ICT200 DATABASE DESIGN AND DEVELOPMENT T325 BRIEF

All information in the Subject Outline is correct at the time of approval. KOI reserves the right to make changes to the Subject Outline if they become necessary. Any changes require the approval of the KOI Academic Board and will be formally advised to those students who may be affected by email and via Moodle.
Information contained within this Subject Outline applies to students enrolled in the trimester as indicated

1. General Information

1.1 Administrative Details

Associated HE Award(s)	Duration	Level	Subject Coordinator
Bachelor of Information Technology (BIT)	1 trimester	Level 2	Dr Saad Sajid Hashmi saad.hashmi@koi.edu.au P: +61 (2) 9283 3583 L: 7-11, 11 York St. Consultation: via Moodle or by appointment.

1.2 Core / Elective
Core subject in the BIT

1.3. Subject Weighting

Indicated below is the weighting of this subject and the total course points.

Subject Credit Points	Total Course Credit Points
4	BIT (96 Credit Points)

1.4 Student Workload

Indicated below is the expected student workload per week for this subject

No. timetabled hours/week*	No. personal study hours/week**	Total workload hours/week***
4 hours/week (2 hour Lecture + 2 hour Tutorial)	6 hours/week	10 hours/week

* Total time spent per week at lectures and tutorials
** Total time students are expected to spend per week in studying, completing assignments, etc.
*** Combination of timetable hours and personal study.

1.5 Mode of Delivery Classes will be face-to-face or hybrid. Certain classes will be online (e.g., special arrangements).

1.6 Pre-requisites ICT103 Systems Analysis and Design

1.7 General Study and Resource Requirements

- Dedicated computer laboratories are available for student use. Normally, tutorial classes are conducted in the computer laboratories.
- Students are expected to attend classes with the requisite textbook and must read specific chapters prior to each tutorial. This will allow them to actively take part in discussions. Students should have elementary skills in both word processing and electronic spreadsheet software, such as OFFICE 365 or MS Word and MS Excel.
- Computers and WIFI facilities are extensively available for student use throughout KOI. Students are

encouraged to make use of the campus Library for reference materials.

- Students will require access to the internet and email. Where students use their own computers, they should have internet access. KOI will provide access to required software.

Software Resource requirements specific to this subject: Office 365, MS Imagine, SQL Server 2017.

1.8 Academic Advising

Academic advising is available to students throughout teaching periods including the exam weeks. As well as requesting help during scheduled class times, students have the following options:

- Consultation times: A list of consultation hours is provided on the homepage of Moodle where appointments can be booked.
- Subject coordinator: Subject coordinators are available for contact via email. The email address of the subject coordinator is provided at the top of this subject outline.
- Academic staff: Lecturers and Tutors provide their contact details in Moodle for the specific subject. In most cases, this will be via email. Some subjects may also provide a discussion forum where questions can be raised.
- Head of Program: The Head of Program is available to all students in the program if they need advice about their studies and KOI procedures.
- Vice President (Academic): The Vice President (Academic) will assist students to resolve complex issues (but may refer students to the relevant lecturers for detailed academic advice).

2. Academic Details

2.1 Overview of the Subject

This subject will provide the student with an overall understanding of database development, concepts and theory. Students will learn to design and build a database from data analysis, normalisation, mapping a specific database model. The relational model is emphasised and introduced using structured query language (SQL) for creating and manipulating databases in both MS Access and SQL Server environments. Assignment work includes the analysis, design, and implementation of a database using SQL queries in SQL Server environment.

2.2 Graduate Attributes for Undergraduate Courses

Graduates of Bachelor courses from King's Own Institute (KOI) will achieve the graduate attributes expected under the Australian Qualifications Framework (2nd edition, January 2013). Graduates at this level will be able to apply a broad and coherent body of knowledge from their major area of study in a range of contexts for professional practice or scholarship and as a pathway for further learning.

