Subject Outline

Subject Name	Database Systems
Subject Code	CP5804
Study Period	SP82 2020
Study Mode	External
Campus	JCU Online
Subject Coordinator	Dr. Joanne Lee

We acknowledge the Traditional Owners of the lands and waters where our University is located and actively seek to contribute and support the JCU Reconciliation Statement, which exemplifies respect for Australian Aboriginal and Torres Strait cultures, heritage, knowledge and the valuing of justice and equity for all Australians.

Pre-requisites

There is no pre-requisite required for this subject.

This subject outline has been prepared by [Type here] for the College of [Type here], Division of [Type here], James Cook University. Updated [Type here].

Q1. This subject is offered across more than one campus and/or mode and/or teaching period within the one calendar year.	Yes ☒	No ☐
Q2. If Yes (Q1), the design of all offerings of this subject ensure the same learning outcomes and assessment types and weightings.	Yes ☒	No ☐
Q3. If no (Q2), **[Type here]** has authorised any variations, in terms of equivalence.		

Subject Outline Peer Reviewer

Name	
Position	
Date Reviewed	

Staff Contact Details

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Contents

1 Subject at a glance

1.1 Student participation requirements

The JCU Learning, Teaching and Assessment Policy (4.3) indicates that, "a **3 credit point subject** will require a **130 hour work load** of study-related participation including class attendance over the duration of the study period, **irrespective of mode of delivery"**. This work load comprises **timetabled hours** and **other attendance requirements**, as well as **personal study hours,** including completion of online learning activities and assessment requirements. Note that "attendance at specified classes will be a mandatory requirement for satisfactory completion of some subjects" (Learning, Teaching and Assessment Policy, 5.10); and that additional hours may be required per week for those students in need of **English language, numeracy** or **other learning support.**

External study is study that does not require on-campus attendance but does require online attendance and participation. All other rules, guidelines and expectations apply. Assessment due dates, learner responsibility in terms of participation and engagement and independent learning skills are necessary. Getting Started: Find out more at the JCU Off-Campus Student Information website: https://www.jcu.edu.au/off-campus-students

You are expected to participate in the Learn Ultra discussion boards. Discussion boards give you a place to interact with staff and other students about subject content and topics, and help you to clarify and extend their understanding of key content. These are a forum for you to present their thoughts/ideas in an online version of an in-person classroom discussion and therefore the same courtesy rules apply.

While attendance in the Collaborate sessions is not mandatory, it is highly recommended. These sessions will provide you with the opportunity to have synchronous (at the same time) conversations with your Subject Coordinator (or your tutor) and with your fellow students from across the subject, to have your questions answered and to receive further clarification about any concerns or questions you may have.

Key subject activities	Time	Day/ Date	Room/ Location
Weekly topic materials	Self-directed	Weekly (Week 1 ~ Week 6)	LearnJCU subject site
Weekly lab tasks	Self-directed	Weekly (Week 1 ~ Week 6)	LearnJCU subject site
SAS course tasks	Self-directed	Weekly (Week 1 ~ Week 6)	LearnJCU subject site
Online Sessions	See Ultra	Weekly (Week 1 ~ Week 6)	LearnJCU Collaborate

1.2 Key dates

Key dates	Date
Census date	See 2020 Study Period and Census Dates
Last date to withdraw without academic penalty	See 2020 Study Period and Census Dates
Assessment task 1 [Conceptual database modelling] [30%]	Due [Week 5 – See LearnJCU for detail]
Assessment task 2 [Normalization] [15%]	Due [Week 4 – See LearnJCU for detail]
Assessment task 3 [Database implementation and writing queries] [15%]	Due [Week 6 – See LearnJCU for detail]
Assessment task 4 [Lab activity] [25%]	Due [Weekly Week 2 to 6 – See LearnJCU for detail
Assessment task 5 [SAS self-training activity] [15%]	Due [Weekly Week 2 to 7 – See LearnJCU for detail]

2 Subject details

2.1 Subject description

The subject will provide an introduction to the principles and concepts of database systems and their importance in data science. The relational model and various competing models for database, and a database query language are introduced and applied. Through this subject you will develop skills in techniques and tools to model, design and implement a database system using SQL.

