15 School of Computing

CO832	Data Mining and Knowledge Discovery					
Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
2	Canterbury	Spring	M	15 (7.5)	80% Exam, 20% Coursework	

Contact Hours

Total contact hours: 22 hours
Private study hours: 128 hours
Total study hours: 150 hours

Department Checked

Yes

Learning Outcomes

The intended subject specific learning outcomes.
On successfully completing the module students will be able to:
1 Explain the differences between the major data mining tasks, in terms of their assumptions, requirement for a specific kind of data, and the different kinds of knowledge
discovered by algorithms performing different kinds of task.
2 Describe data mining algorithms for the major data mining tasks.
3 Identify which data mining task and which algorithm is the most appropriate for a given data mining project, taking into account both the nature of the data to be mined
and the goals of the user of the discovered knowledge.
4 Use a state-of-the-art data mining tool in a principled fashion, being aware of the strengths and weaknesses of the algorithms implemented in the tool.
5 Evaluate the quality of discovered knowledge, taking into account the requirements of the data mining task being solved and the goals of the user.
6 Describe the main tasks and algorithms involved in the preprocessing and postprocessing steps of the knowledge discovery process.
7 Utilize the library and exploit web sites to support investigations into these areas.

The intended generic learning outcomes.
On successfully completing the module students will be able to:
1 Understand the major kinds of data mining tasks and the main kinds of algorithms that are often used to solve these tasks.
2 Understand the strengths and weaknesses of some data mining algorithms, identifying the kind of algorithm that is most appropriate for each data mining problem.
3 Understand the process of knowledge discovery, involving not only data mining but also preprocessing and post-processing steps

Method of Assessment

Main assessment methods
20% Coursework and 80% Examination

One exercise with a data mining tool 10%
One Short Essay (about 1,000 words) 10%
Examination 80%

Reassessment methods
Like for like.

Preliminary Reading

Witten, IH, Frank, E, Hall, MA, Pal, CJ (2016). Data Mining: practical machine learning tools and techniques, 4rd edition. Morgan Kaufmann.
Tan, P-N, Steinbach, M, Karpatne, A, Kumar, V (2018) Introduction to Data Mining, Pearson, 2nd edition.

Pre-requisites

Pre-requisite: knowledge of programming such as that provided by COMP3200 Introduction to Object-Oriented Programming
COMP8710 Advanced Java for Programmers
COMP8820 Advanced Object-Oriented Programming or
COMP8210 Programming for Data Handling

Synopsis *

This module explores a range of different data mining and knowledge discovery techniques and algorithms. You learn about the strengths and weaknesses of different techniques and how to choose the most appropriate for any particular task. You use a data mining tool, and learn to evaluate the quality of discovered knowledge.

CO834 Trust, Security and Privacy Management

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
4	Canterbury	Spring	M	15 (7.5)	70% Exam, 30% Coursework	
5	Canterbury	Spring	M	15 (7.5)	50% Coursework, 50% Exam	
6	Canterbury	Spring	M	15 (7.5)	50% Coursework, 50% Exam	

Contact Hours

Total contact hours: 42
Private study hours: 108
Total study hours: 150

Learning Outcomes

On successfully completing the module students will be able to:
1 Demonstrate systematic understanding of the importance of taking a systems-wide approach to maintaining cyber security, and the role of security risk management.
2 Comprehensively understand the motivation, design, operation and management of modern systems for security management, including awareness of relevant human
factors especially usability issues.
3 Show familiarity of legal issues on security and data protection, and relevant security (management) standards.
4 Analyse and evaluate critically the security and data protection requirements of an organisation.
5 Apply and critically modern security by design principles to develop solutions to real world secure systems problems.
6 Demonstrate awareness of appropriate processes, techniques and tools for developing and managing security systems.
7 Understand the basis of business continuity planning and management, and cyber resilience.

Method of Assessment

50% Coursework and 50% Examination

Group presentations (20%)
Final essay (30%)
Examination, 2 hours (50%)

Preliminary Reading

Taylor, A., Alexander, D., Finch, A. and Sutton, D., "Information Security Management Principles", 2019, 3rd edition, BCS.
Calder, A. and Watkins, S., "IT governance: an international guide to data security and ISO27001/ISO27002", 2019, 7th edition, Kogan Page.
Sutton, D., "Information Risk Management: A practitioner's guide," 2014, BCS.

Pre-requisites

None.

Synopsis *

This module investigates the whole process of information security management and associated activities including the concepts used and practices prescribed by relevant standards, such as those defined by ISO/IEC. A holistic view of information security management is taken, including risk management, the formulation of security policies, business continuity and resilience.
Technical subjects include a description of the various security models, and showing how authorisation policies can be automatically enforced. The legal and data protection issues associated with information management are also addressed, as are the usability issues of security technologies.

CO836 Cognitive Neural Networks

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
2	Canterbury	Autumn	M	15 (7.5)	70% Exam, 30% Coursework	

Contact Hours

Total contact hours: 46
Private study hours: 104
Total study hours: 150

Learning Outcomes

The intended subject specific learning outcomes.
On successfully completing the module students will be able to:
1 Describe what is meant by neural networks, list a number of types of network and give a brief description of each together with some examples of their (actual or potential) applications.
2 Select the appropriate neural network paradigm for a particular problem and be able to justify this choice based on knowledge of the properties and potential of this paradigm. To be able to compare the general capabilities of a number of such paradigms and give an overview of their comparative strengths and weaknesses.
3 Explain the mathematical equations that underlie neural networks, both the equations that define activation transfer and those that define learning.
4 Analyse cognitive and neurobiological phenomena from the point of view of their being computational systems. To be able to take these phenomena and identify the features which are important for computational problem solving.
5 Simulate and understand neural networks using state of the art simulation technology and apply these networks to the solution of problems. In particular, to select from the canon of learning algorithms which is appropriate for a particular problem domain.
6 Discuss examples of computation applied to neurobiology and cognitive psychology, both in the instrumental sense of the application of computers in modelling and in the sense of using computational concepts as a way of understanding how biological and cognitive systems function.
7 To have a detailed knowledge of an advanced specialised topic in cognitive neural networks. Furthermore, the student should be able to explain the key details of one or more of these specialised topics.
8 To have the capacity to engage with the research literature in Computational Neuroscience.

The intended generic learning outcomes.
On successfully completing the module students will be able to:
1 Group work.
2 Time management and organisation.
3 Communication skills.
4 Problem solving.
5 Analytical skills.
6 Independent study and appropriate use of resources, e.g. the library, online resources and internet sites.