King's Own Institute's generic graduate attributes for a bachelor's level degree are summarised below:

	KOI Bachelor Degree Graduate Attributes	**Detailed Description**
	Knowledge	Current, comprehensive, and coherent and connected knowledge
	Critical Thinking	Critical thinking and creative skills to analyse and synthesise information and evaluate new problems
	Communication	Communication skills for effective reading, writing, listening and presenting in varied modes and contexts and for transferring knowledge and skills to a variety of audiences
	Information Literacy	Information and technological skills for accessing, evaluating, managing and using information professionally

	Problem Solving Skills	Skills to apply logical and creative thinking to solve problems and evaluate solutions
	Ethical and Cultural Sensitivity	Appreciation of ethical principles, cultural sensitivity and social responsibility, both personally and professionally
	Teamwork	Leadership and teamwork skills to collaborate, inspire colleagues and manage responsibly with positive results
	Professional Skills	Professional skills to exercise judgement in planning, problem solving and decision making

Across the course, these skills are developed progressively at three levels:

- **Level 1 Foundation** – Students learn the basic skills, theories and techniques of the subject and apply them in basic, standalone contexts
- **Level 2 Intermediate** – Students further develop the skills, theories and techniques of the subject and apply them in more complex contexts, and begin to integrate this application with other subjects.
- **Level 3 Advanced** – Students demonstrate an ability to plan, research and apply the skills, theories and techniques of the subject in complex situations, integrating the subject content with a range of other subject disciplines within the context of the course.

2.3 Subject Learning Outcomes

This is a Level 2 subject.

On successful completion of this subject, students should be able to:

Subject Learning Outcomes	Contribution to Graduate Attributes
a) Explain the history and development of database technologies and the emergence of the relational database model and SQL.	
b) Demonstrate and apply conceptual and logical database design techniques using entity relationship diagrams (ERD) and extended relationship diagrams (EERD) based on business requirements.	
c) Design, develop, test, and critically evaluate an effective physical database by describing and carrying out necessary steps.	
d) Formulate, write, and execute queries in both SQL and NoSQL environments to retrieve, manipulate, and analyse data effectively.	
e) Describe and explain the key concurrency and data administration techniques in database management systems, including transaction processing, recovery, serializability, and access control.	
f) Apply database distribution, big data concepts, and web standards to design scalable, secure, and ethical systems that respect privacy.	

2.4 Subject Content and Structure

Below are details of the subject content and how it is structured, including specific topics covered in lectures and tutorials. Reading refers to the text unless otherwise indicated.

Weekly Planner:

Week (beginning)	Topic covered in each week's lecture	Reading(s)	Expected work as listed in Moodle
Week 1 27 Oct	Introduction to DBMS: ● History of database processing ● Emergence of relational model ● Post-relational developments ● DBMS concepts	Ch.1	Chapter 1 Discussion. Introduction to Database concepts and SQL environments. Formative Tutorial exercise
Week 2 03 Nov	Data modelling with the Enhanced Entity- Relationship model: ● Purpose of a data model ● The E-R model and diagrams ● Variations of the E-R model ● Entities and data modelling ● Process	Ch.5	Activities, Data Modelling ERD exercises. Summative Tutorial exercises (2%)
Week 3 10 Nov	The relational model and normalisation: ● Characteristics of relationships and relational Model ● Normalisation advantages and disadvantages ● Normal forms and normalisation categories	Ch.3	Activities, Normalisation exercises on 1NF, 2NF, 3NF and BCNF. Summative Tutorial exercises (2%)
Week 4 17 Nov	Transforming data models into database designs: ● Purpose of database design ● Tables, entities, primary/alternate keys ● Verify normalisation ● Create relationships ● Design for minimum cardinality	Ch.6	Activities and Database Exercises - creating tables and relationships in SQL, Database Design exercises. Summative Tutorial exercises (2%)
Week 5 24 Nov	Introduction to Structured Query Language: ● To understand SQL statements ● Using SQL in MS SQL Server	Ch 2	Activities and Database exercises - execute simple SQL queries in MS Access and SQL Server. Summative Tutorial exercises (2%) **Assessment 2: Quiz (15%)**
Week 6 01 Dec	SQL for database construction and application processing: ● Use of Relational Algebra in SQL ● SQL Queries using two or more tables	Ch.2	Activities and Database Exercises - Complex SQL queries using relational Algebra, and join Summative Tutorial exercises (2%)

