ELTR E7004: Electronic Systems

Full Title:	Electronic Systems
Language of Instruction:	English

Module Code:	ELTR E7004

Credits:	5

Valid From:	Semester 1 - 2014/15 (September 2014)

Module Delivered in	1 programme(s)

Module Description:	This module introduces the learner to a functional description of electronic hardware so that they may select the most appropriate technique in order to solve any particular problem. The module shows how basic subsytems combined form a hierachy of entire systems on chip. Expertise in microelectronic components is developed.

Learning Outcomes:

On successful completion of this module the learner should be able to

1. Recognise the major operational parameters of a complex integrated circuit.
2. Intelligently interpret a datasheet for a complex Integrated Circuit.
3. Design using standard circuit configurations, systems to achieve specified goals.
4. Recognise potential design defects in device loading or timing parameters.
5. Predict voltages, currents and waveforms present in these circuits using mathematical methods and software.

Module Content & Assessment

Indicative Content
JFET Symbols N-Type, P-Type, physical construction, device characteristics, transconductance, biasing, LTspice simulation.
MOSFET Symbols N-channel, P-channel, E-type, D-type, enhancement and depletion mode operation, physical construction, gate oxide, field oxide. Accumulation, depletion, inversion, threshold, MOS capacitance, W, L, Cox. Equations, calculations, graphs, operating regions, transconductance, transient analysis, LTspice simulation.
Amplfiers DC biasing, AC equivalent circuits, Differential amplifier, DC, AC analysis, design. active load, current mirror, LTspice simulation.
Operational Amplifiers Symbol, IC pin description, Ideal & Non-deal op amp behaviour, slew rate, open & closed loop operation, frequency dependant positive and negative feedback, inverting & non-inverting configuration, input impedance, output impedance, bandwidth, gain, phase margin, datasheet parameters.
Digital to Analog Conversion Binary weighted, R/2R ladder, Resolution, LSB, Accuracy, settling time, linearity. datasheet parameters, DAC applications & examples: VoIP, Audio.
Analog to Digital Conversion ADC types: Flash, Succesive approximation, Dual slope, Stair step ramp, Tracking, ADC parameters: Resolution, conversion time, least significant bit, nyquist rate, quantization error. Sample & hold circuit. Applications & examples: Temperature control system, Music recording, DSP, Data aquisition system for renewable energy source. Interpret datasheet parameters.
Operational Amplifier Circuits 555 timer, comparators, Schmitt trigger, summing amplifier, Instrumentation amplifier, active filters, voltage controlled oscillators, ring oscillator, datasheet parameters.
Case Studies Complex SMPSU, Microprocessor compatible ADC, Frequency counter IC.

Assessment Breakdown	%
Course Work	40.00%
End of Module Formal Examination	60.00%

Full Time

Course Work

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Marks Out Of*	*Pass Marks*	*Assessment Date*	*Duration*
Class Test	n/a	1,2,3,4,5	5.00	0	0	Week 8	0
Class Test	n/a	1,2,3,4,5	5.00	0	0	Week 14	0
Continuous Assessment	n/a	1,2,3,5	20.00	0	0	Week 9	0
Multiple Choice Questions	n/a	1,2,4,5	10.00	0	0	Every Second Week	0

No Project

No Practical

End of Module Formal Examination

Assessment Type	*Assessment Description*	*Outcome addressed*	*% of total*	*Marks Out Of*	*Pass Marks*	*Assessment Date*	*Duration*
Formal Exam	n/a	1,2,3,4,5	60.00	0	0	End-of-Semester	0

Reassessment Requirement
A repeat examination *Reassessment of this module will consist of a repeat examination. It is possible that there will also be a requirement to be reassessed in a coursework element.*
Reassessment Description In the case of a student having failed this module overall and having achieved less than 40% for their CA element they will be given an opportunity to repeat some recoverable elements of the CA.

DKIT reserves the right to alter the nature and timings of assessment

Module Workload & Resources

Workload: Full Time

Workload Type	Workload Description	Hours	Frequency	Average Weekly Learner Workload
Lecture	Classroom Lecture	3.00	Every Week	3.00
Directed Reading	No Description	2.00	Every Week	2.00
Independent Study	No Description	2.33	Every Week	2.33
			Total Weekly Learner Workload	7.33
			Total Weekly Contact Hours	3.00

This course has no Part Time workload.

Resources

Recommended Book Resources

Floyd T, *Electronic Fundamentals, Circuits, Devices & Applications*, Prentice Hall

Malvino A.P, *Electronic Principles*, McGraw-Hill

Allen, Philip E, *CMOS Analog Circuit Design*

R. Jacob Baker, *CMOS circuit design, layout & simulation*

Willy M.C. Sansen, *Analog Design Essentials*

Behzad Razavi, *Design of Analog CMOS Integrated Circuits*

This module does not have any article/paper resources

Other Resources

Web Resource: Linear Technology 2014, *LTspice Software*
http://www.linear.com/designtools/softwa re/?gclid=COKAr7yTlbwCFfNF2wodjCAApQ#LTs pice

Magazine: EDN*Electronic Design News*
http://www.edn.com

Website: *Lecture Notes*
http://moodle.dkit.ie

Module Delivered in

Programme Code	Programme	Semester	Delivery
DK_EELES_7	Bachelor of Engineering in Electrical and Electronic Systems	3	Mandatory