Method of Assessment

Main assessment methods
30% Coursework and 70% Examination

Two simulation assessments (15% total)
Talk in workshop (15%)
Examination (70%)

Reassessment methods
Like for like

Preliminary Reading

O'Reilly, R.C. and Munakata, Y. (2000) Computational Explorations in Cognitive Neuroscience, Understanding the Mind by Simulating the Brain. A Bradford Book, MIT Press.
Rumelhart, D.E., McClelland J.L. and the PDP Research Group (1986) Parallel Distributed Processing, Volume 1: Foundations. MIT Press.
Rumelhart, D.E., McClelland J.L., and the PDP Research Group (1986) Parallel Distributed Processing, Volume 2: Psychological and Biological Models. MIT Press.
Bechtel, W. and Abrahamson, A. (2002) Connectionism and the Mind, Parallel Processing Dynamics and Evolution of Networks. Blackwell Publishers.
Haykin, S. (1999) Neural Networks, A Comprehensive Foundation. Prentice Hall International Edition.
Bishop, C.M. (1995) Neural Networks for Pattern Recognition. Oxford University Press.
Ellis, R. and Humphreys, G. (1999) Connectionist Psychology, A Text with Readings. Psychology Press Publishers.

Pre-requisites

None

Synopsis *

Neural networks will be placed into a historical perspective related to neuro-biology and in the context of the artificial intelligence hypothesis. Students will familiarise themselves with the Leabra/Emergent environment.

CO837 Natural Computation

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
2	Canterbury	Autumn	M	15 (7.5)	60% Exam, 40% Coursework	

Contact Hours

Total contact hours: 22
Private study hours: 128
Total study hours: 150

Department Checked

Yes.

Learning Outcomes

The intended subject specific learning outcomes.
On successfully completing the module students will be able to:
1 To be able to describe what is meant by a natural computation paradigm, list a number of natural computing paradigms and give a brief description of each together with
some examples of their (actual or potential) applications.
2 To be able to select the appropriate technique for a particular problem from a set of problem-solving heuristics based on these natural computing paradigms, and to be
able to justify this choice based on a knowledge of the properties and potential of these methods. To be able to compare the general capabilities of a number of such
methods and give an overview of their comparative strengths and weaknesses.
3 To be able to analyse phenomena from the natural world from the point of view of their being computational systems. To be able to take these phenomena and distinguish
between the features which are important for computational problem solving and those that are merely a fact of their realization in the natural world.
4 To be able to implement a natural computation system on the computer, and apply this program to the solution of problems.
5 To be able to exploit library and online resources to support investigations into these areas.

Method of Assessment

Main assessment methods
60% Examination, 40% Coursework

Preliminary Reading

Eiben, AE, Smith, JE. (2015) Introduction to Evolutionary Computing, 2nd Edition. Springer.
Dorigo, M. and Stutzle, T. (2004) Ant Colony Optimization, MIT Press.
Barnes, DJ, Chu, D. (2010) Introduction to Modeling for Biosciences, Springer

Pre-requisites

An Honours degree in a computing, scientific, engineering, mathematical or other numerate discipline.

Synopsis *

There is an increasing use of nature-inspired computational techniques in computer science. These include the use of biology as a source of inspiration for solving computational problems, such as developments in evolutionary algorithms and swarm intelligence. It is therefore proposed to allow students the opportunity to become exposed to these types of methods for use in their late careers.

CO841 Computing Law, Contracts and Professional Responsibility

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
4	Canterbury	Autumn	M	15 (7.5)	50% Coursework, 50% Exam	
5	Canterbury	Autumn	M	15 (7.5)	100% Coursework	
4	Canterbury	Spring	M	15 (7.5)	50% Coursework, 50% Exam	
5	Canterbury	Spring	M	15 (7.5)	100% Coursework	

Contact Hours

Contact hours: 20
Private study hours: 130
Total study hours: 150

Learning Outcomes

The intended subject specific learning outcomes.
On successfully completing the module, students will be able to:
1 Demonstrate an advanced grounding in concepts, ethics, principles and rules of cyber security, data protection, consent and privacy in a legal context
2 Demonstrate a systematic understanding of the development of EU, UK and US laws related to cyber security, cybercrime, digital investigation, privacy and data
protection, including domestic legislation and emphasising cross-boundary issues and international efforts.
3 Critically analyse emerging legal issues in cyber security, cybercrime, privacy and data protection, for example: big data, social media, data anonymization, data access
controls, state and commercial surveillance.
4 Demonstrate a critical awareness of, and the ability to evaluate, legal and regulatory actions taken to ensure cyber security, privacy and data protection, including legal
governance and compliance requirements.
5 Demonstrate a critical understanding of the public and private tensions involved in cyber security, cybercrime, privacy and data protection.

Method of Assessment

Main assessment methods
100% Coursework

Preliminary Reading

P. Carey, Data Protection: a practical guide to UK and EU Law (Oxford University Press, 2009).
M. Johnson, Cyber Crime, Security and Digital Intelligence (ePub Ashgate, 2013).
L. Katz, (2013) 'Symposium on Cybercrime'. Journal of Criminal Law and Criminology, 103 (3).
C. Kunar, International Data Privacy Law (Oxford University Press, 2013).
D. Solove, P. Schwartz, Privacy, Information, and Technology, 3rd edition (Aspen Publishing Co., 2012).
H. Tse, Cyber Security Law and Guidance (Bloomsbury Press, 2018)

Pre-requisites

None

Synopsis *

The module will explore existing and emerging legal issues in cyber security, cybercrime, privacy and data protection, including the domestic and cross-boundary legal regulatory frames and their associated ethical dimensions. Topics covered include cybercrime, privacy and data protection, Internet and cyber surveillance, cross-border information flows, and legal structures. Students will be challenged to critically examine the ethics and management of cyber data. It will require students to assess emerging legal, regulatory, privacy and data protection issues raised by access to personal information.

CO843 Extended IT Consultancy Project

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
2	Canterbury	Spring	M	60 (30)	100% Project	

Contact Hours

Total contact hours: 16
Private study hours: 584
Total study hours: 600

Department Checked

Yes

Learning Outcomes

8. The intended subject specific learning outcomes.
On successfully completing the module students will be able to:
8.1 Formulate and evaluate technical alternatives to meet IT requirements arising from small businesses, including projects which have a medium-or large-scale impact on the processes of the business.
8.2 Estimate proposed solutions to IT-based problems in small business situations, in respect of both time and cost.
8.3 Present technical and commercial aspects of proposed solutions to IT-based problems to clients, using reasoned argument attuned to the client's level of technical understanding.
8.4 Demonstrate an ability to work to tightly-defined cost and timescale budgets, and have gained an understanding of how to respond in a professional manner to changes in client requirements, and other eventualities that raise the prospect of budget overruns.
8.5 Give evidence of detailed practical experience in applying selected areas of computing technology to meet the requirements of small enterprises.
8.6 Show experience of carrying out project work in a framework of defined procedures and processes, be able to evaluate that framework critically, and formulate practical proposals to develop that framework so as to achieve a dependably high-quality service in a cost-effective way.
8.7 Formulate costed plans for the strategic development of an IT consultancy business, and to canvass support for such plans by reasoned argument.
8.8 Manage consultancy prjects of at least medium scale through the project lifecycle.
8.9 Demonstrate a working awareness of the commercial considerations and practical steps needed for an IT consultancy to develop internally a product or service and present it for sale.

