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MODULE DESCRIPTOR

Module Title

Advanced Electronics

| | | | |
|-----------|----------------|-------------|---------|
| Reference | EN4512 | Version | 5 |
| Created | July 2017 | SCQF Level | SCQF 10 |
| Approved | March 2004 | SCQF Points | 15 |
| Amended | September 2017 | ECTS Points | 7.5 |

Aims of Module

To provide the student with the ability to analyse, synthesise, simulate and implement complex electronic systems.

Learning Outcomes for Module

On completion of this module, students are expected to be able to:

- 1 Design high-frequency, wide-band circuits.
- 2 Analyse and design electronic systems taking noise and associated effects, including EMC-compliance, into consideration.
- 3 Appreciate the principles of high-speed digital design.
- 4 Analyse and design HDL-based digital systems.
- 5 Design, synthesise and report on digital systems using an HDL/FPGA-based approach.

Indicative Module Content

High frequency transistor models, circuits employing wideband discrete and integrated devices, layout design considerations for high frequency. Circuit noise sources and associated effects on electronic systems. Noise estimation techniques and mitigating measures. Interference and compatibility between systems, including EMC considerations. Principles of high-speed digital circuit design, reliability issues, system minimisation. HDL design flow: system design and synthesis using HDL and software tools. System-level design of complex digital designs, SoC, IP blocks, implementation using Field Programmable devices (e.g. FPGA).

Module Delivery

This is a predominantly lecture-based course supplemented with tutorial sessions. The HDL content is lab-based.

| Indicative Student Workload | Full Time | Part Time |
|---|-----------|-----------|
| Contact Hours | 39 | 39 |
| Non-Contact Hours | 111 | 111 |
| Placement/Work-Based Learning Experience [Notional] Hours | N/A | N/A |
| TOTAL | 150 | 150 |
| Actual Placement hours for professional, statutory or regulatory body | | |

ASSESSMENT PLAN

If a major/minor model is used and box is ticked, % weightings below are indicative only.

Component 1

| | | | | | |
|--------------|---|------------|-----|--------------------|---|
| Type: | Coursework | Weighting: | 30% | Outcomes Assessed: | 5 |
| Description: | Component 1 is a coursework which is based on a laboratory design exercise, with preparatory and practical progress recorded in a logbook, and the submission of a final formal report. | | | | |

Component 2

| | | | | | |
|--------------|---|------------|-----|--------------------|------------|
| Type: | Examination | Weighting: | 70% | Outcomes Assessed: | 1, 2, 3, 4 |
| Description: | Component 2 is a closed book examination. | | | | |

MODULE PERFORMANCE DESCRIPTOR

Explanatory Text

To pass the module, you must achieve at least a 40% weighted average mark in the exam and coursework. In addition you need to achieve at least 35% in both the individual exam and coursework Components.

| Module Grade | Minimum Requirements to achieve Module Grade: |
|--------------|--|
| A | >70% |
| B | 60-69% |
| C | 50-59% |
| D | 40-49% |
| E | 35-39% |
| F | 0-34% |
| NS | Non-submission of work by published deadline or non-attendance for examination |

Module Requirements

| | |
|--------------------------|--|
| Prerequisites for Module | Electronics 3 (EN3512), or its equivalent. |
| Corequisites for module | None. |
| Precluded Modules | None. |

ADDITIONAL NOTES

An Indicative Bibliography will normally reference the latest edition of a text. In some cases, older editions are equally useful for students and therefore, those are the editions that may be stocked.

INDICATIVE BIBLIOGRAPHY

- 1 BEASLEY, J.S. and MILLER, G.M., 2014. Modern Electronic Communication. 9th ed. Essex: Pearson.
- 2 JOHNSON, H. and GRAHAM, M., 1993. High Speed Digital Design. 2nd ed. Upper Saddle River, NJ: Prentice Hall.
- 3 ROTH, C.H., 2017. Digital Systems using VHDL. 3rd ed. Boston, MA: PWS Publishing.
- 4 SEDRA, A.S. and SMITH, K.C., 2014. Microelectronic Circuits. 7th ed. New York, NY: Oxford University Press.
- 5 WILLIAMS, T., 2016. EMC for Product Designers. 5th ed. Oxford: Newnes.