

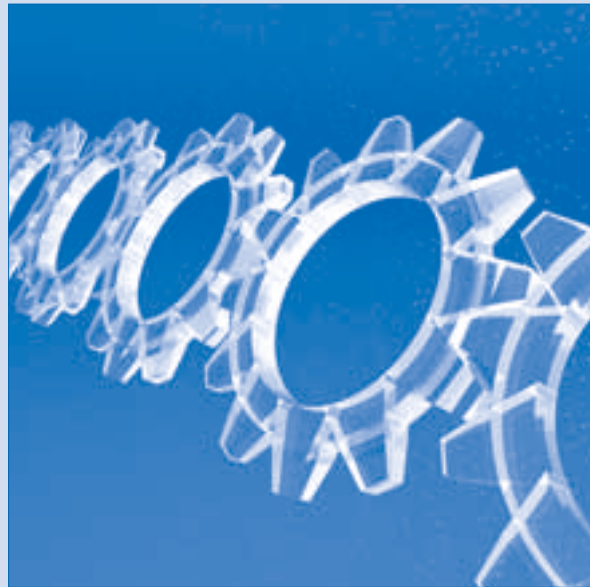


**COMP S838**  
**Enterprise Systems**  
**and Information**  
**Security Management**

**M885**

POSTGRADUATE ICT AND COMPUTING

**Analysis and design of  
enterprise systems:  
an object-oriented  
approach**



**Course Guide**

This publication forms part of an Open University course M885 *Analysis and design of enterprise systems: an object-oriented approach*. Details of this and other Open University courses can be obtained from the Student Registration and Enquiry Service, The Open University, PO Box 197, Milton Keynes MK7 6BJ, United Kingdom: tel. +44 (0)845 300 60 90, email [general-enquiries@open.ac.uk](mailto:general-enquiries@open.ac.uk)

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The Open University  
Walton Hall, Milton Keynes  
MK7 6AA

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**This *Course Guide* provides an overview of the course and some important practical advice. Your time will be well spent if you read through it carefully now.**

## M885 COURSE TEAM

**Lucia Rapanotti**, Chair and Author

**Leonor Barroca**, Author

**Steven Self**, Author

**Ivan Dunn**, Project Officer

**Neil Smith**, Academic Reader

**Pam Brightman**, Production Course Manager

**Deborah Mairs**, Presentation Course Manager

### Media development staff

**Stewart Nixon**, Media Project Manager

**John O'Dwyer**, Media Project Manager

**Judith Pickering**, Media Project Manager

**Jenny Chalmers**, Freelance Editor

**Garry Hammond**, Editor

**Andrew Whitehead**, Graphic Artist

**Phillip Howe**, Composer

### External assessors

**Richard Mitchell**, Technical Director, Michael Horvath Ltd

**Jane Chandler**, University of Portsmouth

### Critical readers

**Colin Blackburn**, Associate Lecturer, The Open University

**Don Kavanagh**, Technical Director, Green Grid Ltd

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# 1

## Introduction to M885

This course is one of the modules in the Open University's Postgraduate ICT and Computing Programme. As such, it can contribute to postgraduate qualifications in:

- ▶ Computing for Commerce and Industry
- ▶ Information Systems
- ▶ Software Development
- ▶ Management of Software Projects.

It may also be studied as part of other programmes in Manufacturing or Technology Management, or as a stand-alone course in its own right.

You can find full details of all the courses and qualifications available on the OU's website at <http://www.open.ac.uk>.

### Overview of the course

M885 is an introduction to the object-oriented approach to software, its principles, benefits, techniques and practical applications; it teaches practical skills in applying object-oriented analysis and design. It covers a wide range of established techniques and current issues in object-oriented software development, from use case analysis to software architectures and design patterns. The UML notation is used throughout. This is primarily a course on software development, and not a programming course.

However, Java technology is used for illustration and to give you an object-oriented language with which to carry analysis and design through to implementation.

The main focus of this course is on the process of construction of enterprise systems and the collection of activities and artefacts that are required in this process. Enterprise systems are software applications that automate and integrate most of, if not all, the key business processes of an organisation.

The course focuses on normal engineering for enterprise systems. In particular, you will learn about current development practices for this type of system and develop relevant skills applicable in real-world problems.

### Prerequisite skills and knowledge

You can take this as a stand-alone course and it requires no formal qualifications for entry. However, it is a postgraduate course, and you will be expected to have appropriate skills at this level which might be developed from previous study or from professional or commercial experience. In particular, we do assume that you have already studied to HNC/HND level or have equivalent experience from your employment. You should have experience of programming and programming environments, as the course gives no introduction to the basic concepts of programming and algorithms. You will also need a basic knowledge of the use of Windows or other similar desktop environments.