9. The intended generic learning outcomes.
On successfully completing the module students will be able to:
9.1 Explore diverse sources of information to formulate and present technical alternatives to solve a given problem, and to provide guidance to clients to allow them to decide between competing solutions within an identified framework of constraints, using criteria of evaluation that they have formulated.
9.2 Show an understanding of project management in a commercial context, including the ability to assess and manage financial, organisational, and technical risks, and the need to establish and evolve a quality management system.
9.3 Appreciate how to deal with customers in a consulting role: skills required here include communication, presentation, negotiation and (where conflict arises) conflict resolution.
9.4 Interact effectively within a team, recognise and support leadership provided by others, and be able to manage conflict in this context. Students will be able spontaneously to seek and make use of advice and feedback.
9.5 Take responsibility for their own work, including (where applicable) leadership and mentoring provided by them to other team members, and evaluate its strengths and weaknesses.
9.6 Be confident in the application of their own judgement, including developing their own criteria of evaluation, and be able to challenge received opinion.
9.7 Present ideas, arguments and results in the form of a well-structured report.

Method of Assessment

Main assessment methods
Performance evaluation (pass/fail, failure in this component means failure of the module)
Report with supporting materials and viva (100%)
Although KITC activities involve working in teams, each student is assessed on an individual basis.

13.2 Reassessment methods
Like-for-like.
In the event that reassessment isn't feasible, credit retrieval will involve undertaking an alternative project module

Preliminary Reading

● The BS EN ISO9001:2000 Standard BSi, ISBN 580368378
● John Locke, Open Source Solutions for Small Business Problems, Charles River Media 2004, ISBN 158403203
● Efraim Turban et al. Electronic Commerce: A Managerial and Social Networks Perspective, Springer Texts in Business and Economics 2016, ISBN 978-3319362700
● Mark Norris and Steve West, eBusiness Essentials: Technology and Network Requirements for Mobile and Online Markets, John Wiley 2001, ISBN 471521833
● Tom DeMarco and Timothy Lister, Waltzing with Bears: Managing Risk on Software Projects, Dorset House 2003, ISBN 0932633609

Pre-requisites

Pre-requisite: COMP8850 (CO885) Project Research.
Admission to the module is subject to interview; these interviews normally take place at the end of the Autumn Term. The admission interview will seek to determine whether a candidate meets the criteria defined in the KITC Student Consultant job description(s), which will be available to students on request.
The maximum number to be admitted to the module, and the required mix of skills, will be determined each year by the KITC management according to the commercial prospects at the time, and published in advance of the admission interviews.

Synopsis *

Students undertake several projects for the Kent IT Consultancy (KITC). Each of these will be either a commercial project for an external client, or an internal development project, e.g. developing a future service offering for the KITC.
In addition to project work, students will be expected to engage in ongoing tasks related to the operation of the consultancy, including marketing, sales and mentoring/buddying colleagues.
Each assignment will be carried out under the supervision of KITC management and in accordance with client requirements, with deliverables defined by negotiation with the client.

CO845 New Enterprise Development

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
2	Canterbury	Whole Year	M	30 (15)	100% Coursework	

Contact Hours

The module will be delivered via a series of 6 x 1-day workshops plus individual tutorials (3 hours per student) as part of a programme of 300 learning hours for the module. Teaching methods will include interactive class discussion, case studies and exercises, lectures from entrepreneurs and visiting specialists, and individual tutorial support and coaching. Workshop delivery (as opposed to conventional lectures and seminars) has proven to be more conducive to the achievement of learning outcomes and successful development and production of a high-quality business plans, and is used extensively in the university for undergraduate and postgraduate teaching, and for delivery of high-growth start-up programmes for external entrepreneurial start-ups and early-stage businesses. Teaching will take place during the Spring Term allowing time for tutorial support for the business plan development during the Summer Vacation.

Learning Outcomes

Understand the process of producing a viable business plan for a new or proposed business venture in line with models of good practice
Analyse and evaluate the business venture and strategic options to produce a practical and comprehensive business plan that is of sufficient detail and quality to be presented to a potential lender or investor
Integrate and apply the other consultancy skills and knowledge developed within the M.Sc. programme within the business proposal
Understand the issues and constraints facing prospective entrepreneurs in terms of market entry, access to finance, and protection of intellectual property
Understand the strategies for survival and growth required to successfully establish a new business. (

Preliminary Reading

Pre-requisites

None

Restrictions

This module is only available to students registered on the MSc IT Consultancy, or MSc Computing and Entrepreneurship

Synopsis *

The curriculum will include the following areas of study:
• The business plan structure and content and the importance of the business planning process.
• Initial development and evaluation of the business idea and identification of potential markets and customers.
• Identifying the appropriate management structure and potential team members, the skills and knowledge required for success, and any appropriate development needs, or professional business intervention.
• Identification of relevant Intellectual Property protection requirements and opportunities for the commercialisation of IP assets. Understanding of the processes and procedures for ensuring IP protection, and options and limitations of enforcing that protection.
• Choosing the appropriate trading status for the new business, requirements to ensure and maintain legal compliance, and policies to ensure best practice in the governance of the business.
• Market research and segmentation, competitor analysis, development of appropriate marketing strategies and distribution networks. Integration of customer care and quality monitoring systems.
• Identifying and quantifying resource requirements of the business and the implications for capital investment – physical resources (land, premises, plant & equipment, transport, materials, etc) and present and future staff requirements.
• Negotiation skills to ensure best value from suppliers, for sales and customer contracts, and for obtaining funding for the business.
• Financial planning processes: budgetary planning, cash flow and profit forecasts, break-even analysis. Formulation of financial requirements to establish the business. Credit control and financial monitoring.
• Funding requirements and capital investment - relevance of personal investment, loan capital, bank security requirements, ensuring investment readiness, accessing and bidding for business angel capital and venture capital, and managing the due diligence process.
• Obtaining share and loan capital for conventional business start-up situations, boot-strapping where funding is limited. Escalator growth funding for high-growth / high-tech companies each stage: research & development, seed-funding, development and longer-term growth.
• Implementation of the business: project planning the implementation, risk analysis of potential delays and problems, contingency plans to mitigate risks, longer-term development plans including growth and exit strategies.

CO846 Cloud Computing

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
2	Canterbury	Autumn	M	15 (7.5)	50% Coursework, 50% Exam	

Contact Hours

Total contact hours: 27
Private study hours: 123
Total study hours: 150

Learning Outcomes

8. The intended subject specific learning outcomes.
On successfully completing the module students will be able to:
8.1 Understand the concepts of web services and how service-oriented architectures are driving the virtualisation of grid/cloud resources.
8.2 Have an understanding of grid computing technology and its relation with cloud computing.
8.3 Understand virtualisation technologies and how they are used in cloud computing.
8.4 Be familiar with the general details of current cloud computing technologies.
8.5 Have an understanding of security issues in grid/cloud environments.
8.6 Be able to use a range of open source tools (hadoop etc.) in the creation of a cloud infrastructure and perform basic operations in existing grid/cloud infrastructures.

