



Prifysgol Cymru
Y Drindod Dewi Sant
University of Wales
Trinity Saint David

MODULE DIRECTORY

LEVEL 5 – Electronics Pathways

SCHOOL OF APPLIED COMPUTING

FACULTY OF ARCHITECTURE COMPUTING AND ENGINEERING

2018-2019

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INTRODUCTION

This Module Directory includes all the modules for Level 5 Electronics within the School of Applied Computing in the academic year 2018-2019.

This directory accompanies the Programme of Study Handbook, which will provide you with details of which modules you will be studying for your programme this year in the 'Programme of Study' section. This directory may include modules that are running on other programmes of study within your School/Faculty. If you require assistance in identifying the modules for your programme of study, please contact the Programme Director (whose name and contact details are provided in the accompanying Programme of Study Handbook), or the relevant Faculty Office.

The University has made every effort to make the information as full and as accurate as possible, but you should note that minor changes in the organisation of modules between the planning stage and the actual teaching are inevitable. We shall try to keep any such changes to a minimum, and you will receive plenty of advance warning in the event of any alteration. We would also be grateful if you would let us know about any changes that you think might be helpful if introduced into future handbooks.

MODULES

MODULE CODE: ACDA5000
TITLE: Communications and Protocols
DATED: 16/08/2018

LEVEL: 5
CREDITS: 20

JACS CODE: H610

AIM(S)

To equip students with a critical understanding of both digital communications and digital signal processing systems. A detailed understanding of digital modulation techniques along with relevant digital signal processing methods will be developed along with a knowledge that will equip the student with the skills needed to design, analyse and simulate digital signal processing and digital communications systems.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

1. demonstrate detailed knowledge and critical understanding of the theoretical concepts of digital signal processing and digital communications systems;
2. demonstrate a critical analysis of information through the use of system level simulation software.

INDICATIVE CONTENT

- Digital signal processing: signals and sequences, the sampling theorem and digital convolution
- Spectrum Analysis: The Discrete and Fast Fourier Transforms
- Moving average and windowed FIR filter design and implementation, simulation of filters and DSP concepts.
- Signals and Channels: Wireless channel characteristics including, Gaussian, Rayleigh and Rician noise
- Digital Communications: Modulation methods, error detection and correction, signals and noise considerations.
- Baseband pulse transmission: PAM, sampling theorem, TDM, FDM, binary signalling, eye diagrams, PCM
- Communications Protocols: Modbus, Fieldbus, PFOFIBUS, IoT Protocols, Zigbee, LonTalk, CAN, VAN, LIN, R2232, Rs485 etc
- Digital modulation and demodulation: ASK, PSK, FSK, QPSK, MSK, spread spectrum (CDMA TDMA etc.).
- Coding: Channel and source coding, information theory.
- Legal aspects of spectrum use

LEARNING AND TEACHING STRATEGY

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	60	30%
Independent learning	140	70%
Placement learning	0	0%
TOTAL	200	100%

ASSESSMENT

Assessment Component 1

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Essay	2000 words	50%

Assessment Component 2

☒ Written exam ☐ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Exam	2 hours	50%

Assessment Summary

Activity type	Percentage
Written exam	50%
Coursework	50%
Practical	0%
TOTAL	100%

READING LIST

Module Code	ACDA5000	
Module Title	Communications and Protocols	
Classification	Reading List entry	Electronic*
Essential	Michael Parker Digital Signal Processing 101: Everything You Need to Know to Get Started 26 Jun 2017	☒
Essential	Louis E. Frenzel, Principles of Electronic Communication Systems – 16 Mar 2016	☒
Essential	Bernard Sklar, Digital Communications: Pearson New International Edition: Fundamentals and Applications 6 Aug 2013 by	☒
Further	Communication Systems Paperback – 8 May 2009 by Simon Haykin (Author), Michael Moher (Author)	☐
Further	Communication Networks in Automation: Bus Systems. Components. Configuration and Management. Protocols. Security Hardcover – 1 Oct 2018 by Ricarda Koch (Author), Ralph Luftner (Author)	☐
Further	Communication Systems for Electrical Engineers (Springer Briefs in Electrical and Computer Engineering) Paperback – 7 Jan 2018 by Mohammad A. Matin (Author)	☐
Further	Problem-Based Learning in Communication Systems Using MATLAB and Simulink (IEEE Series on Digital & Mobile Communication) Hardcover – 15 Apr 2016 by Kwonhue Choi (Author), Huaping Liu (Author)	☐
Further	The Essential Guide to Digital Signal Processing (Essential Guide Series) (Essential Guides (Prentice Hall)) Paperback – 15 May 2014 Richard G. Lyons (Author), D. Lee Fugal (Contributor)	☐
Further	IEEE Communications Magazine	☒
Further	IEEE Signal Processing Magazine	☒
Further	http://www.mathworks.co.uk	☒