Some of the background knowledge and skills needed to study this course could have been gained by studying some of the Open University's other postgraduate computing courses.

More details of Open University PC requirements are given at <http://www.open.ac.uk/personal-computing/>.

## Required computing facilities

You are required to have easy access to a personal computer with word-processing software, and access to the internet.

Internet access is needed for:

- ▶ access to the course website;
- ▶ access to material on the internet;
- ▶ downloading some of the course materials;
- ▶ submitting tutor-marked assignments (TMAs) electronically;
- ▶ participating in conferencing.

If you are a new student, you will be sent your OU computer username (OUCU) and password through the post by the Learning and Teaching Solutions (LTS) department. Go to your StudentHome page at <http://www.open.ac.uk/students/> and enter your username and password, and you will then be able to access all the online services that you need to study the course.

# 2

## Aims and learning outcomes of the course

In common with most Open University courses, M885 includes detailed aims and learning outcomes, as described below. In addition, each chapter in the text includes a list of learning outcomes specific to that chapter.

### Aims

M885 aims to provide the skills and knowledge necessary to:

- ▶ acquaint you with iterative software development: its principles, benefits, techniques and practical applications;
- ▶ provide you with an understanding of an object-oriented approach to software development, with an emphasis on object-oriented analysis and design;
- ▶ provide practical skills in the application of object-oriented analysis and design;
- ▶ expose you to recent developments in object technology and industry trends.

After completing this course, you should be able to:

- ▶ apply object-oriented concepts in software development;
- ▶ describe an object-oriented process of software development and apply it in practice with a notation;
- ▶ use UML notation for modelling;
- ▶ analyse existing systems, identifying opportunities for reuse;
- ▶ critically evaluate emerging technologies and trends.

### Learning outcomes

Learning outcomes applicable to M885 can be grouped into the following overlapping categories.

#### Knowledge and understanding

Demonstrating a critical awareness of:

- ▶ the concepts associated with an iterative approach to software development;
- ▶ the features and techniques of object-oriented analysis and design;
- ▶ the UML notation and its intended use;
- ▶ the principles and applications of Design by Contract;
- ▶ the concepts and techniques associated with software validation, verification and testing;
- ▶ the importance of reuse in developing software;
- ▶ the concepts and applications of software components, architectures, patterns and frameworks.

#### Cognitive skills – evaluation, application and comparison

In particular, being able to:

- ▶ suggest a plan for development following an iterative and incremental approach to different situations;
- ▶ apply object-oriented analysis and design techniques to given requirements with an appropriate use of UML;

- ▶ develop validation and verification strategies (Design by Contract and testing) within given application developments;
- ▶ apply software components, architectures, patterns and frameworks within design;
- ▶ compare iterative software development with other software development processes;
- ▶ suggest alternative paths through software development using different approaches;
- ▶ reason about the relationship between different models.

#### **Key skills – communication, demonstration, critical evaluation**

In particular, being able to:

- ▶ communicate effectively about object-oriented development processes and techniques;
- ▶ provide appropriate, effective documentation for the analysis of a domain situation and design of a software solution;
- ▶ discuss competently a variety of topics related to object technology;
- ▶ appraise critically information on object technology expressed in different presentation styles and new developments in object technology.

#### **Practical and/or professional skills – demonstrating independent learning ability**

In particular, being able to:

- ▶ demonstrate the ability to apply the principles, concepts and techniques of the course in the development of software in the workplace;
- ▶ demonstrate the ability to extend the concepts and techniques of the course to more open-ended software development problems;
- ▶ demonstrate the ability to place novel software development techniques within established software development practices;
- ▶ document software systems using notations appropriate to different stages of the software life cycle;
- ▶ develop an awareness of a variety of tools adopted in industry and their intended use.



# 3

## Course structure

The course materials are provided partly in print and partly online via the course website. Some items are provided in both media.

This section contains a brief summary of each item of the materials, and it describes how they fit into the course structure.

### Course Guide

This *Course Guide* gives you an overview of the course and its contents, together with details of how your work will be assessed. It directs you to other documents for further details. It contains some notes on how you should study the materials and how to use the course website, and it also gives an outline of the contents of the course texts.

The *Course Guide* is provided both in print and online in searchable pdf format.

### Course text

The main course text, written by the course team, covers all the topics in the course. It contains references to other books and papers, but these are mainly acknowledgements of the sources used to produce the material, as well as suggestions for further reading; you are not expected to obtain or study these references as part of the course unless specifically requested in the course assessment.