9. The intended generic learning outcomes.
On successfully completing the module students will be able to:
9.1 Identify, analyse and formulate criteria and specifications appropriate to a given problem;
9.2 Manage their own time effectively, individually or in groups, and work effectively as a member of a team;
9.3 Communicate technical issues with specialist and non-specialist audiences;

Method of Assessment

50% Examination, 50% Coursework

Preliminary Reading

Reading list (Indicative list, current at time of publication. Reading lists will be published annually)

M. Armbrust et al., "Above the Clouds: A Berkeley View of Cloud Computing", UC Berkley, 2009
T. White, "Hadoop: The Definitive Guide", O'Reilly, 2009, ISBN:978-0596521974
J. Varia, "Cloud Architectures", Amazon Web Services White Paper.
D. Sanderson, "Programming Google App Engine", O'Reilly, 2009, ISBN:978-0596522728
S.Song, K.Dong Ryu D.Silva, IBM, "Blue Eyes: Scalable and Reliable System Management for Cloud Computing", 2009

Pre-requisites

Prior knowledge of networks, security, and computer operating systems equivalent to an undergraduate degree in Computer Science or a closely related subject

Synopsis *

Cloud computing describes a new supplement, consumption, and delivery model for IT services based on the Internet, and it typically involves over-the-Internet provision of dynamically scalable and often virtualized resources. It is a by-product and consequence of the ease-of-access to remote computing sites provided by the Internet. This frequently takes the form of web-based tools or applications that users can access and use through a web browser as if it were a program installed locally on their own computer.

CO871 Advanced Java for Programmers

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
5	Canterbury	Autumn	M	15 (7.5)	100% Coursework	

Contact Hours

Total contact hours: 30
Private study hours: 120
Total study hours: 150

Learning Outcomes

The intended subject specific learning outcomes.
On successfully completing the module students will be able to:
1 Apply the principles of the object-oriented paradigm and understand its relationship to 'traditional' methods.
2 Develop (design, implement and test) OO applications in Java using encapsulation, data hiding, inheritance and polymorphism to write compact, reusable, distributable
code, and reuse existing class libraries to implement more complex and substantial programs.
3 Use online and library resources to research topics in this area, and to be able to communicate programming concepts and design ideas to other programmers.

Method of Assessment

Main assessment methods
100% Coursework

Preliminary Reading

David J. Barnes & Michael Kölling, Objects First with Java, Prentice Hall /Pearson Education, 2008 (although much of this is introductory, the book is excellent at encouraging reflective design.)
Joshua Bloch, Effective Java: Second Edition, Addison Wesley, 2008.
Eric Freeman, Elisabeth Freeman, Bert Bates,Kathy Sierra, Head First Design Patterns, O'Reilly, 2004.
Java 8 in action: lambdas, streams, and functional-style programming - Raoul-Gabriel Urma, Mario Fusco, Alan Mycroft 2014

Pre-requisites

A good working knowledge of imperative programming and of the fundamentals of structured software development is assumed.

Restrictions

This module cannot be taken with either CO881/COMP8810 Object-Oriented Programming, or CO882/COMP8820 Advanced Object-Oriented Programming.

Synopsis *

This module provides for well-qualified computer science students entering the MSc programme from a range of backgrounds. These students will have good programming skills but will not necessarily have used Java or another object-oriented language extensively. This module seeks to ensure that students have the Java and object-oriented design skills necessary for the rest of their programme.

CO874 Networks and Network Security

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
6	Canterbury	Autumn	M	15 (7.5)	75% Exam, 25% Coursework	

Contact Hours

Total contact hours: 30
Private study hours: 120
Total study hours: 150

Learning Outcomes

On successfully completing the module students will be able to:
1 Be capable of comparing and contrasting a wide range of switching, multiple access and transmission techniques used in current communication networks in order to assess their suitability for various applications;
2 Be aware of current developments in the Internet, especially protocols that expand the addressing space, and offer scalable routing and multicasting;
3 Be aware of the various protocols and architectures used by the Internet including those used to transport real time data streams and to support network Quality of Service;
4 Be aware of the mechanisms used to maintain basic network security;
5 Have a deeper and integrated understanding of selected key topics at the forefront of this field, including recent developments and outstanding issues;
6 Have the skills to keep abreast of future developments in networking;
7 Be able to undertake an investigation into areas covered by this module and report on their findings.

The intended generic learning outcomes.
On successfully completing the module students will be able to:
1 Time management and organisation;
2 Communication skills;
3 Report writing;
4 Problem solving;
5 Independent study and appropriate use of relevant resources;

Method of Assessment

Main assessment methods
Report (3000 words) (15%)
Problem solving exercises (10%)
Examination (2-hours) (75%)

Reassessment methods
Like for like.

Preliminary Reading

Tanenbaum, A.S. and Weatherall, D.J., "Computer Networks", (5th ed), Prentice-Hall, (2011);
Stallings, W., "Data and Computer Communications", (10th ed), Prentice-Hall, (2014);
Kurose, J. and Ross, K., “Computer Networking: A Top-Down Approach”, (7th ed), Pearson, (2017)

Pre-requisites

None

Synopsis *

Introduction, including a review of network techniques, switching and multiple access. High speed local area networks. Network protocols, including data link, network, transport and application layers and their security issues. Problems of network security and mechanisms used to provide security such as firewalls and network security protocols. Real time data transmission and quality of service. Naming and addressing and related security concerns. Security of IEEE 802.11 networks.

CO876 Computer Security

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
4	Canterbury	Autumn	M	15 (7.5)	50% Coursework, 50% Exam	
4	Canterbury	Autumn	M	15 (7.5)	60% Coursework, 40% Exam	
4	Canterbury	Autumn	M	15 (7.5)	60% Exam, 40% Coursework	

Contact Hours

Contact hours: 50
Private study hours: 100
Total hours: 150

Learning Outcomes

8. The intended subject specific learning outcomes.
On successfully completing the module students will be able to:
1) demonstrate an understanding of some basic concepts of the state-of-the-art in symmetric and asymmetric key cryptography;
2) demonstrate a systematic understanding of the mathematical and computational principles used in cryptography and how they relate to real world applications;
3) demonstrate an understanding of the various techniques used in authentication, authorisation and accountability (AAA);
4) make informed choices of the appropriate cryptographic primitives and AAA security measures to put into place for a given application;
5) undertake an independent investigation into areas covered by this module and report on their findings;
6) undertake practical exercises related to this topic of this module.

Method of Assessment

Main assessment methods
Programming assessment (30%)
Practical report (20%)
Written examination (50%)

Re-assessment methods
Like for like.