MODULE CODE: ACDA5001
TITLE: Electrical Engineering
DATED: 16/08/2018

LEVEL: 5
CREDITS: 20

JACS CODE: H610

AIM(S)

To develop a knowledge of circuit theory and principles and a critical understanding and analysis of AC and DC electrical and electronic systems.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

1. Critically analyse and evaluate AC and DC electrical circuits and systems including Three Phase Systems
2. Perform critical analysis and detailed simulation of relevant circuits.

INDICATIVE CONTENT

- Circuit theorems and application to complex AC & DC networks and electronic circuits.
- Complex Power calculations
- Power Factor and Power Factor Correction
- Maximum Power Transfer for resistive and reactive circuits.
- Three Phase circuits.
- Star-Delta and Delta –Star transformations.
- Equivalent circuits for transformers
- Complex wave analysis
- Laplace Transforms

LEARNING AND TEACHING STRATEGY

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	60	30%
Independent learning	100	70%
Placement learning	0	0%
TOTAL	200	100%

ASSESSMENT

Assessment Component 1

(Tick one)

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Essay	2000 Words	50%

Assessment Component 2

☒ Written exam ☐ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Exam	2 Hours	50%

Assessment Summary

Activity type	Percentage
Written exam	50%
Coursework	50%
Practical	0%
TOTAL	100%

READING LIST

Module Code	ACDA5001	
Module Title	Electrical Engineering	
Classification	Reading List entry	Electronic*
Essential	Nilsson, J and Riedel, S., <i>Electric Circuits,n</i> , Prentice Hall (2014)	☒
Essential	Bird J. <i>Electrical Circuit Theory and Technology,,</i> Newnes (2017)	☒
Essential	Bird J. <i>Electrical and Electronic Principles and</i>	☒

	<i>Technology</i> , Newnes. (2017)	
Further	Cathey, J.J., <i>Schaum's Outline of Electronic Devices and Circuits, Second Edition</i> , Schaum's Outline Series (2011)	☐
Further	Agarwal, A and Lang, J., <i>Foundations of Analog and Digital Electronic Circuits</i> , The Morgan Kaufmann Series in Computer Architecture and Design (2005)	☐

MODULE CODE: ACDA5002
TITLE: Electronics I
DATED: 16/08/2018

LEVEL: 5
CREDITS: 20

JACS CODE: H610

AIM(S)

To build on the basic component level theory previously studied, and thus provide the student with knowledge of how these components are utilized in real life scenarios as functional building blocks or as parts of holistic working systems, with emphasis given to design solutions based on embedded microcontroller/microprocessors.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

1. Demonstrate and critically analyse the deployment of discrete components and microcontrollers in the design of functional building blocks and complete circuits.
2. Critically evaluate existing designs and be able to understand and effectively communicate how they function.

INDICATIVE CONTENT

- Design of simple linear power supplies. Single, Split and multi rail.
- SMPS principles. Buck, Boost configurations etc.
- DC Power Control. Using e.g. PWM techniques.
- AC Power Control. Using e.g. phase angle firing.
- Data acquisition via custom devices/modules
- Serial and Parallel bus interfacing.
- System Input, Output and UI design considerations.
- Case studies of existing embedded system designs.

LEARNING AND TEACHING STRATEGY

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	60	30%
Independent learning	140	70%
Placement learning	0	0
TOTAL	200	100%

ASSESSMENT

Assessment Component 1

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Assignment	2,000 words	60%

Assessment Component 2

☐ Written exam ☐ Coursework ☒ Practical

Mode of assessment	Volume	Weighting
Timed Lab exercise	2 hr timed session	40%

Assessment Summary

Activity type	Percentage
Written exam	0%
Coursework	60%
Practical	40%
TOTAL	100%

READING LIST

Module Code	ACDA5002	
Module Title	Electronics 1	
Classification	Reading List entry	Electronic*
Essential	Horowitz, P. and Hill, W, (2015), The Art of Electronics, Cambridge University Press	☒
Essential	Scherz, P &, Monk, S (2016), Practical Electronics for Inventors, Mc Graw Hill	☒
Further	Embedded Control Handbook – Microchip Technologies http://ww1.microchip.com/downloads/cn/devicedoc/cn_00711a.pdf	☐
Further	Elektor – Electronics design Magazine. UWTSD Owen Library.	☐

MODULE CODE: ACDA5003
TITLE: Enterprise & Innovation Group Project
DATED: 16/08/2018

LEVEL: 5
CREDITS: 20

JACS CODE: I310

AIM(S)

The module develops the student's innovation entrepreneurship and employability skills by enabling them to work in teams to apply and develop their skills and knowledge to create an innovative prototype, new product business plan and professional pitch presentation.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

1. Demonstrate a sound understanding of enterprise & innovation concepts by evaluating and documenting a vital contribution to an innovative business opportunity.
2. Work as part of a team to design and implement a practical solution and pitch a new business initiative.

