

# **BCS Higher Education Qualifications**

## **Level 6 System Design Methods**

Version 3.0

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This is a United Kingdom government regulated qualification which is administered and approved by one or more of the following: Ofqual, Qualification in Wales or SQA.

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# 1. Change History

Any changes made to the syllabus shall be clearly documented with a change history log. This shall include the latest version number, date of the amendment and the changes made. The purpose is to identify quickly what changes have been made.

Version Number	Date	Changes Made
Version 1.0	March 2014	Released
Version 2.0	June 2016	Re-formatted with syllabus numbering – no change to content
Version 3.0	Dec 2016	Regulation Statement Added

## 2. Rationale

System design methods constitute the framework that enables the building of information systems to be treated as a disciplined engineering activity rather than as a craft. The range of methods available varies from very informal sets of guidelines to highly formal and mathematical approaches. While claims that some method is universally applicable are often made, all methods are, in practice, applicable only to certain classes of application.

All information systems engineers should be familiar with at least one system design method. This option is intended for the large numbers of candidates who need to go beyond a simple familiarity with the method used in their own organisation because they have to:

- choose a method appropriate for a new class of application;
- monitor the implementation of a new method;
- create a method appropriate to a special set of circumstances.

## 3. Aims

- To develop a wide understanding of system design methods, together with a critical practitioner's knowledge of at least one such method and a general familiarity with several others, not restricted to a single application area.

## 4. Objectives

Upon successful completion of this module, candidates will be able to demonstrate their competence in, and their ability to:

- Identify the weaknesses and limitations of proposed design methods
- Develop expertise in selecting a system design method (or combination of methods) appropriate to a given environment, identifying and considering all relevant factors
- Assist in planning and managing the introduction of a system design method into an existing development environment
- Assist in planning and implementing monitoring procedures to evaluate the effectiveness of a method in practice
- Identify areas in which changes to the method might usefully be introduced

## **5. Prior Knowledge Expected**

The learner must have achieved the Diploma in IT or have an appropriate exemption to be entered for the Professional Graduate Diploma in IT.

Candidates should have practical experience of using at least one system design method on a real-life project. An elementary knowledge of statistics and discrete mathematics is also required.

Candidates are required to become a member of BCS, The Chartered Institute for IT to sit and be awarded the qualifications. Candidates may apply for a four-year student membership that will support them throughout their studies.

## **6. Format and Duration of the Examination**

The examination is a three-hour closed book examination (no materials can be taken into the examination room) based on the syllabus in this document.

Examinations are held once a year and are undertaken in normal examination conditions with one or more duly appointed invigilators.

The pass mark is 40%.

## 7. Syllabus Detail

Category	Ref	Content
1 BASIC ELEMENTS OF SYSTEM DESIGN METHODS	1.1	Waterfall, V-model, spiral model, prototyping, incremental, reuse-oriented. The relationship between activities and life cycle phases; deliverables associated with each phase. The relationship between life cycle models and system design methods.
	1.2	Graphical notations including amongst others: rich pictures, data flow diagrams, entity life history diagrams, entity relationship diagrams, state transition diagrams, state charts, enquiry access paths (EAPs) and UML diagrams.
	1.3	Formal notations based on mathematical logic and algebra.
	1.4	Techniques for validation and verification: reviews, inspections, walkthroughs, etc.; automatic techniques.
2 CONSTRUCTION OF A METHOD	2.1	The idea of the virtual machine underlying a design method and the way in which this affects the applicability of the method.
	2.2	Examples of methods illustrating the use of the techniques and notations listed in section 1.
	2.3	Categories of methods such as structured (e.g. SSADM), object-oriented (e.g. RUP), agile, RAD, component-based development, and 'soft' methods (e.g. SSM).
3 SELECTING A METHOD	3.1	Technical factors: matching the method to the type of application; suitability of the method for use with existing software development environment; life cycle coverage; interfacing with other methods; tool support; comparison frameworks e.g. NIMSAD.
	3.2	Non-technical factors: how widely used is the method; documentation and training; availability of staff; how is the method supported; standardization; track record.
4 INTRODUCING A METHOD	4.1	Piloting and evaluating the pilot. Motivating staff who will be using the method. Role of consultants. Education and training.
	4.2	Reverse engineering of existing systems to fit in with the new method.
	4.3	Pitfalls.
5. EVALUATION AND TUNING	5.1	Statistical process control as applied to the software development process. Appropriate software metrics: strengths and the dangers inherent in their use.
	5.2	Use of metrics to improve the software development process.
	5.3	The relationship between structured and object oriented methods and software quality assurance.
	5.4	Assessing the benefits obtained through the introduction of a new method.

## 8. Recommended Reading List

System Design Methods	ISBN 10	ISBN 13
<b>Primary Texts</b>		
<ul style="list-style-type: none"><li>Avison D. Fitzgerald G., Information Systems Development: Methodologies, Techniques &amp; Tools, McGraw-Hill (4th Ed), 2006.</li></ul>	0077114175	978-0077114176
<ul style="list-style-type: none"><li>Ian Sommerville, Software Engineering: International Version Edition 9, Addison Wesley, 2010.</li></ul>	0137053460 0137035152	978-0137053469 978-0137035151
<ul style="list-style-type: none"><li>Pressman R.S. and Ince D., Software Engineering: A Practitioner's Approach, McGraw Hill (7th Ed), 2009/10 <a href="http://ebookily.org/pdf/software-engineering-by-pressman-6th-ed">http://ebookily.org/pdf/software-engineering-by-pressman-6th-ed</a></li></ul>	0073375977 0071267824	978-0073375977 978-0071267823
<ul style="list-style-type: none"><li>Watts Humphrey, Managing the Software Process (SEI), Addison- Wesley, 1989. This book is particularly valuable for its explanation of how statistical process control can be used to improve system design methods.</li></ul>	0201180952	978-0201180954
<b>Other Texts</b>		
<ul style="list-style-type: none"><li>Budgen D., Software Design, Addison-Wesley (3rd Ed), 2003</li></ul>	0201722194	978-201722192
<b>Other Reading</b>		
<ul style="list-style-type: none"><li>Jackson M., Problems, Methods and Specialisation Software Engineering Journal, Vol. 9, No 6., 1994 <a href="http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.49.8831&amp;rep=rep1&amp;type=pdf">http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.49.8831&amp;rep=rep1&amp;type=pdf</a> This article explores the nature and limitations of design methods in greater depth than the texts cited above.</li></ul>		
<ul style="list-style-type: none"><li>Kitchenham B.A., Linkman S.G. and Law, D.T. Critical Review of Quantitative Assessment Software Engineering Journal, Vol. 9, No 2., 1994</li></ul>		
<ul style="list-style-type: none"><li>Kitchenham B.A., Pickard L. and Pfleeger S.L., Case Studies for Method and Tool Evaluation, IEEE Software, July, 1995 <a href="http://www.idi.ntnu.no/emner/it3605/artikler/s4052.pdf">http://www.idi.ntnu.no/emner/it3605/artikler/s4052.pdf</a> These articles describe techniques that have been used for carrying out quantitative assessments of the benefits of system design methods.</li></ul>		

## 9. Contact Points

### Email:

Customer Service team via [www.bcs.org/contact](http://www.bcs.org/contact)

### Phone:

UK: 01793 417424 or 0845 300 4417 (lo-call rate)

Overseas: +44 (0)1793 417424

Lines are open Monday to Friday, 08.15 a.m. to 5.45 p.m. UK time.

### Website:

[www.bcs.org/heq](http://www.bcs.org/heq)

### Post:

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Swindon SN2 1FA, United Kingdom