Preliminary Reading

• Nigel P. Smart. "Cryptography Made Simple", 2016, Springer. Available at: https://link-springer-com.chain.kent.ac.uk/content/pdf/10.1007%2F978-3-319-21936-3.pdf
• Jonathan Katz and Yehuda Lindell. "Introduction to Modern Cryptography", 2nd edition, 2015, CRC Press.
• Alfred J. Menezes, Paul C. van Oorschot and Scott A. Vanstone. Handbook of Applied Cryptography, 1997, CRC Press. Available at: http://cacr.uwaterloo.ca/hac/
• Charles P. Pfleeger and Shari Lawrence Pfleeger, "Security in Computing", 5th ed., 2015, Prentice Hall
• Dieter Gollmann, "Computer Security", 3rd Edition. 2011. John Wiley and Sons.

Pre-requisites

None

Synopsis *

• Symmetric and asymmetric cryptographic principles and techniques.
• Authentication, authorisation and accountability (AAA) principles and techniques.
• Example applications of cryptography and AAA in real world systems e.g. centralised and decentralised trust-based systems.

CO880 Project and Dissertation

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
2	Canterbury	Spring	M	60 (30)	100% Project	
2	Canterbury	Spring	M	60 (30)	100% Project	

Contact Hours

Total contact hours: 25
Private study hours: 575
Total study hours: 600

Learning Outcomes

The intended subject specific learning outcomes.
On successfully completing the module students will be able to:
1 Understand the nature of research and be able to use a variety of resources to gather information.
2 Read and critically review research papers or technical documentation.
3 Plan a research or development-based project.
4 Carry out a substantial project containing a substantive background research component as well as possibly a development component and report the work in the form of
a dissertation.
5 Demonstrate a deeper understanding of and competence in their individual project domains.

The intended generic learning outcomes.
On successfully completing the module students will be able to:
1 Deal with complex issues systematically and creatively.
2 Make sound judgements in the absence of complete data.
3 Work with self-direction and originality in tackling and solving problems.
4 Plan, work and study independently, and use relevant resources in a manner that reflects good practice.
5 Demonstrate time management and organisational skills, including the ability to manage their own learning and development.
6 Present ideas, arguments and results in the form of a well-structured report.
7 Communicate effectively in a presentation.
8 Reflect on issues of personal development and the skills needed to perform a task, and act accordingly.

Method of Assessment

Main assessment methods
Background presentation (5%)
Dissertation and supporting materials (7.000 to 10.000 words) (95%)
Although some projects may involve group work, each student is assessed on an individual basis.

Reassessment methods
Like-for-like
In the event that reassessment isn't feasible, credit retrieval will involve repeating the module

Preliminary Reading

Entirely project-dependent

Pre-requisites

None

Synopsis *

The project consists primarily of an extended period during which students undertake a substantial piece of work and a report on this in the form of a dissertation. It is preceded by an exploratory stage in which students review and summarise relevant literature or other technical background, including in a verbal presentation, and gain specific skills relevant to their project. It may be permitted to undertake the work in groups, particularly for projects with a development focus. However, the dissertations are produced individually. The project examines the student's ability to research technical background, to understand and expand on a specific problem commensurate with their programme of study and relate it to other work, to carry out investigations and development (as appropriate), to describe results and draw conclusions from them, and to write a coherent and well organised dissertation demonstrating the student's individual reflection and achieved learning.

CO881 Object-Oriented Programming

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
2	Canterbury	Autumn	M	15 (7.5)	Pass/Fail Only	

Contact Hours

Total contact hours: 30
Private study hours: 120
Total study hours: 150

Learning Outcomes

The intended subject specific learning outcomes.
On successfully completing the module students will be able to:
1 Appreciate the rationale for and the basic concepts of a state-of-the-art programming paradigm and language that will be used throughout these degree programmes.
2 Develop simple programmes with this language that utilise built-in features for manipulating various types of data, selection, repetition and communication with users.
3 Appreciate the functions of and be able to make basic use of development tools for creating, editing, compiling, executing and testing such programmes.
4 Utilise online documentation for such tools and for the programming language API.
5 Appreciate the importance of good programming practice including coding style and inline documentation.

Method of Assessment

Main assessment methods
Lab exercises (Pass/Fail)
In-class test (Pass/Fail)

Preliminary Reading

Barnes, David J, and Kölling, Michael. (2016). Objects First with Java - A Practical Approach using BlueJ (6th Edition). Pearson.

Pre-requisites

None.

Restrictions

This module cannot be taken with CO871/COMP8710 Advanced Java for Programmers or CO889/COMP8890 C++ Programming

Synopsis *

This module provides an introduction to object-oriented programming using the popular Java language. It is designed for beginners who have not studied computer programming before. By the end students will be able to develop simple programmes using Java.

CO882 Advanced Object-Oriented Programming

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
3	Canterbury	Whole Year	M	15 (7.5)	100% Coursework	

Contact Hours

Total contact hours: 25
Private study hours: 125
Total study hours: 150

Learning Outcomes

The intended subject specific learning outcomes.
On successfully completing the module students will be able to:
1 develop non-trivial computer programs following recognized object-oriented principles.
2 critically evaluate the suitability of a commercially-relevant implementation language in the solution of particular problems.
3 describe concepts used in programming and to discuss programming using vocabulary from professional computer science.
4 choose and use appropriate data structures and algorithms in the construction of programs.
5 apply principled design techniques in the construction of software.
6 choose and use appropriate software testing strategies.
7 critically reflect on both the process and outcomes of software creation.

Method of Assessment

100% Coursework

Preliminary Reading

Barnes, D.J. and Kölling, M. (2017) Objects First with Java - A Practical Approach using BlueJ (6th Edition): Pearson Education

Pre-requisites

Pre-requisite: COMP8820: Object-Oriented Programming

Restrictions

This module cannot be taken with CO871/COMP8710 Advanced Java for Programmers or CO889/COMP8890 C++ Programming

Synopsis *

Building upon Introduction to Object-Oriented Programming, this module covers the design and implementation of high-quality software using OO techniques. Systems are modelled as configurations of objects communicating with one another. Techniques (e.g. inheritance) are introduced which allow objects to play different roles within a system. These two concepts are key to the support for adaptation and reuse that OOP provides. Much emphasis will be placed on gaining a deep understanding of these concepts and applying them in practice by developing programs in Java. The remainder of the module will explore software component frameworks, specifically those that come packaged with Java, placing most emphasis on the frameworks to support the structuring and manipulation of data (data structures and algorithms).

CO883 Systems Architecture

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
2	Canterbury	Autumn	M	15 (7.5)	75% Exam, 25% Coursework	
2	Canterbury	Spring	M	15 (7.5)	50% Coursework, 50% Exam	

Contact Hours

Total contact hours: 25
Private study hours: 125
Total study hours: 150

Learning Outcomes

On successfully completing the module students will be able to:
1. Demonstrate a systematic understanding of the hardware and software components of a typical computer system, and of how they interact.
2. Demonstrate originality in applying the principles of abstraction and layering for building complex systems.
3. Identify the interfaces of abstraction layers and be able to select an appropriate layer on which to build useful systems.