2.2 Subject learning outcomes

On successful completion of this subject, you will be able to:

- critically appraise database and database management systems, their features and rationale
- formulate queries using a database query language
- develop a database model using the entity-relationship model
- describe and apply the techniques of normalisation
- construct a database design to a database management system

These outcomes will contribute to your overall achievement of **course learning outcomes.** Your course learning outcomes can be located in the entry for your course in the electronic JCU Course and Subject Handbook 2019 (click on 'Course Information' bar/ select 'Undergraduate Courses' or 'Postgraduate Courses'/ select relevant course/ scroll down to 'Academic Requirements for Course Completion', 'Course learning outcomes').

2.3 Learning and teaching in this subject

This subject uses a combination of approaches to teaching and learning, including both students centred and tutor (online) directed approaches. The content of the subject is disseminated using a variety of teaching strategies including main topic coverages, relevant lab activities, and readings. All teaching materials are available through online delivery.

The assessment activities in this subject aim to be authentic applications of the concepts/theory learned. Weekly learning activities might be less 'real world' but will be stepping stones towards the assessment items. Each weekly topic is subdivided into small mini-modules accompanied by corresponding mini hands- on practice materials. Because the practical aspects of database design are stressed, we cover design concepts and procedures in details by providing a number of end-of-module problems and cases so you can develop real and useful design skills.

In addition to main subject materials requiring students' self-direction, weekly mandatory practical classes are run by tutor. These face-to-faces essions are the useful real time source of communication in this subject. They provide the opportunity to consolidate and apply your knowledge and ask questions.

2.4 Student feedback on subject

As part of our commitment at JCU to improving the quality of our courses and teaching, we regularly seek feedback on your learning experiences. Student feedback informs evaluation of subject and teaching strengths and areas that may need refinement or change. ***YourJCU Subject and Teaching Surveys*** provide a formal and confidential method for you to provide feedback about your subjects and the staff members teaching within them. These surveys are available to all students through LearnJCU. You will receive an email invitation when the survey opens. We value your feedback and ask that you provide constructive feedback about your learning experiences for each of your subjects, in accordance with responsibilities outlined in the Student Code of Conduct. Refrain from providing personal feedback on topics that do not affect your learning experiences. Malicious comments about staff are deemed unacceptable by the University.

2.5 Subject resources and special requirements

Textbook

The following textbook is used for this subject. The electronic copy is available through the JCU library Online.

> Coronel and Morris (2017) *Database Systems: Design, Implementation, & Management*, 12th Ed. *Cengage Learning*, ISBN: 978-1-305-62748-2

The following is a useful reference but is not required for the subject. The electronic copy is available through the JCU library.

> Rod Stephens (2009) Beginning Database Design Solutions, Wiley

MySQL Workbench

This is the essential tool that you will use in this subject. The Community (open source software) Edition is available for free at https://www.mysql.com/products/workbench

SAS

For the SAS component of the subject, you will use the University Edition of the SAS software which is available for free at:

https://www.sas.com/en_au/software/university-edition.html

3 Assessment details

3.1 Requirements for successful completion of subject

In order to pass this subject, you must:

- Achieve an overall percentage of 50% or more;
- Submit a credible attempt at all assessment items within this subject. Students who have completed less than 100% of the assessment will be subject to review by the College Assessment Committee which could result in an 'X' grade (*Fail (did not sit for exam/s or did not complete at least 80% of assessment requirements or deferred exam not granted))*
- Demonstrate regular attendance and engagement with the content of this subject in accordance with student participation requirements as outlined in 1.1, including but not limited to any mandatory face to face attendance or online session participatory attendance.

Assessment items and final grades will be reviewed through moderation processes (Learning, Teaching and Assessment Policy, 5.13-5.18). It is important to be aware that assessment "is always subject to final ratification following the examination period and that no single result represents a final grade in a subject" (Learning, Teaching and Assessment Policy, 5.22.).

