

**University of Exeter**

**Faculty of Environment, Science and Economy**

**ECM2419 - Database Theory and Design**

## **Course Work**

**Release Date: Wednesday 2<sup>nd</sup> November 2022**

**Submission Deadline: 12:00 noon Thursday 1<sup>st</sup> December 2022**

This course work weights 40% of the overall module assessment. This is an **individual assessment** and you are reminded of the University's Regulations on Collaboration and Plagiarism. You must avoid plagiarism, collusion and any academic misconduct behaviours. Further details about Academic Honesty and Plagiarism can be found at <https://vle.exeter.ac.uk/course/view.php?id=1957>

# 1. OBJECTIVES

This coursework comprises two parts:

1. Specifications analysis and high-level database design
2. Relational database normalisation

Part 1 is about designing a database system for the Department of Computer Science at the University of Exeter whose specification is provided in section 2, in particular:

- (i) producing an *Entity Relationship Diagram* (ERD) *using UML notation* that fully captures the specifications.
- (ii) explaining and justifying systematically all elements of your ERD.

Part 2 is about converting provided relational data described in section 3 to *3<sup>rd</sup> normal form* (3NF), in particular:

- (i) producing normalised relation schema and data.
- (ii) explaining the process by which you generated them from the data given and justifying any assumptions you have made.

**Note that these are design tasks which may require students to resolve ambiguities, fill in relevant missing details, and carefully interpret the specification and data provided. Students are expected to do this autonomously and explicitly explain and justify all their design decisions.**

## 2. DATABASE SPECIFICATION

In this assignment you are required to carry out an analysis and high-level design for a database system for the Department of Computer Science at the University of Exeter. The Department is part of the Faculty of Environment, Science and Economy, and it is housed in Innovation Centre Building at Streatham Campus in Exeter. General information about the department can be found on <https://computerscience.exeter.ac.uk/>.

The purpose of the database is to enable the Department to keep track of its current students and academic staff. It is also to enable the Department to keep track of its education (teaching and learning) and research activities. During your analysis and design you may need to make assumptions in the design process. If you do so, then you should ensure that your assumptions are i) clearly stated, ii) justified and iii) followed through in the design process.

Staff members within the campus generally fall into one of three categories: academic staff, research staff and professional services staff. Academic staff may be classified as associate lecturers, lecturers, senior lecturers, associate professors and professors. Research staff may be classified as postdoctoral research associate, research fellows and senior research fellows. A list of academic staff in the Department is available on the website: <https://computerscience.exeter.ac.uk/staff/>.

The students in the department include undergraduate students, taught postgraduate students (i.e., students on MSc programmes) and research postgraduate students (i.e., students doing MPhil and PhD programmes). Each student is allocated a tutor from amongst the academic staff on enrolling. Students are enrolled on one programme at a time. Each degree programme has a number of mandatory modules and optional modules. A list of the programmes offered

by the Department is available on the website: <https://intranet.exeter.ac.uk/emps/studentinfo/subjects/computerscience/programmes/2022/>. Each module is taught by one or more academic staff members. One of these academic staff members are designated the Module Leader. The role of the Module Leader is to organise the module's teaching and assessment activities. The majority of the Department's modules are assessed through both an examination and coursework. However, a small percentage of the Department's modules are entirely assessed through either a coursework or an examination.

### 3. DATA TO NORMALISE

From the module ELE page (<https://vle.exeter.ac.uk/course/view.php?id=10429>), download the spreadsheet called StaffTeachingRecords.xlsx. This can be found in the tile 'Assessment information and submission' under the section 'Coursework Brief'. This spreadsheet shows some sample data of the past teaching records from different academic staff members within the Department of Computer Science. Note that each academic staff member may teach the same module in different academic years. The 'Number of Times' attribute indicates how many times a specific module was taught by the staff member. Each academic staff is also affiliated to one research group in which there is one senior staff member acting as the group lead.

### 4. WHAT YOU SHOULD SUBMIT

You should submit a **single PDF** document to the EBART electronic submission system (<https://bart.exeter.ac.uk/>) by **12:00 noon on Thursday 1<sup>st</sup> December 2022**.

The document should be organised in two separate sections, one for each part of the coursework. Part 1 of your document **must not exceed 4 pages (4 sides of A4)** and should comprise:

- 1) An Entity Relationship Diagram (**using UML notation**) for your design of the database system. Where appropriate you should make use of enhanced Entity-Relationship Diagrams. The Entity Relationship Diagram should include all the necessary entities (including their attributes) and relationships needed to meet fully the specifications of the database.
- 2) A systematic explanation of the Entity-Relationship Diagram of the database system. Where appropriate you should make reasonable assumptions to filling relevant missing details. You should describe and justify the entities (including entity attributes) and relationships between the entities that fulfil the specifications of the database.

Part 2 of your document **must not exceed 4 pages (4 sides of A4)** and should comprise:

- 1) Your normalised table definitions (i.e., relation schema and data).
- 2) A description of the process by which you generated them from the data given, and any assumptions you have made.

## 5. MARKING SCHEME

Task No.	Task Description	Key Aspects to be Assessed	Mark Allocated
1.1	Entity Relationship Diagram for your design of the database	Marks will be allocated for identifying and appropriately naming all the <b>entities</b> , <b>relationships</b> and <b>attributes</b> that ensure that the resulting database design will comply fully with the specifications mentioned in section 2 and any other requirements from your reasonable assumptions. Marks will be allocated for indicating the <b>cardinality</b> of each entity in each relationship, for identifying and labelling the <b>primary keys</b> of all the entities, and for appropriate use of <b>enhanced constructs</b> (e.g., generalisation/specialisation).	40
1.2	A report explaining your Entity Relationship Diagram	Marks will be allocated for a <b>systematic description and clear justification of all elements</b> of your design, stating explicitly and justifying any <b>assumptions</b> made. This includes clear justification of your use of entities, relationships and attributes; justification of the choice of the primary keys of all the entities in your database design as well as the cardinality of each entity in a relationship; justification of enhanced construct. Writing and presentation will also be assessed.	30
2.1	Normalisation	Marks will be allocated for the <b>correct tables</b> normalised to 1NF, 2NF and 3NF for the provided data.	20
2.2	Normalisation documentation	Marks will be allocated for <b>clearly describing the process</b> for normalisation to 3NF of the provided data showing all intermediate steps, and any <b>assumptions</b> you have made.	10
Penalty of overlength submissions (-10 marks) Penalty of drawing ERD without using UML notation (-10 marks)			