Method of Assessment

Main assessment methods
25% Coursework and 75% Examination

Preliminary Reading

English, J. (2004). Introduction to Operating Systems. Palgrave Macmillan.
Patterson, D and Hennessy, J. (2013). Computer Organisation and Design, Fifth Edition. Morgan Kaufman
Nisan, N and Schocken, S. (2005) The Elements of Computing Systems: Building a Modern Computer from First Principles. MIT Press
Scott, J.C. (2009) But How Do It Know? - The Basic Principles of Computers for Everyone. John C. Scott

Pre-requisites

Co-requisites: COMP8810: Object-Oriented Programming, or
COMP8710: Advanced Java for Programmers

Synopsis *

This module covers the fundamental components (hardware and software) of a typical computer system, and how they collaborate to execute programs. The module provides a comprehensive overview, from the lowest level of abstractions in hardware to the highest level of abstractions of modern programming languages. Examples of topics that may be covered include logic circuits, machine language, processor organization, memory management, processes and concurrency, file systems. Throughout, special attention is paid to abstraction, performance, and other quality requirements.

CO884 Algorithms and Logic

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
3	Canterbury	Spring	M	15 (7.5)	50% Coursework, 50% Exam	
2	Canterbury	Spring	M	15 (7.5)	75% Exam, 25% Coursework	

Contact Hours

Total contact hours: 22
Private study hours: 128
Total study hours: 150

Learning Outcomes

On successfully completing the module students will be able to:
1. Understand a problem description, and then identify, compare, and apply appropriate algorithms to solve it.
2. Demonstrate ability to formulate formal solutions to problems logically and in algorithmic form using pseudocode.
3. Reason about the correctness and runtime of algorithms, and reflect on how changes in these algorithms would impact their correctness and runtime.
4. Evaluate different ways to implement an algorithm, and implement it as part of an executable program.
5. Understand and implement basic data structures (e.g., arrays, lists, trees) and use algorithmic techniques (recursion and divide & conquer) to solve well-known problems
(searching and sorting) and to newly encountered problems.
6. Understand and manipulate a variety of logical formalisms (e.g., propositional and predicate logic).
7. Formulate statements and problems in logical form (e.g., as SAT instances).
8. Understand, at least at a high level, one or more established techniques for automated reasoning and the algorithms involved (e.g., the Davis-Putman-Logemann-
Loveland algorithm).

The intended generic learning outcomes.
On successfully completing the module students will be able to:
1. Communicate information, ideas, problem, and solutions to both specialist and non-specialist audiences.
2. Critically evaluate arguments, assumptions, abstract concepts and data (that may be incomplete), to make judgements, and to frame appropriate questions to achieve a
solution to a problem.
3. Apply the methods and techniques that they have learned to review, consolidate, extend and apply their knowledge and understanding, and to initiate and carry out
projects.

Method of Assessment

Main assessment methods
Written exercises (25%)
Take-home programming test (25%)
Examination, 2 hours (50%)

Reassessment methods
Like for like.

Preliminary Reading

Steven Skiena, "The Algorithm Design Manual", Springer, 2008.
Huth, M. & Ryan M., Logic in computer science: modelling and reasoning about systems, Cambridge University Press, 2004.

Pre-requisites

Co-requisites:
COMP8810 Object-Oriented Programming
and COMP8820 Advanced Object-Oriented Programming
or COMP8710 Advanced Java for Programmers

Synopsis *

This module contains four main components, several of which are at the forefront of the academic discipline and are informed by research: Propositional and predicate logic, and resolution; Prolog programming; Search Techniques; Constraint Logic Programming.

CO885 Project Research

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
2	Canterbury	Spring	M	15 (7.5)	100% Coursework	

Contact Hours

Total contact hours: 40
Private study hours: 110
Total study hours: 150

Department Checked

Yes

Learning Outcomes

8. The intended subject specific learning outcomes.
On successfully completing the module students will be able to:
8.1 start their Masters Project, both in terms of preparatory work for their specific choice of project and in terms of general skills as listed below;
8.2 understand the nature of research and be able to frame a research question;
8.3 plan a research project: this will include being able to perform an analysis of a research topic to identify (i) objectives for the research, (ii) prior research in the area, (iii) the value of the research in terms of possible outcomes and (iv) the probable methodology, action plan or approach to the research;
8.4 document their analysis in the form of a reasoned argument;
8.5 demonstrate an introductory understanding of the nature of intellectual property and be able to use a variety of resources to gather information.
8.6 understand issues arising in the design and analysis of experiments in computing, including simulation study.

9. The intended generic learning outcomes.
On successfully completing the module students will be able to:
9.1 Work as part of a group;
9.2 Manage and organise their time;
9.3 Communicate effectively;
10. A synopsis of the curriculum
The crowning piece of most Masters degrees is the Masters Project in which you apply a wide range of skills learned in the taught modules to an interesting research problem or practical application of your choice. The Project Research module provides useful transferable skills for doing the project, and supports you in some preparatory tasks such as literature study and project planning.

Method of Assessment

13.1 Main assessment methods
Series of in-class exercises, may be undertaken and assessed on a group basis (total 12%)
Critical review (43%)
Mini-conference, may be undertaken and assessed on a group basis (45%)

13.2 Reassessment methods
Like for like.

Preliminary Reading

W Booth, G C Colomb & J M Williams, The craft of research, University of Chicago Press, 2nd edition, 2003.
T Greenfield (Ed), Research methods: a guide for postgraduates, Arnold, 2nd edition, 2002.
J Kirkman, Good style, E&FN Spon (1997)
J Kirkman, Guidelines for giving effective presentations, 2nd edition, Routledge, 2005.
A Fink, Conducting Research Literature Reviews, Sage, 1998
A Fink & J Kosecoff, How to conduct surveys, Sage, 3rd edition, 2005
S Toulmin, R Rieke and A Janik, An introduction to reasoning, Prentice-Hall, 1984.

Pre-requisites

None

Synopsis *

The crowning piece of most Masters degrees is the Masters Project in which you apply a wide range of skills learned in the taught modules to an interesting research problem or practical application of your choice. The Project Research module provides useful transferable skills for doing the project, and supports you in some preparatory tasks such as literature study and project planning.

CO886 Software Engineering

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
2	Canterbury	Spring	M	15 (7.5)	50% Coursework, 50% Exam	

Contact Hours

Total contact hours: 32 hours
Private study hours: 118 hours
Total study hours: 150 hours

Learning Outcomes

The intended subject specific learning outcomes.
On successfully completing the module students will be able to demonstrate:
1 A critical understanding of the principles and practice of the development of software systems (broadly defined) including requirements specification, design, validation, implementation and evolution.
2 A comprehensive understanding of techniques for modelling software systems and their domains.
3 The ability to design and implement test plans, and apply a wide variety of testing techniques effectively and efficiently, and being able to evaluate their efficacy in identifying a wide range of faults.
4 The conceptual understanding of planning, documentation, estimation, quality, time, cost and risk evaluation in the business context.
5 Self-direction in the design of software systems, including design simplicity, appropriateness and styles of system thinking and focused problem solving.
6 Critical awareness of the deployment of certain types of software system and show an understanding of the professional and legal duties software engineers owe to their employers, employees, customers and the wider public.
7 Ability to use state-of-the-art tools and techniques when developing software systems.