Each text is provided both in print and online in searchable pdf format

The course text comprises 12 chapters organised in the following three bindings.

#### Introduction – Chapter 1

This introduces the main concepts studied in this course and gives an overview of software development within an object-oriented approach.

The main topics covered are:

- ▶ software development processes and their main activities;
- ▶ modelling and the Unified Modeling Language (UML);
- ▶ the object-oriented approach to software development;
- ▶ issues of reuse;
- ▶ the role of CASE tools in software development.

#### From requirements to code in one iteration – Chapters 2 to 6

This part of the course introduces a wide range of activities and techniques in software development from the analysis of a problem to the derivation of a software solution.

The main topics covered are:

- ▶ requirements and their documentation, and how to represent different aspects of a business situation;
- ▶ how to specify a software solution, identify the boundaries of a software system, and derive structural models for a software system from representations of a real-world situation;
- ▶ the guiding principles of good design for software;
- ▶ how to derive design models from the specification of a software system;
- ▶ the concepts of architecture and pattern and their application in the design of a software system;

- ▶ how to derive implementation code from the design model of a software system;
- ▶ a wide range of UML techniques to support the activities of analysis and design of software.

## Revisiting development and further concepts – Chapters 7 to 12

This part of the course revisits the development process and introduces further techniques for the analysis and design of software.

The main topics covered are:

- ▶ how to capture behaviour with state machines;
- ▶ how to relate different models and keep them consistent;
- ▶ how software systems can be built from existing components;
- ▶ how design patterns can be used to design the interfaces of a system both to its users and to external systems;
- ▶ how software systems are verified and validated.

## Exercises

Throughout the course there are exercises to help you to focus on the points that are important for you to learn from the text. The exercises vary in nature; some are questions that you should be able to answer quickly based on the material that you have just studied but some are more substantial pieces of work and may take anything between 5 and 40 minutes to complete.

## Study Guide

The *Study Guide* is provided online in pdf format.

The *Study Guide* gives you a breakdown of what you need to do, week by week, to study the course and to prepare for your assessment. It is an important document to guide you in your study and we recommend you refer to it throughout the course.

## Assessment Booklet

The *Assessment Booklet* is provided online in pdf format.

The *Assessment Booklet* contains the three tutor-marked assignments (TMAs) for the course.

## Overview of the Assessment

The *Overview of the Assessment* is provided online in pdf format.

The *Overview of the Assessment* contains information on completing TMAs and taking the M885 examination.

## Specimen Examination Paper with Solutions

The SEP is provided online in pdf format.

The *Specimen Examination Paper with Solutions* contains the Specimen Examination Paper (SEP), which gives you a preview of the structure and style of the real examination paper, and sample solutions. Many students practise for the exam by taking the SEP under examination conditions with similar constraints on the time and the materials available. The solutions give guidance about the standard expected of good answers. You can use these answers to find those areas where you need to do further revision.

## Case Study

The *Case Study* is provided online in pdf format.

This booklet outlines a business problem for which a software solution is required. You will use it in your TMA work.

## Notation Booklet

This booklet contains a summary of the UML and other relevant notations used in the course.

The *Notation Booklet* is provided online in pdf format.

## Index and Glossary

This booklet contains the main technical terms used in the course.

The *Index and Glossary* is provided online in pdf format.

## Reader

This is a collection of links to articles or websites that you will need for your TMA work.

The *Reader* is only available online.

## Study Calendar

The Study Calendar gives you a timetable for study of the main components of the course; the dates by which you must submit your assignments (known as cut-off dates) and the approximate examination date. It is important to try to keep up with this timetable in order to complete and submit your assignments by the cut-off dates and to leave sufficient time at the end of the course for revision.

The Study Calendar is provided both in print (in your *Starting M885* document) and online.

## Starting M885 document

The *Starting M885* document will be in your first mailing of materials and contains important information, and advice on whom to contact in case of problems. It is very important that you read the *Starting M885* document when you receive your mailing. A printed copy of the Study Calendar is included.

The *Starting M885* document is provided in print and is also available online.