Reasonable adjustments may be made to assist students manage additional circumstances impacting on their studies provided these do not change the academic integrity of a degree. Reasonable adjustments do not alter the need to be able to demonstrate the inherent requirements of the course. Students who believe they will experience challenges completing their degree or course because of their disability, health condition or other reason should discuss their concerns with an Access Ability Services team member or a member of College staff, such as the Course Coordinator. In the case where it is determined that inherent requirements cannot be met with reasonable adjustments, the University staff can provide guidance regarding other study options.

3.2 Feedback on student learning

The marked assessment and feedback will be available online through LearnJCU no later than 21 days after the due date (click on My Grades in the subject site menu).

3.3 Assessment tasks

ASSESSMENT TASK 1: CONCEPTUAL DATABASE MODELING

Aligned subject learning outcomes	• develop a database model using the entity-relationship model
Group or individual	Individual
Weighting	30%
Due date	End of Week 5 – See LearnJCU for detail

ASSESSMENT TASK 1: DESCRIPTION

You will be given a number of small-scale business scenarios to conceptually design a relational database model for each scenario. For each scenario, you are required to conceptually model the design in the form of an Entity-Relationship-Diagram (ERD), which will be drawn using a proper software tool (like MySQL Workbench, MS Visio, etc.).

ASSESSMENT TASK 1: CRITERIA SHEET

	Criteria	Exemplary	Competent	Marginal	Unacceptable
Database Modelling	Entities (presented in ERD)	**10** All required entities (based on the business scenario given) are included in ERD.	**5-9** Most required entities are included but not perfectly designed	**2-4** Many of required entities are missing	**0-1** Not attempted (0) or all or most entities included are not relevant or incorrect
	Attributes (Fields) (presented in ERD)	**10** Attributes in each entity are relevant to desired information and correctly designed. All required attributes are included. Attributes are named correctly and logically	**5-9** Some of required attributes are missing or named inappropriately	**2-4** Many of required attributes are missing or named inappropriately	**0-1** Most of required attributes are missing or incorrectly designed (included in a wrong entity etc.)
	Connectivities (presented and ERD)	**10** All relationships are correctly designed and presented in ERD.	**5-9** Most but not all (more than 50%) relationships are correctly designed and presented in ERD	**2-4** Some (less than 50%) relationships are correctly designed and presented in ERD	**0-1** Most of required relationships between entities are missing or incorrectly designed.
	Cardinalities & Optionalities (presented in ERD)	**10** All cardinalities and optionalities are appropriately designed and presented in ERD.	**5-9** Most but not all (more than 50%) cardinalities and optionalities are correctly designed and presented in ERD	**2-4** Some (less than 50%) cardinalities and optionalities are correctly designed and presented in ERD	**0-1** Most of required cardinalities and optionalities are missing or incorrectly designed.
	Relationship Names (presented in ERD)	**10** All relationships presented in ERD are appropriately named.	**5-9** Most but not all (more than 50%) relationships are named appropriately	**2-4** Some (less than 50%) relationships are appropriately named	**0-1** Most relationship names are missing
	Relationship Strength (presented in ERD)	**10** All relationship strength (weak or strong) is appropriately designed and correctly presented in ERD (dotted line or solid line)	**5-9** Most but not all (more than 50%) relationships are presented correctly corresponding with its strength	**2-4** Some (less than 50%) relationships are presented correctly corresponding with its strength	**0-1** Most relationship strengths are not presented appropriately
	Primary keys	**10** All primary keys are correctly identified and unique	**5-9** Most but not all primary keys are correctly identified and unique	**2-4** Some primary keys are correctly identified and unique	**0-1** Most primary keys are not properly identified or unique
	Foreign keys	**10** All necessary foreign keys are correctly identified	**5-9** Most but not all necessary foreign keys are correctly identified	**2-4** Some foreign keys are correctly identified	**0-1** Most foreign keys are not correctly identified
Presentation	ERD	**10** All components included in ERD are neatly and clearly presented without unnecessary complexity	**5-9** Some parts in ERD are not clear or easily visible due to inappropriate display of components	**1-4** Most of ERD are not clear or neatly presented.	**0** ERD is not included
Assumptions		**10** All necessary assumptions are appropriately made and listed. All assumptions are correctly incorporated in ERD	**5-9** Most but not all assumptions are made appropriately or correctly incorporated in ERD	**1-4** Some assumptions are made but not correctly incorporated in ERD.	**0** Assumptions are not made or listed at all.