The intended generic learning outcomes.
On successfully completing the module students will be able to:
1 The ability to work effectively as a member of a team.
2 Effective use of IT facilities.
3 Time management and organisational skills, including the ability to manage one's own learning and development.
4 An understanding of the importance of keeping quality procedures under review, to ensure that they fulfil quality objectives cost-effectively, and in a manner understood by the project team.
5 Be able to analyse a problem specification and to design and implement a solution
6 Appreciation of the social, ethical and professional issues related to software development.
7 Appreciation of the importance of continued professional development as part of lifelong learning.

Method of Assessment

Main assessment methods
50% Coursework and 50% Examination

Case Studies, undertaken and assessed on group basis, 5000 words (15%)
Group Project, undertaken and assessed on group basis, 40 hours (35%)
Examination, 2 hours (50%)

Reassessment methods
Like for like

Preliminary Reading

Cohn, M. (2002). User Stories Applied. Addison-Wesley.
Fowler, M (2003). UML Distilled: A Brief Guide to Standard Object Modeling Language. Addison-Wesley.
Sommerville, I. (2015). Software Engineering 10th ed. Addison-Wesley.
Craig, RD. and Jaskie, SP. (2002). Systematic Software Testing. Artech House.
Pezze, M, Young, M. (2007). Software Testing and Analysis: Process, Principles and Techniques. John Wiley & Sons.
McConnell, S. (2004). Code Complete: A Practical Handbook of Software Construction. Microsoft Press.
Hall, EM. (1998). Managing Risk: Methods for Software Systems Development. Addison-Wesley.
Martin, R. (2008). Clean Code: A Handbook of Agile Software Craftsmanship. Prentice Hall.
Brooks, F.P. (1995). The Mythical Man-Month: Essays on Software Engineering. Addison-Wesley Professional.
Ensmenger, N. L. (2010). The Computer Boys Take Over: Computers, Programmers, and the Politics of Technical Expertise. The MIT Press.
Slayton, R. (2013). Arguments that Count: Physics, Computing, and Missile Defense, 1949-2012. The MIT Press

Pre-requisites

COMP8820 Advanced Object-Oriented Programming, or COMP8710 Advanced Java for Programmers

Synopsis *

• Software processes.
• Modelling techniques, and the use of these techniques throughout the project lifecycle.
• Introduction to modelling principles (decomposition, abstraction, generalization, projection/views) and types of models (information, behavioural, structural, domain and functional).
• Risk and risk management in software.
• Approaches to software testing and inspection.
• Approaches to software configuration management.
• Software engineering tools: configuration control, project management, integrated development environments and modelling tools

CO887 Web-Based Information Systems Development

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
2	Canterbury	Autumn	M	15 (7.5)	50% Coursework, 50% Exam	
2	Canterbury	Spring	M	15 (7.5)	50% Coursework, 50% Exam	

Contact Hours

Total contact hours: 28
Private study hours: 122
Total study hours: 150

Learning Outcomes

The intended subject specific learning outcomes.
On successfully completing the module students will be able to:
1 Main types of e-business strategy supported by web-based systems
2 Design of dynamic web applications
3 HTML and CSS
4 Client-side programming
5 Server-side programming
6 Relational database systems and SQL
7 Key features in web-based design and implementation, including transactions and security issues
8 Key aspects of legal, ethical and professional issues affecting IS developers
And be able to:
9 Use appropriate methods to model the requirements and design of simple web-based systems
10 Choose an appropriate implementation model and apply it to build simple active web systems.
11 Evaluate and test small-scale, active web pages.
12 Use all of the above to build a complete system.

The intended generic learning outcomes.
On successfully completing the module students will be able to:
1 Do self-directed background research
2 Discuss technical issues with professionals in the field
3 Identify information relevant to a project and discard irrelevancies
4 Synthesise information collected from a variety of sources, including other modules, to produce findings
5 Produce abstract models from concrete situations
6 Adjust the pace and goals of their work to meet deadlines.
And have developed the following transferable skills:
7 Self-management
8 Oral and written communication
9 Internet-based information retrieval

Method of Assessment

Main assessment methods
Database programming (20%)
Web Development (30%)
Examination (50%)

Reassessment methods
Like-for-like.

Preliminary Reading

JavaScript: The Definitive Guide (Definitive Guides) by David Flanagan. 2011
Programming PHP by Kevin Tatroe, Peter MacIntyre and Rasmus Lerdorf. 2013
The Definitive Guide to HTML5 by Adam Freeman. 2011
Learning PHP, MySQL, JavaScript, and CSS: A Step-by-Step Guide to Creating Dynamic Websites by Robin Nixon. 2012

Pre-requisites

Co-requisite:
COMP8820: Advanced Object-Oriented Programming or
COMP8710: Advanced Java for Programmers

Synopsis *

Web-based information systems form the heart of e-commerce. They are also increasingly the way businesses handle all their information needs. Building such systems requires an understanding of up-to-date tools and technologies such as web page creation, client side programing, server side programming and databases; it also calls for an understanding of how to design systems that genuinely meet user and business needs.

CO892 Advanced Network Security

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
2	Canterbury	Spring	M	15 (7.5)	75% Exam, 25% Coursework	

Contact Hours

Total contact hours: 20
Private study hours: 130
Total study hours: 150

Learning Outcomes

The intended subject specific learning outcomes.
On successfully completing the module students will be able to:
1 Have a knowledge of the threats faced by computer operating systems, applications and networks that originate from network-based attacks, intrusion and misuse;
2 Have a knowledge of the types of countermeasures that can be put in place in computer systems, networks, and network infrastructures to identify, reduce or prevent problems caused by network attacks or misuse;
3 Be capable of making informed choices of the appropriate countermeasures that should be put in place to protect systems from network attacks or misuse and to maintain network security;
4 Have a deeper and integrated understanding of selected key topics at the forefront of this field, including recent developments and outstanding issues;
5 Have the skills to keep abreast of future developments in network security;
6 Be able to undertake an investigation into areas covered by this module and report on their findings.

The intended generic learning outcomes.
On successfully completing the module students will be able to:
1 Time management and organisation;
2 Communication skills;
3 Be able to undertake an independent investigation into areas covered by this module and report on their findings;
4 Problem solving;
5 Independent study and appropriate use of relevant resources.

