# Teaching Scheme
## Business Information Technology
### Database Systems 2
#### Level : I
#### Year : 2007–2008
Jim Craven (jcraven@bournemouth.ac.uk)  
Konstantina Lepinioti (klepinioti@bournemouth.ac.uk)  
Stephen Mc Kearney (smckearn@bournemouth.ac.uk)

## Autumn Term

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<tr>
<td>1/10</td>
<td>Induction Week</td>
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| 8/10 | Multi-User and Client/Server Databases (JC)  
This lecture will consider current requirements and solutions for data/database management. How has the demand for databases been met in the past? What were the traditional constraints? What are to-day’s requirements for data storage? What solutions exist in terms of database models and hardware/communications platforms? What are the benefits of these solutions?  
*Reading:* Connolly(Chapter 1), McFadden(Chapter 1) | Introduction to Oracle  
This class will work through units from the Oracle book (Red Book). | 1,2,3,4 |
| 15/10 | Database Architecture 1 (SMcK)  
This lecture will describe the concept of a database architecture. What is a database architecture? Why does a database need an architecture? A database architecture can be considered to consist of three parts, called schemas - what are these schemas? Why are schemas important? The three schemas provide data independence - what is data independence? How do the schemas provide data independence? What is the advantage of data independence?  
*Reading:* Elmasri(Chapter 2), Connolly(Chapter 2) | SQL 1  
This class will work through units from the Oracle book (Red Book). | 1,3,4 |
| 22/10 | Database Architecture 2 (SMcK)  
This lecture looks at the actual components of a database management system. What are the main components of a DBMS? What functions do these components perform? Which part of the system is each component responsible for? We communicate with the DBMS using a language - which languages can be used with a DBMS? Why do we need more than one language? What does each language do? What other components exist in the DBMS? What functions do they perform? What features of a system are important when selecting a DBMS?  
*Reading:* Elmasri(Chapter 2), Connolly(Chapter 2) | SQL 2  
This class will work through units from the Oracle book (Red Book). | 1,3,4 |
<table>
<thead>
<tr>
<th>Date</th>
<th>Lecture Title</th>
<th>Instructor</th>
<th>Text Content</th>
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<tr>
<td>29/10</td>
<td><strong>Transaction Processing 1</strong></td>
<td>(SMcK)</td>
<td>This lecture introduces the concept of a transaction which is the main method of guarantee the security and reliability of a database and the data it contains. What problems can occur in a database? What is a transaction? Why does using transactions solve these problems? What is an example of a transaction? Why does a transaction guarantee the integrity of the data? How does a transaction guarantee the security of the data? What problems can occur when using a transaction? Why do these problems occur?</td>
<td>Elmasri(Chapter 2), Connolly(Chapter 19), McFadden(Pages 441-445)</td>
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<tr>
<td>5/11</td>
<td><strong>Transaction Processing 2</strong></td>
<td>(SMcK)</td>
<td>This lecture introduces transaction schedules and locking. When more than one transaction is executing at the same time they must be run according to a schedule. What is a schedule? There are two types of schedule - what are they? Which is the best type of schedule? What is locking? Why is locking necessary? How does locking solve the problems that can occur with transactions? What problems can occur when using locking? How might these problems be avoided?</td>
<td>Elmasri(Chapter 17), Connolly(Chapter 19), McFadden(Pages 441-445)</td>
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<tr>
<td>12/11</td>
<td><strong>Database Recovery</strong></td>
<td>(SMcK)</td>
<td>This lecture discusses the issue of recovery in databases. Recovery is the process of recovering from a failure or error in the system without introducing errors into the data. Why do DBMSs need recovery? What is a bad method of recovery? Why? What is a good method of recovery? How is a recovery system implemented? What are the major components in a recovery system?</td>
<td>Elmasri(Chapter 19), Connolly(Chapter 19)</td>
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<tr>
<td>20/11</td>
<td><strong>Conceptual Modelling 1</strong></td>
<td>(JC)</td>
<td>This lecture reviews the process of building entity-relationship diagrams and conceptual models. What are the steps in the modelling process? How to distinguish between direct and indirect relationships? What are strong and weak entities? Where does modelling fit in database development process?</td>
<td>Connolly(Chapter 11), De Carteret(Chapter 4, 5 and 6), McFadden(Chapter 3)</td>
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<td><strong>SQL 3</strong></td>
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<td>This class will work through units from the Oracle book (Red Book).</td>
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<td><strong>SQL 5</strong></td>
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<td>This class will work through units from the Oracle book (Red Book).</td>
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<td><strong>SQL 6</strong></td>
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<td>This class will work through units from the Oracle book (Red Book).</td>
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<tr>
<td></td>
<td><strong>Conceptual Modelling 1</strong></td>
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<td>This class will work through examples based on the lecture material.</td>
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<td>Week</td>
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| 26/11 | Conceptual Modelling 2 (JC)  
This lecture continues the process of building conceptual models introducing more advanced considerations. What are the different relationship types? What is a recursive relationship and how is it modelled? How can classes be represented in a conceptual model? What are the benefits from having super classes and sub classes? How can multiple inheritance be represented? How are exclusive arc and optional relationships shown? How to resolve difficult relationships?  
*Reading:* Connolly (Chapter 12), De Carteret (Chapter 4, 5 and 6), McFadden (Chapter 4), Elmasri (Chapter 4) | Conceptual Modelling 2  
This class will work through examples based on the lecture material. | | |
| 3/12 | Functional Analysis (JC)  
This lecture introduces the concept of functional dependency and the development of functional dependency diagrams. What is functional dependence? How can this be represented diagrammatically? How are single and composite identifiers shown? What are mutual and transitive dependence? What method is used for constructing a global functional dependence diagram? How does functional analysis relate to the process of normalisation and to choosing relation identifiers? What are the advantages and disadvantages of functional analysis?  
*Reading:* Connolly (Chapter 13), Elmasri (Chapter 14) | Functional Analysis 1  
This class will work through examples based on the lecture material. | | |
| 10/12 | Higher Normal Forms 1 (JC)  
This lecture reviews the normalisation process and looks further to higher normal forms. What is the purpose of the normalisation process? Where does it fit in the database development cycle? What is Boyce-Codd normal form? How does it differ from 3rd normal form? What is 4th normal form and how does it arise? What other normal forms are there? Are these higher normal forms useful or likely to occur?  
*Reading:* Connolly (Chapter 13), Elmasri (Chapter 10) | Higher Normal Forms 1  
This class will work through examples based on the lecture material. | | |