INDICATIVE CONTENT

- Creativity & Innovation
- Market research and analysis
- New product design and specification
- Cost analysis, prediction and pricing
- Project planning skills
- Prototype development methods
- New product / Business planning
- Business Types and Strategy
- Marketing
- Financial planning and management
- Operation and production planning
- Professional legal and ethical considerations
- Report writing & Presentation skills
- Organisation and self-motivation skills
- Team working skills
- Use of relevant hardware and software tools.

LEARNING AND TEACHING STRATEGY

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	60	30%
Independent learning	140	70%
Placement learning		
TOTAL	200	100%

ASSESSMENT

Assessment Component 1

☐ Written exam ☐ Coursework ☒ Practical

Mode of assessment	Volume	Weighting
Interim Presentation	10 minutes	20%

Assessment Component 2

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Report	1500 words	40%

Assessment Component 3

☐ Written exam ☐ Coursework ☒ Practical

Mode of assessment	Volume	Weighting
Final Presentation	15 minutes	40%

Assessment Summary

Activity type	Percentage
Written exam	0
Coursework	40%
Practical	60%
TOTAL	100%

READING LIST

Module Code	ACDA5003	
Module Title	Enterprise & Innovation Group Project	
Classification	Reading List entry	Electronic*
Essential	McKeown, M. (2014) The Innovation Book: How to Manage Ideas and Execution for Outstanding Results (The X Book), FT Publishing International.	☒
Essential	Williams, S (2016) (30th Ed.), The FT Guide to Business Start Up 2017/18: The Most Comprehensive Guide for Entrepreneurs, FT Publishing International.	☒
Further	Barringer, B. R. (2015) (4th Ed.), Entrepreneurship, Pearson.	☐
Further	Ries, E. (2011) The Lean Startup: How Constant Innovation Creates Radically Successful Businesses, Portfolio Penguin.	☐

Further	Kerzner, H, (2017) Project Management: A Systems Approach to Planning, Scheduling, and Controlling, Wiley.	☐
Further	Brechner, E (2015) Agile Project Management with Kanban, Microsoft Press.	☐
Further	Haber, J. (2016) The Business of Good: Social Entrepreneurship and the New Bottom Line, Entrepreneur Press.	☐
Further	Gelobter, M (2015) Lean Startups for Social Change: The Revolutionary Path to Big Impact, EDS Publications Ltd.	☐
Further	Curedale, R (2016) (3rd Ed.), Design Thinking Process and Methods, Design College Inc.	☐
Further	Lewrick, M et. Al. (2018) The Design Thinking Playbook: Mindful Digital Transformation of Teams, Products, Services, Businesses and Ecosystems, John Wiley & Sons.	☐
Further	Horowitz, P. & Hill, W, (2015) The Art of Electronics, Cambridge University Press.	☒
Further	Scherz, P &, Monk, S, (2016) Practical Electronics for Inventors, Mc Graw Hill.	☒
Further	Cowan, A. (2012) Starting a Tech Business: A Practical Guide for Anyone Creating or Designing Applications or Software, John Wiley & Sons.	☐
Further	Waite, R (2015) Online Business Startup: The entrepreneur's guide to launching a fast, lean and profitable online venture, Rethink Press Limited.	☐
Further	Elektor magazine	☐
Further	Electronics World Magazine	☐
Further	Websites: www.entrepreneur.com www.entrepreneurship.org www.isbe.org.uk www.jsbe.com www.ft.com/management/entrepreneurship www.bytestart.co.uk www.gov.uk	☒
Further	Journals: Journal of Small Business and Entrepreneurship Journal of Business Venturing Journal of Small Business Management Small Business Economics The Journal of Product Innovation Management.	☒

MODULE CODE: ACDA5004
TITLE: Project Management and Research Methods
DATED: 16/08/2018

LEVEL: 5
CREDITS: 20

JACS CODE: I100

AIM(S)

