UNIVERSITY OF LONDON

Course information 2020-21
IS2138 Information and communication technologies: principles and perspectives

General information

COURSE LEVEL: 5

CREDIT: 30

NOTIONAL STUDY TIME: 300 hours

Summary

Information and communication technologies (ICTs) are the foundation for virtually all modern computing applications. The creation of such an ICT system raises many complex questions such as how an ICT is used, how an ICT stores data, and how an ICT communicates. Three complementary topics, or elements, concern these issues and form the basis for this course: human-computer interaction (HCI), databases and network technologies.

Conditions

Prerequisite: If taken as part of a BSc degree, the following courses must be passed before this course may be attempted:

- IS1060 Introduction to information systems **AND**
- **EITHER** IS1168 Introduction to computer systems architecture and programming **OR** IS1129 Introduction to programming.

Exclusion: You may not register for this course in the same year as:

- IS2182 Innovating digital systems and services

Aims and objectives

The main aims of this course are to:

- introduce students to three key, complementary elements of ICTs in an integrated manner
- develop understanding of how ICTs can be designed to be as usable as possible by studying the field of human-computer interaction
- develop understanding of how data can be represented and stored in an ICT by studying the theory and application of databases
- develop understanding of how ICT applications use networking technology to communicate.

Please consult the current EMFSS Programme Regulations for further information on the availability of a course, where it can be placed on your programme's structure, and other important details.

Learning outcomes

At the end of this course and having completed the essential reading and activities students should be able to:

- describe the increasing role of interactive systems in computing and systems design
- describe the key cognitive, social and organisational concepts that underpin how humans interact with information technology
- discuss various theoretical and practical approaches to HCI
- identify important technology developments in the domain
- show an awareness of the HCI viewpoint that places the user at the centre of the design
- explain and apply a variety of approaches to HCI design, showing an understanding of their benefits and drawbacks within the design process
- apply appropriate user-centred design process and methods (e.g. iterative prototyping, usability evaluation, user centred design) to assess and alleviate any problems their users face
- demonstrate understanding of key concepts and applications associated with the tree-level ANSI-SPARC architecture, DBMS, multi-user DBMS architectures, relational and object-oriented data models
- employ conceptual data modelling techniques for the specification of data requirements and evaluate which are most appropriate to given application problems
- describe key elements of a database language and demonstrate how these are used to manipulate data in a database
- discuss challenges faced in designing and managing databases, including security and transaction management
- demonstrate an understanding of key issues and technologies involved in *business intelligence* describe the fundamental requirements of a successful distributed multimedia system
- discuss how distributed multimedia systems might be designed and implemented, highlighting the major problems that are involved in operating and inter-operating distributed multimedia systems
- identify and explain the fundamentals of a range of multimedia technologies and systems
- discuss the principles and requirements of secure communications
- describe and contrast the use of Public and Private Key Cryptography in secure communications.

Essential reading

For full details please refer to the reading list:

Comer, D.E. Computer Networks and Internets. (Prentice Hall, 2015) sixth edition [ISBN 978-1292061177]

Connolly, T.M. and C.E. Begg Database Systems: a Practical Approach to Design, Implementation and Management. (Addison-Wesley, 2014) sixth edition [ISBN 978-0132943260]

Halsall, F. Multimedia Communication: Applications, Networks, Protocols and Standards. (Addison-Wesley, 2000) first edition* [ISBN 978-0201398182]

Kurose, J.F. and K.W. Ross Computer Networking: a Top-Down Approach. (Addison-Wesley, 2016) seventh edition [ISBN 978-0133594140]

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Sharp, H., Y. Rogers and J. Preece Interaction Design: Beyond Human−Computer Interaction. (John Wiley, 2019) fifth edition [ISBN 978-1119547259]

***** This textbook is out of print. If you cannot obtain a copy, you should instead refer to:
Chapman, N. and J. Chapman Digital multimedia. (Chichester: Wiley, 2009) third edition [ISBN 978-0470512166]

Assessment

This course is assessed by a three-hour unseen written examination.

Syllabus

There are three topics in this course. However, rather than approaching these as separate, individual themes, this course presents them as a single, integrated topic that will assist you in the creation of ICT supported applications. This course therefore considers these topics to be key elements of ICTs. These are:

Human Computer Interaction (HCI): This will introduce you to HCI and interactive systems design from an ICT perspective and show how issues in HCI are fundamental to good ICT design. It will examine how issues for interactive systems design arise from the psychological, social and organisational context of interaction. Current research issues in HCI will be considered where they impact on the use and future development of ICTs; notably, this will cover issues in mobile and pervasive computing, social media and social networking. In order to design effective interactive systems around these contexts, a detailed review of the tools and techniques for interaction design will be considered, covering user-centred design, prototyping and usability evaluation.

Databases: This aims to provide you with an understanding of the main issues related to data modelling, storage and manipulation as employed in database systems. The subject will mainly focus on the theory and practice of the relational model. It will also discuss challenges of managing databases, and recent and emerging trends in database systems.

Distributed multimedia systems: In ICTs, communication and the media through which it is achieved are fundamental. This element aims to provide you with an understanding of the main issues involved in the digitisation, storage and transmission of digital media to an ever-increasing array of devices via a diversity of communication pathways. The increasingly mobile nature of such pathways leads to the possibility of building context-aware applications and we shall be looking at the challenges and opportunities that such applications provide. Last, but not least, security is an important aspect of networked communication, and we shall also be covering its main principles and safeguards.

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