## Course website

The course website is a very important resource for M885. It contains the following items:

- ▶ A course *News* section, where you will find a variety of important information, such as corrections or additions to the course materials and messages from the course team to advise you during your studies.
- ▶ The *Study Calendar*.
- ▶ A *Course resources* page, containing the main course texts, *Course Guide*, *Index and Glossary* and *Notation* booklets in pdf format.
- ▶ A page for the course *Reader* as a collection of links to relevant articles and websites.
- ▶ An *Assessment* page, where you will find:
  - Study Guide* and *Assessment* booklets in pdf format;
  - Specimen Examination Paper with Solutions* in pdf format;
  - Case Study* in pdf format.
  - A link to the *Assessment Handbook*
  - eTMA Guide for Students*.
- ▶ Links to various resources such as the OU library (for access to academic databases).
- ▶ A *Who to ask?* page, containing details of whom you should contact at the Open University about queries relating to your study of M885.
- ▶ A link to the *Course forums*.

The course website will be first available up to two weeks before the course start date. At that point you will be able to access it from your StudentHome page at: <http://www.open.ac.uk/students>.

The course team uses the website regularly to post news items for students, and you should get into the habit of checking it at least once a week. To receive important course-related emails, please make sure that you've provided the OU with your 'preferred email address'.

## Course forums

There are usually lively student forums on the Open University's FirstClass system, which is widely used by students on the Postgraduate ICT and Computing Programme. All our tutors are registered on it, and it provides a very useful forum for students. The M885 course forums are moderated by a tutor and are regularly accessed by the course team and many of the tutors.

FirstClass software is included on the *Online Applications* CD. Alternatively, once you are a registered OU student, you can download the FirstClass software from the internet, or use the web interface to FirstClass – both these facilities are available from your StudentHome page. However, we recommend that you use the software from the *Online Applications* CD, as it has better functionality, unless you will need to access FirstClass from several different computers.

Once you have installed the FirstClass software on your computer, you can access the M885 course forums by following the instructions in the booklet that accompanies the *Online Applications* CD.

## Anti-virus software

If you are using electronic TMA submission, you will need anti-virus software.

If you do not have any anti-virus software, you are strongly advised to install the version accessible from your StudentHome page.

# 4

## How to study the course

You should expect to take about 150 hours to study this course. This equates to about seven hours study each week during the study period, which runs for nearly six months. This time includes an allowance for completing your assignments and for revision. The estimated time required for each chapter is set out in the Study Calendar and the *Study Guide*.

When you study the course text, you should consult the *Study Guide*, as it gives you a breakdown of what you need to do, week by week, to study the course and prepare for your assessment.

### Using the teaching materials

The course text provides most of the teaching on this course. The text is designed to provide interactive learning, which is achieved through the use of exercises throughout, together with suggestions of further reading. The study time you will need for each chapter of the text can vary, and this is indicated by the varying study periods in the *Study Guide* and on the Study Calendar.

Since this is a masters-level course, you will be expected to be able to access and read material of an advanced nature, as appears in the research literature, for instance. There are many references made to such material in the course, and from time to time you will be expected to read research papers or white papers. As well as informing your study, these will keep your knowledge of the field of study up-to-date.

### Summaries

Each chapter ends with a summary. This reviews the main points you should have learnt from your study of the chapter. When you have finished studying a chapter read the summary carefully as it contains the main points you will be assessed on.

### Further reading and references

Lists of books and papers referred to in the text, and suggestions for further reading, appear at the end of each chapter. The books or papers cited do not form an essential part of the course but are for reference if you want to delve deeper into a particular topic.

### Using the course website

All the documents you need for the course are available in pdf format for download.

Occasionally, a text will refer you to a web URL, which may contain articles, news items or academic papers which we consider relevant or think you may find interesting or useful as further reading. Links to such URLs will be embedded in the pdfs of the course texts.

For all the material that forms an essential part of the course, a link will be provided from the Reader page of the course website.

If this is your first Open University course, please take particular note of the material in this section.

If you are thinking of taking an MSc using M885 as one of your Diploma courses, and choosing a topic from the course for your project, some of these references might make a useful starting point in considering your project proposal.

## Keeping your own notes

As part of studying this course, we recommend that you make notes as you go along. Keeping your own notes is generally good practice, both when studying a course and for your normal work activities

You will find advice about note taking and other study skills, such as report writing, in MD500, the introductory pack and website for all new students on the Postgraduate ICT and Computing Programme. The Open University has also developed a range of online study toolkits which you will find via the study skills section on the Learning with the OU website; you can access this website from the study support section of your StudentHome page.

If you are a new student and have not received a copy of MD500, please consult the *Starting M885* document for information on how to rectify this.

# 5

## Tutorial support

Once you have registered for the course, you will be assigned a course tutor to support your study. Shortly before the course starts (usually about a week before), you will be informed of your tutor's name, email address and telephone number by our Postgraduate Technology and Computing (PTC) Office in Nottingham.