- To provide students with a critical awareness of the contemporary challenges facing IT managers and the key decisions they must take in order to satisfy the principal stakeholders to create quality systems within the promised timescale and budget. The student will be able to critically appreciate the importance of professional conduct and consider the ethical and legal issues facing IT personnel.
- To underpin academic research and the third year major project, and to provide students with a comprehensive and systematic understanding of the knowledge and skills needed to collect, interpret, analyse, synthesise and present data using appropriate research methods. The module will extend the student's technical expertise in information systems development such that s/he is able to evaluate the suitability of different development methods for different situations.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

1. Evaluate project management methods and techniques, and demonstrate an appreciation of the legal and ethical issues, including sustainability.
2. Demonstrate a critical awareness and systematic understanding of a range of contemporary project management techniques while working as a member of a team.
3. Review critically the current research literature pertinent to a research topic and communicate the results of the research to specialist and non-specialist audiences.
4. Demonstrate a sound understanding of research and development strategies and use these to produce a proposal suitable for a Major Project that meets ethical and sustainability guidelines.

INDICATIVE CONTENT

- Understanding the roles and responsibilities within project teams and the management of people and change.
- Ethical, legal and professional responsibilities incumbent on IS/IT managers, e.g. intellectual property, data protection, codes of practice (BCS), legal frameworks, contracts.
- Resourcing alternatives: for example, outsourcing, developing bespoke software or purchasing sophisticated software packages (such as enterprise systems)
- Project Planning: Function Point Analysis (FPA), Critical Path Analysis (PERT, CPM), Gantt Charts, Work Breakdown Structures (WBS).
- Concepts of Quality Management: quality assurance, quality control methods, quality standards.
- Factors influencing project success or failure
- Risk management: health and safety, sustainability and green drivers for project success

- BCS guidelines on Green and Sustainable IT
- Financial appraisal methods, e.g. payback, discounted cash flow
- Research principles and approaches (e.g. the research process, purpose, sources of data including primary/secondary research, quantitative/qualitative data, objective/hypothesis formation, reliability, validity, generalisability)
- Research design strategies, (e.g. experiments, surveys, case studies), their advantages and limitations, and their suitability to a variety of research contexts
- Data collection & sampling methods (e.g. interviews, questionnaires, observation), and their advantages and limitations in a variety of contexts
- Developing and structuring a research proposal: problem identification, formulating aims/hypotheses, sampling, sustainability and ethical issues and the practicalities of design
- Referencing conventions (e.g. the Harvard system, numeric system, IEEE)
- Critical, analytical thinking and writing

LEARNING AND TEACHING STRATEGY

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	60	30%
Independent learning	140	70%
Placement learning	0	0%
TOTAL	200	100%

ASSESSMENT

Assessment Component 1

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Essay	2500 words	50%

Assessment Component 2

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Research Proposal	2500 words	50%

Assessment Summary

Activity type	Percentage
Written exam	0%
Coursework	100%
Practical	0%
TOTAL	100%

READING LIST

Module Code	ACDA5004	
Module Title	Project Management and Research Methods	
Classification	Reading List entry	Electronic*
Essential	Hughes, B. (2015), 5 th Edition <i>Project Management for IT-Related Projects</i> , british Computer Society	☒
Essential	Marder, M. (2011) <i>Research Methods for Science</i> , Cambridge University Press: Cambridge.	☒
Essential	Weaver, P. (2004) <i>Success in Your Project: a Guide to Student System Development Projects</i> , Prentice Hall: Harlow	☒
Further	Newton, R. (2016), <i>Project Management Step by Step</i> , FT Publishing International	☒
Further	Dobson, M.S. (2010) <i>Creative Project Management</i> . McGraw-Hill	☒
Further	Larson, E.W. (2017) 7 th Edition, <i>Project Management</i> . McGraw-Hill	☐
Further	Sommerville, Ian (2015) <i>Software Engineering</i> , Global Edition, Pearson Education	☒
Further	Teagarden, David (2015) <i>Systems Analysis and Design: An Object-Oriented Approach with UML</i> 5th Edition, Wiley	☐
Further	Baase, S. (2008) 3 rd Edition <i>A Gift of Fire: Social, Legal, and Ethical Issues for Computing and the Internet</i> : International Edition, Pearson: NY	☒
Further	Klein, G. and Dabney, A. (2013) <i>The Cartoon Guide To Statistics</i> , Hill and Wang: NY.	☒
Further	Quinn, M. J. (2009) 3 rd Edition, <i>Ethics for the Information Age: International Edition</i> , Pearson: NY	☒
Further	http://www.acm.org	☒
Further	http://www.ieee.org	☒
Further	http://www.bcs.org	☒
Further	http://www.theregister.co.uk	☒