Spring Term
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<th>Date</th>
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| 14/1  | **Database Security I** (SMcK)              | Connolly(Chapter 18), McFadden(Chapter 9), Stoll | **SQL - Security**  
This class will work through units from the Oracle book (Red Book). |
| 21/1  | **Database Security II** (SMcK)             | Connolly(Chapter 18), McFadden(Chapter 9), Stoll | **SQL - Security**  
This class will work through units from the Oracle book (Red Book). |
| 28/1  | **Database Administration and Data Dictionary** (SMcK)  
This lecture introduces database administration - the management of data as a resource - and the data dictionary - a database that stores information about another database. What is database administration? Why should data be managed? What roles may people play in managing a database? Why are these roles important for ensuring a well-managed database? What is the data dictionary? Why is a data dictionary useful? What are the advantages of a data dictionary? What is the structure of a data dictionary?  
*Reading:* Connolly(Chapter 9), Curtis(Section 12.2), McFadden(Chapter 4) | **SQL - Reports**  
This class will work through units from the Oracle book (Red Book). |
| 4/2   | **Embedded SQL - SQLJ** (SMcK)              | Connolly(Chapter 21), Oracle PL/SQL | **SQL - Reports**  
This class will work through units from the Oracle book (Red Book). |
| 11/2  | **Object-Oriented Data Models** (SMcK)      | Connolly(Chapter 24 and 25), Elmasri(Chapter 22) | **Object-Oriented Data Models**  
This class will expand on material presented in the lecture. |
This lecture will introduce the concept of semi-structured data and semi-structured data models. It will discuss the use of XML to describe the structure of different types of data sets. It will introduce the components of an XML document and compare an XML document with an HTML document. 

Reading: Connolly (Chapter 29)

This lecture continues looking at XML. It will look at different types of XML documents: well-formed and validated documents. It will introduce the concept of 'Document Type Definition' (DTD) and discuss when it is appropriate to create a new DTD. This lecture will also discuss and give examples of how an XML document can be parsed.

Reading: White

Summer Term

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<tr>
<td>21/4</td>
<td>Revision Lecture(JC)</td>
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<tr>
<td>28/4</td>
<td>Revision Lecture(SMcK)</td>
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<tr>
<td>5/5</td>
<td>Revision Lecture(SMcK)</td>
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Reading

Core

- Connolly, Thomas and Begg, Database Systems, A Practical Approach to Design, Implementation and Management, Addison-Wesley, 2005. This is the main text and it covers almost all the material discussed in the lectures and seminars.

Recommended


**Other**

• Stoll, Clifford, *Cuckoo’s Egg*, Pocket Books, 2000. *This is a classic book describing the author’s role in tracking down the people behind a major hacking incident. It illustrates many of the issues that are involved in securing complex computer systems.*


**Learning Outcomes (L/O)**

1. Understanding the factors to be considered in choosing a database product for an application, as might be demonstrated by specifying a database management system for an application.

2. Design, develop and extend a database application for business, as might be demonstrated by designing such an application.

3. Understand the role of the database administrator as might be demonstrated by designing a multi-user database application.

4. Understand the use of client-server technology as might be demonstrated by implementing a client-server database.