Method of Assessment

13.1 Main assessment methods
Two reports (25% total)
Examination, 2-hour (75%)

13.2 Reassessment methods
Like for like.

Preliminary Reading

Christos Douligeris & Dimitrios Nikolaou Serpanos, "Network security: current status and future directions", John Wiley and Sons (2007).
Joseph Migga Kizza, "Guide to Computer network security", 4th ed., Springer (2017).
NIST SP800-61 r2, “Computer Security Incident Handling Guide” (2012), https://csrc.nist.gov/publications/detail/sp/800-61/rev-2/final
Sherri Davidoff and Jonathan Ham, “Network Forensics: Tracking Hackers Through Cyberspace”, Prentice Hall (2012).
Michael Bazzell, “Open Source Intelligence Techniques: Resources for Searching and Analyzing Online Information”, 7th ed (2019).
Enisa, “Introduction to Network Forensics” (2019), https://www.enisa.europa.eu/topics/trainings-for-cybersecurity-specialists/online-training-material/documents/introduction-to-network-forensics-handbook.pdf
William Stallings, “Foundations of Modern Networking: SDN, NFV, QoE, IoT, and Cloud”, Addison Wesley (2016).

Pre-requisites

COMP8710 Advanced Java for Programmers
or (COMP8810 Object-Oriented Programming
and COMP8820 Advanced Object-Oriented Programming)

Synopsis *

A synopsis of the curriculum
• Network security and cybercrime.
• Analysis of real world network security incident (IoT botnet).
• Email security issues (spam and phishing attacks; spam filtering systems).
• Spyware (system vulnerabilities; stealth techniques; detection and removal).
• Network-related data security (data breaches; data loss prevention; remote sniffer detection).
• Security of WiFi networks.
• Network forensics and incident response.
• Emerging network protocols
• IPv6 security.
• Honeypots and honeynets.
• Software-defined networking.

CO894 Development Frameworks

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
2	Canterbury	Autumn	M	15 (7.5)	50% Coursework, 50% Exam	

Contact Hours

Total contact hours: 22
Private study hours: 128
Total study hours: 150

Learning Outcomes

The intended subject specific learning outcomes.
On successfully completing the module students will be able to:
1 be able to make effective use of software development environments and frameworks for developing, debugging, testing and deploying applications;
2 have an understanding of the requirements and facilities of industry-standard software development, testing and deployment environments;
3 have an understanding of how development environments integrate into the project life-cycle, including making effective use of project and source-code management
tools;
4 have an understanding of the conceptual basis and evolution of software frameworks and their relationship with software development environments.

Method of Assessment

Coursework (50%)
Examination, 2 hours (50%)

Preliminary Reading

Jim D'Anjou, Scott Fairbrother, Dan Kehn, John Kellerman, Pat McCarthy, "The Java Developer's Guide to Eclipse", Addison Wesley; 2nd ed., 2004. ISBN: 978-0321305022.
C. Pilato, Ben Collins-Sussman, Brian Fitzpatrick, "Version Control with Subversion", O'Reilly; 2nd ed., 2008. ISBN: 978-0596510336.
Peter Smith, "Software Build Systems: Principles and Experience", Addison Wesley, 2011, ISBN: 978-0321717283
Jez Humble, David Farley, "Continuous Delivery: Reliable Software Releases through Build, Test, and Deployment Automation", Addison Wesley, 201, ISBN: 978-0321601919.

Pre-requisites

Co-requisite: COMP8710: Advanced Java for Programmers or equivalent experience

Synopsis *

Introduction to software development environments and the facilities they provide. Development of simple applications in these environments, using a broad range of the facilities provided. Software libraries and frameworks, and their use in developing and testing software systems. Use of development frameworks' facilities for project and source-code management, automated testing, refactoring and profiling. Deploying applications across multiple platforms using installers and build-systems, continuous integration and deployment.

CO899 System Security

Version	Campus	Term(s)	Level	Credit (ECTS)	Assessment	Convenor
2	Canterbury	Spring	M	15 (7.5)	50% Coursework, 50% Exam	
2	Canterbury	Spring	M	15 (7.5)	75% Exam, 25% Coursework	

Contact Hours

Total contact hours: 34
Private study hours: 116
Total study hours: 150

Learning Outcomes

On successfully completing the module students will be able to:
1 Demonstrate a systematic understanding of knowledge of a broad variety of advanced topics related to cyber security research and development.
2 Demonstrate critical awareness of the importance role of human factors for addressing cyber security problems.
3 Demonstrate knowledge and a comprehensive understanding of modern principles in modelling, developing and evaluating in cyber security systems.
4 Select, use and evaluate critically appropriate tools for developing and evaluating cyber security systems.
5 Undertake a research investigation in order to have a conceptual understanding into areas covered by this module, to evaluate critical the current research, and report on their findings.

Method of Assessment

Main assessment methods
50% Coursework and 50% Examination

Presentation (10%)
Written assessment (40%)
Examination, 2 hours (50%)

Preliminary Reading

Fridrich, J. (2009). "Steganography in Digital Media: Principles, Algorithms, and Applications". Cambridge: Cambridge University Press. doi:10.1017/CBO9781139192903.
Kipper, G. (2003). "Investigator's Guide to Steganography". CRC Press, Inc., USA.
Solving CAPTCHAs, Machine Learning vs. online services https://towardsdatascience.com/solving-captchas-machine-learning-vs-online-services-3596ad6f0137
Parisi, A. (2019). "Hands-On Artificial Intelligence for Cybersecurity: Implement smart AI systems for preventing cyber attacks and detecting threats and network anomalies". Pack Publishing.
Nemec, M., Sys, M., Svenda, P., Klinec, D. and Matyas, V. (2017). "The return of coppersmith's attack: Practical factorization of widely used rsa moduli" In Proceedings of the 2017 ACM SIGSAC Conference on Computer and Communications Security, pp. 1631-1648.
Sikorski, M. (2012). "Practical Malware Analysis: The Hands-On Guide to Dissecting Malicious Software". No Starch Press

Pre-requisites

COMP8760: Computer Security,
COMP8740: Networks and Networks Security
(or equivalent knowledge of subject, eg. gained from another degree course)

Synopsis *

The module looks at a number of advanced topics in cyber security that are important for understanding, finding, researching and assessing security solutions. Example topics include:
● Digital steganography and watermarking, and its increasing role in modern malware;
● CAPTCHAs and other mechanisms to distinguish bots from humans remotely;
● AI in security, for example, the role of deep learning and adversarial examples in cyber security;
● Security in AI, for example, the protection of machine learning techniques against cyber threats;
● Random number generators and their relevance in password and nonce generation;
● Advanced malware threats such as ransomware, covering their evolution and providing some insights into likely future trends, including economic aspects.
● Advanced topics in research related to human factors and usable security, e.g., user behaviour and their relationship to cybercrime, positive security, user profiling and modelling;
● Quantum cyber security and the development of quantum-resistant cyber security systems based on quantum mechanics;
● Advanced topics in IoT security, covering new developments and trends, threats and mitigations.