Your main contact with your tutor will be by telephone or email and through the detailed comments that he or she will make on your TMA scripts sent either by post or via the electronic TMA system. The feedback you receive from your tutor will provide valuable help and advice on your progress through the course. Your tutor is also available to answer your queries by phone or email.

In addition to support from your tutor, there may be an introductory tutorial day. We recommend that you attend if the tutorial is offered. It will provide you with four hours of tuition on M885. The tutor who gives the tutorial may not be your own tutor, but will be an experienced tutor on the course. The tutorial day will also provide you with the opportunity to meet fellow students, but is dependent on student numbers.

Towards the end of the course, an optional two-day residential revision school is offered, at extra cost. This provides invaluable preparation for the examination in a series of intensive tutorial sessions. Students also find it useful for the discussion of course materials and for the exchange of ideas. Sessions on examination preparation and course choice are included in the school timetable. This revision school is only viable if enough students express an interest, therefore it is important to book as early as possible.

### Other sources of support

As you work through the course, there may be occasions when you need help with a problem before you can proceed with your study. In these circumstances you should normally contact your tutor. If you have other queries, or if your tutor is not available within a reasonable time, contact the appropriate person from the list given in the *Starting M885* document or on the course website. If in doubt as to who the appropriate person is, please contact the PTC Office.

We would encourage you to look at the FirstClass forums for this course and to join in the discussions if you wish. This is a useful forum for meeting other students, for sharing comments about the course itself and for discussing wider issues related to the course.

# 6

## Assessment

The grades you will be awarded at the end of the course will depend on (a) your marks for the three TMAs and (b) your mark for the final three-hour examination. Both these components are compulsory, and it is necessary to pass both of them (i.e. gain a score of 40 per cent or more on each) if you wish to obtain a course certificate. The three TMAs together count for 50 per cent of the overall course grade; the examination counts for the other 50 per cent.

General information on course assessment and course results is provided in the Open University's online *Assessment Handbook for Taught Higher Degrees*. A link to the *Assessment Handbook* is available online via the course website and your StudentHome page.

### Tutor-marked assignments

There are three TMAs, all three count towards the grade you will be awarded at the end of the course.

The weighting of the TMAs is as follows:

TMA 01            30 per cent

TMA 02            35 per cent

TMA 03            35 per cent

Substitution does not apply to TMAs on M885.

Any assignment not submitted is given a zero score.

TMA 01 relates to Chapters 1 and 2 and covers study weeks 1 to 5 of the course;

TMA 02 relates to Chapters 3 to 6 and covers study weeks 6 to 13 of the course;

TMA 03 relates to Chapters 7 to 12 and covers study weeks 14 to 20.

The *Assessment Booklet* on the course website contains the three TMAs. The *Overview of the Assessment* provides guidance on how to structure and organise your answers, together with advice on citations, references and plagiarism.

### Submission of assignments

This course uses the electronic TMA (eTMA) system for submission of TMAs. If you are unable to use the eTMA system you may, with your tutor's permission, submit your assignment by post. Full details of how to submit your TMAs are provided in Section 9 of the *Overview of the Assessment*.

The dates by which you should send your assignments to your tutor are important. These cut-off dates are clearly shown at the beginning of each assignment and also on the Study Calendar. In exceptional circumstances (for example, for medical reasons or because of unforeseen business travel) you can obtain a short extension on the submission date for the first two TMAs. Please contact your tutor as soon as you know you may have difficulty in meeting the cut-off date, and request an extension.



## Examination

The final component of the course is a three-hour written examination, to be taken at the end of your study period.

The best way to prepare for the examination is to read the *Specimen Examination Paper with Solutions*. You may wish to attempt the SEP under exam conditions yourself shortly before your examination.

You will be informed by the Examinations Office of the date of your examination and your local examination centre. You will also receive full details of examination regulations.

# 7

## What to do next

First, look carefully at the *Starting M885* document you have been sent and follow up any advice given there.

Next, make sure that you have received your OU computer username (OUCU) so that you can access and explore the course website, and become familiar with its structure and operation.

Then, read through the assignments.

Once you have done these things you should be ready to start on your study of the first text.

You will receive an introductory letter from your tutor nearer the course start date. It is helpful to get in touch with him/her at an early stage.

We hope that you will enjoy your study of M885 and that you will have the opportunity to use the skills and knowledge you will have gained by the end of the course. We also hope that, having experienced Open University study, you will be enthusiastic about studying more courses on the Postgraduate ICT and Computing Programme, to gain a postgraduate diploma or MSc, or about following one of the OU's other programmes of study.



