voltage follower and inverting op-amp configurations, their gains and properties. Effects of input offset voltage and input bias current. Testing and troubleshooting op-amp circuits.

Effect of noise on op-amp operation. Schmitt trigger. Summing amplifiers. Digital-to-analogue converter. Basic integration and differentiation circuits. Differential amplifier, common-mode rejection ratio. Real op-amp parameters, slew-rate, critical frequency, gain-bandwidth product, closed loop bandwidth.

Coursework

LABORATORIES - INTRODUCTION TO ELECTRIC CIRCUITS

1 laboratory training session, not assessed - 2 hours

4 assessed laboratory sessions - 2 hours each.

LABORATORIES - PRACTICAL OPERATIONAL AMPLIFIER CIRCUITS

5 assessed laboratory assignments - 2 hours each.

ASSIGNMENT - PRACTICAL OPERATIONAL AMPLIFIER DESIGN

2 non-assessed tutorials - 1 hour each

1 assessed practical laboratory mini-project - 3 hours

14. Indicative Reading List

15. 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 module learning outcomes

This module will make extensive use of a computer-aided electronic circuit design (CAD) tool to assist in and to amplify traditional lecture-based learning. A practical hands-on approach is the best introduction to electronic circuits, where students are first introduced to a circuit and the theory during the lecture and then, in the laboratory classes can observe circuit operation and its properties using powerful but easy to use CAD tool, which resembles laboratory experiment with real instruments. The CAD tool will also be extensively used in the assessment, which will include comparison of the predicted and simulated circuit responses, problem solving, circuit design and circuit troubleshooting. A mini-project will add to the above a real laboratory experience, including practical design, physical construction and testing of an example circuit. The module will have 10 x 2 hour laboratory sessions timetabled each week of term 1. The first session will be used to train students to enable them to operate the computer-aided design package. The mini-project will be preceded by a tutorial lecture explaining the requirements for the circuit and describing the suggested design approach. The students will design the circuit and then, during a 3-hour laboratory session in the project week, they will practically build and measure it. Another tutorial lecture will follow, to assess the results and to discuss the issues which students have identified.

There will be a total of 45 student contact hours and the total student workload will be 150 hours.

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

The module will be assessed by coursework only. Both Practical Operational Amplifiers Circuits and Introduction to Electric Circuits will be assessed by laboratory assignments (learning outcomes 1-6). Learning outcome 7 will be mainly assessed by the mini-project assignment.

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

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18. The School recognises and has embedded the expectations of current disability equality legislation, and supports students with a declared disability or special educational need in its teaching. Within this module we will make reasonable adjustments wherever necessary, including additional or substitute materials, teaching modes or assessment methods for students who have declared and discussed their learning support needs. Arrangements for students with declared disabilities will be made on an individual basis, in consultation with the University's disability/dyslexia support service, and specialist support will be provided where needed.

19. Campus(es) where module will be delivered:

If the module is part of a programme in a Partner College or Validated Institution, please complete the following:

20. Partner College/Validated Institution:
 21. University School responsible for the programme:
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SECTION 2: MODULE IS PART OF A PROGRAMME OF STUDY IN A UNIVERSITY SCHOOL

Statement by the School Director of Learning and Teaching/School Director of Graduate Studies (as appropriate): "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"

.....
Director of Learning and Teaching/Director of
Graduate Studies (delete as applicable)

.....
Date

.....
Print Name

Statement by the Head of School: "I confirm that the School has approved the introduction of the module and, where the module is proposed by School staff, will be responsible for its resourcing"

.....
Head of School

.....
Date

.....
Print Name

SECTION 3: MODULE IS PART OF A PROGRAMME IN A PARTNER COLLEGE OR VALIDATED INSTITUTION

(Where the module is proposed by a Partner College/Validated Institution)

Statement by the Nominated Officer of the College/Validated Institution (delete as applicable): "I confirm that the College/Validated Institution (delete as applicable) has approved the introduction of the module and will be responsible for its resourcing"

.....
Nominated Responsible Officer of Partner
College/Validated Institution

.....
Date

.....
Print Name

.....
Post

.....
Partner College/Validated Institution