Further details on Marking Criteria for each assessment item will be provided via LearnJCU.

ASSESSMENT TASK 2: NORMALIZATION

Aligned subject learning outcomes	• describe and apply the techniques of normalisation
Group or individual	Individual
Weighting	15%
Due date	End of Week 4 – See LearnJCU for detail

ASSESSMENT TASK 2: DESCRIPTION

You will be given a number of tasks to test them to fully understand the concept of dependency between attributes and normalization. Non-normalized sample data will be provided for you to apply appropriate normalization process from the lower normal form to highest form (usually 3NF).

ASSESSMENT TASK 2: CRITERIA SHEET

Criterion	Description	Mark
Dependency Diagram	Define appropriate PK by identifying dependencies from PK to other attributes correctly	1
	Correctly identify partial dependencies or transitive dependencies if necessary	1
Understanding the initial normal form	Correctly identify what normal form the relation currently is	0.5
	Correctly state the reason for the answer	0.5
Normalization process (up to 3NF)	Normalize the given relation table to a number of 3NFs and draw the dependency diagrams of 3NF tables correctly	4
Transforming the completed 3NF to ERD	Transform and present tables correctly	3
	Set PKs and FKs correctly	2
	Set relationships between tables correctly (connectivities, cardinalities and optionalities)	2
	State reasonable assumptions correctly corresponding to optionalities presented in the ERD	1

Further details on Marking Criteria for each assessment item will be provided via LearnJCU.

ASSESSMENT TASK 3: IMPLEMENTING DATABASE AND QUERIES

Aligned subject learning outcomes	• construct a database design to a database management system • formulate queries using a database query language
Group or individual	Individual
Weighting	15%
Due date	Wednesday of Week 7 – See LearnJCU for detail

ASSESSMENT TASK 3: DESCRIPTION

You will be given a completed example ERD and they are required to implement the completed ERD model using a DBMS (MySQL Workbench). This involves creating the physical table structures, defining the relationships between tables and creating SQL queries to execute various tasks including importing data from existing tables, retrieving information from the existing DB by applying various relational operations.

ASSESSMENT TASK 3: CRITERIA SHEET

REQUIREMENT	CRITERIA	MARKS
Task 1: Creating the database	All tables required are correctly created • Correct attributes (1 mark) • Setting correct Primary keys (1 mark) • Data added correctly (1 mark)	3 marks for each table
	Relationships are constructed correctly	1 mark for each relationship
Task 2: Creating queries	Queries produce the correct results with correct logic	2 marks for each query

Further details on Marking Criteria for each assessment item will be provided via LearnJCU.

ASSESSMENT TASK 4: DATABASE LAB ACTIVITY

Aligned subject learning outcomes	• critically appraise database and database management systems, their features and rationale • develop a database model using the entity-relationship model • construct a database design to a database management system • formulate queries using a database query language
Group or individual	Individual
Weighting	25% (5 weekly lab submission in total – 5% for each lab submission)
Due date	Weekly End of Week 2 to 6 - See LearnJCU for detail

ASSESSMENT TASK 4: DESCRIPTION

You will be given weekly lab tasks to cover the practical aspects of conceptual DB modeling, DB implementation and operation by utilizing an example DBMS (MySQL Workbench) as a tool. A set of practical tasks are given every week and you are required to follow instructions through the given weekly task sheet, complete all tasks as instructed and submit the completed worksheet by the due date, usually the end of the week.

