

ELECTRONIC SYSTEM DESIGN 3

Course code	0GBW
GU Credits	10
ECTS Credits	5
Prerequisite course(s)	Electrical Circuits 2X, 7MCV Analogue Electronics 2, 7MEV
Teaching staff (the first has overall responsibility)	Prof JMR Weaver (telephone 5656; email J.Weaver)
Approximate size of class	100 students
Semester	1

Description of course**1. Electronic Systems*****Aims***

To develop student's ability to design analogue and mixed-mode electronic systems.

Objectives***Understanding***

The sources of DC error in opamp based circuits. The role of interconnection and grounding in system design. Why differential amplification is often necessary. The origins of broadband noise in amplifier circuits and the difference between correlated and uncorrelated noise sources.

Knowledge

DC limitations of operational amplifiers. Basic circuits and operation of differential and instrumentation amplifiers. Effect of ground currents on circuit operation. Simple noise models.

Skills

Design of precision and low-noise analogue signal processing and conditioning systems. Design of elementary mixed-mode systems by rational ground design and the appropriate use of differential amplification.

Syllabus

Analogue systems: Offset and bias; Sources, specification, effects and design. Simple noise models. Detection of signals in the presence of noise: signal to noise ratio, noise bandwidth and effect on systems performance. Ground impedance, layout and bounce problems. Differential and instrumentation amplifiers. Common mode and differential gain. Advantages of instrumentation amplifier. Use of differential amplification for floating signal sources and elimination of common-mode signals. Mixed mode analogue/digital circuits. Simple instrumentation systems: resolution and accuracy, effect of offsets and noise.

2. Design Exercise***Syllabus***

Design exercises in precision circuit design and instrumentation amplifier design. Two

exercises individually assessed by formal design.

Recommended books

Authors	Title, edition	Publisher	Year	ISBN	Cost	Code
A S Sedra and K C Smith	Microelectronic Circuits (4 ed)	Oxford	1998	0195116909	£34	C
S Franco	Design with Operational Amplifiers and Analog Integrated Circuits (2 ed)	McGraw-Hill	1998	0071157220	£25	C

Codes : A = compulsory; B = strongly recommended; C = recommended; D = wider reading

Study times

Type	Hours
Lectures and tutorials	20
Design exercises	10
Tutorial sheets	15
Review and consolidation of course material	40
Final revision and examination	15

These times are a rough estimate of the work required by a typical student. There will be variations between individuals, but you will run the risk of failure if you spend significantly less time on this course than these guidelines suggest.

Assessment

Components of assessment

%	Type	Details
10	Two design assignments	Two design exercises presented in a structured report.
90	Degree examination	90 minute paper: Section A compulsory (40%), choice of 2 from 3 questions in Section B (60%).

The degree examinations are held in weeks 13 to 14; a resit is available in August/September.