MODULE CODE: ACDA5005
TITLE: Smart and Connected Devices I
DATED: 16/08/2018

LEVEL: 5
CREDITS: 20

JACS CODE: H610

AIM(S)

Apply web technology to condition monitoring and control of IoT sensors and actuators.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

1. Implement an Internet of Things sensor/actuator and server link
2. Apply appropriate methods and tools to create suitable management and monitoring software

INDICATIVE CONTENT

- Internet of Things – Real World Interfaces
 - o Devices (hubs/controllers/microcontroller devices, sensors, actuators)
 - o Device operation – polled and interrupt driven interfaces
- Internet of Things – Transfer of Information
 - o Routers, modems and communications devices
 - o App based communications over IP and TCP/IP
 - o Mobile phone applications in control of actuators and use of sensor information
- Internet of Things – Servers and the middle tier
 - o Server side scripting – Apache & PHP, WAMP
 - o Databases interfacing, data management
- Internet of Things - User Interfaces and information display – CSS3, HTML5 and PHP
 - o Usability and information presentation
- Internet of Things - security

LEARNING AND TEACHING STRATEGY

Supporting self-study material may be used.

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	60	30%
Independent learning	140	70%
Placement learning	0	0%
TOTAL	200	100%

ASSESSMENT

Assessment Component 1

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Simulation and Report	2500 words	50%

Assessment Component 2

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Web based IoT Application and Report	2500 words	50%

Assessment Summary

Activity type	Percentage
Written	0%
Coursework	100%
Practical	0%
TOTAL	100%

READING LIST

Module Code	ACDA5005	
Module Title	Smart and Connected Devices I	
Classification	Reading List entry	Electronic*
Essential	IEEE Communications Society, Internet of Things Journal	☒
Further	Greengard, S, (2005), The Internet of Things (MIT Press Essential Knowledge) The MIT Press Essential Knowledge series)	☒
Further	Schwartz, M, (2016) Internet of Things with Arduino Cookbook, Packt Publishing	☒

Further	www.w3schools.com	☒
Further	Proteus User Guide	☒

MODULE CODE: ACDA5006
TITLE: Transducers and Signal Conditioning
DATED: 16/08/2018

LEVEL: 5
CREDITS: 20

JACS CODE: H610

AIM(S)

- To provide the student with knowledge of various types of transducers and the understanding of their application.
- To provide the student with the skills and understanding of various signal conditioning techniques and their application.

LEARNING OUTCOMES

Upon the successful completion of this module, the student should be able to:

1. Demonstrate a knowledge of a wide range of transducers be able to select an appropriate transducer for a given parameter and scale.
2. Demonstrate a knowledge of signal conditioning techniques and be able to apply a suitable design technique to the implementation of a given transducer signal.

INDICATIVE CONTENT

- Transducers / Sensors
 - o Thermistors, thermocouples, infrared temperature sensors, light dependant resistors, photo diodes, photo transistors. Optical Sensors beam break / reflective, Hall effect sensors, strain gauges.
- Dynamic transducers
 - o Altimeters, accelerometers, gyroscopes.
- Passive signal conditioning.
- Active signal conditioning – amplification and attenuation.
- Standard operational amplifier configurations and applications.

LEARNING AND TEACHING STRATEGY

The study time for the module is divided as follows:

Activity type	Hours	Percentage
Scheduled learning	60	30%
Independent learning	140	70%
Placement learning	0	0%
TOTAL	200	100%

ASSESSMENT

Assessment Component 1

☐ Written exam ☒ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Report	2500 words	50%

Assessment Component 2

☒ Written exam ☐ Coursework ☐ Practical

Mode of assessment	Volume	Weighting
Exam	2 Hours	50%

Assessment Summary

Activity type	Percentage
Written exam	50%
Coursework	50%
Practical	0%
TOTAL	100%

READING LIST

Module Code	ACDA5006	
Module Title	Transducers and Signal Conditioning	
Classification	Reading List entry	Electronic*
Essential	Horowitz, P. and Hill, W, (2015), The Art of Electronics, Cambridge University Press	☒
Essential	Sinclair, I (2014), Sensors and transducers, Newnes ISBN 0434901814	☐
Further	Wobschall, D, (1987), Circuit design for electronic instrumentation, Mc Graw Hill	☐

Further	Murty, D, (2011) Transducers and Instrumentation, PHI Learning	☒
Further	Patranabis, D (2011), Sensors and Transducers, PHI Learning	☐