ASSESSMENT TASK 4: CRITERIA SHEET

Participation assessment will be based on you efforts to complete the work to a satisfactory standard, not to get everything correct. Students will be marked for each weekly activity participation as follows:

0 ~ 1 – not attempted or minimal effort

2 ~ 4 – some of the work attempted/completed with decent effort but nor fully successfully

5 – all of the work successfully completed

Further details on Marking Criteria for each assessment item will be provided via LearnJCU.

ASSESSMENT TASK 5: SAS COURSE TRAINING

Aligned subject learning outcomes	• critically appraise database and database management systems, their features and rationale • formulate queries using a database query language
Group or individual	Individual
Weighting	15%
Due date	Weekly Wednesday Week 2 to 7 - See LearnJCU for detail

ASSESSMENT TASK 5: DESCRIPTION

You are provided free course materials provided by SAS Institute Inc. covering two SAS modules: SAS Programming I Essentials and SAS SQL I Essentials. You are required to work these two SAS modules by self-directed way.

You are given a set of exercises after each module to respond to. You will be asked to submit screen-captured image of results of selected exercises.

ASSESSMENT TASK 5: CRITERIA SHEET

You are required to submit their works for six exercise sets (recommended to do weekly) in total, and each submission will be marked by the following categories:

0 – not submitted or submit non-relevant results
1 or 2 – submitted but the results are not fully desirable
2.5 – submit results correctly complete

Further details on Marking Criteria for each assessment item will be provided via LearnJCU.

4 Submission and return of assessment

4.1 Submission of assessment

All assessments are submitted through Learn Ultra.

Note that the Learning, Teaching and Assessment Policy (5.22.3) outlines a uniform formula of penalties that will be imposed for submission of an assessment task after the due date. **This formula is 5% of the total possible marks for the assessment item per day including part-days, weekends and public holidays**. After 20 days, the assessment item thus would be awarded 0 marks (i.e. 5% x 20 = 100% of total possible marks in penalties).

4.2 Return of assessment

Feedback on marked assessments will be available in the Gradebook in Learn Ultra.

Please see the Current Students web page for links to all student resources and support services to optimise your academic and personal success.
Please see the Learn Student Guide web page for general advice on plagiarism, referencing and examinations. Here, you can also access individual and group assessment task cover sheets. Note that cover sheets are only required for hard copy submissions.

5 Subject calendar

Please note, the sequence of some topics may change due to staff availability, resourcing, or due to unforeseen circumstances.

Week/Date/Module theme		Topics covered	Related readings	Lab activity	(Self-directed) SAS course training Weekly schedule recommended	Note for assessment
1	Introduction to Database Systems and Data Models	DB, DBMS, Relational DB Model, Business Rules	Chapter 1, 2.1~2.4	Download & Install MySQL Workbench	SAS Programming I: Essentials 1~3	
2	Entity Relationship Modeling	ER Diagram (ERD), Extended ERD, Advanced Data Modeling Issues, Data Integrity	Chapter 3.1~3.3, 4, 5.1~5.3	Drawing ERD on MySQL Workbench	SAS Programming I: Essentials 4~6	Lab 2 Due
3	Normalization of Database Tables	Normal forms, Improving Design, Denormalization	Chapter 5.4, 6	Implementing a DB model on MySQL Workbench (I)	SAS Programming I: Essentials 7~9	Lab 3 Due
4	Introduction to SQL	Relational Set Operations, Data Definition Commands, Data Manipulation Commands, Joining Tables	Chapter 7	Implementing a DB model on MySQL Workbench (II)	SAS Programming I: Essentials 10~12	Lab 4 Due Assessment 2 Due
5	Advanced SQL	More SQL Join Operators, Subqueries, Correlated queries, Trigger	Chapter 8	SQL Practice - basics	SAS SQL 1 Essentials 1~4	Lab 5 Due Assessment 1 Due
6	Evaluate a Database Design	Database Life Cycle (DBLC), Database Design Strategies.	Chapter 9	SQL Practice - advanced	SAS SQL 1 Essentials 5~8	Lab 6 Due
7						SAS 6 Due Assessment 3 Due