Week (beginning)	Topic covered in each week's lecture	Reading(s)	Expected work as listed in Moodle
Week 7 08 Dec	SQL for database construction and application processing: ● Creating SQL Views ● Use of Functions, Triggers, and Stored Procedures	Ch.7	Activities and Database Exercises – Execute advanced SQL queries using SQL Server Summative Tutorial exercises (2%)
Week 8 15 Dec	Database Redesign: ● The need for database redesign ● Analysing existing databases ● Making changes to tables, columns, constraints, cardinalities, relationships ● Reverse and forward engineering ● SQL Queries using subqueries	Ch. 8	Chapter Activities – Database Redesign, Alter Table names, columns, relationships Summative Tutorial exercises (2%) **Assessment 3: Practical Exam (30%)**
Week 9 05 Jan	Managing multiuser databases: ● Database administration ● DBMS and application security ● Database backup and recovery ● Managing the DBMS and data repository ● Data Ethics and Privacy	Ch.9 Reading Resources related to ACS code of conduct, General Data Protection Regulation (GDPR) and Australia's Privacy Principles	Chapter Activities related to resource locking, database security, ethics, privacy, backup, and recovery Summative Tutorial exercises (2%)
Week 10 12 Jan	The web server environment: ● The web database processing environment ● Database server access standards ● The importance of XML ● Use of NoSQL	Ch.11	Chapter Activities related to ODBC, OLE DB and ADO.NET, and JDBC Database Exercises – Execute NO SQL queries using MongoDB Summative Tutorial exercises (2%)
Week 11 19 Jan	Distributed Database,Big data, data warehousing, and business intelligence systems: ● Distributed database concepts ● Big data and business intelligence systems ● Data warehousing and data marts ● OLAP and data mining ● Cloud computing	Ch.12	Chapter Activities related to Distributed database, Big Data, Business Intelligence, Data Warehousing, Data Mart, and Cloud computing Summative Tutorial exercises (2%) **Assessment 4: Group report, self-reflection report and presentation (35%)**
Week 12 27Jan (Tue)	**Revision**	All Chapters	**Revision**

Week (beginning)	Topic covered in each week's lecture	Reading(s)	Expected work as listed in Moodle
Week 13 02 Feb	Study review week and Final Exam Week		
Week 14 09 Feb	Examinations Continuing students - enrolments for T126 open		Please see exam timetable for exam date, time and location
Week 15 16 Feb	Student Vacation begins New students - enrolments for T126 open		
Week 16 23 Feb	• Results Released • Review of Grade Day for T325 – see Sections 2.6 and 3.2 below for relevant information. • Certification of Grades NOTE: More information about the dates will be provided at a later date through Moodle/KOI email.		
T126 2 Mar 2026			
Week 1 02 Mar	Week 1 of classes for T126		

2.5 Teaching Methods/Strategies

Briefly described below are the teaching methods/strategies used in this subject:

- *Lectures* (2 hours/week) are conducted in seminar style and address the subject content, provide motivation and context and draw on the students' experience and preparatory reading.
- *Tutorials* (2 hours/week) include class discussion of case studies and research papers, practice sets and problem-solving and syndicate work on group projects. Tutorials often include group exercises and so contribute to the development of teamwork skills and cultural understanding. Tutorial participation is an essential component of the subject and contributes to the development of many of the graduate attributes (see section 2.2 above). Tutorial participation contributes towards the assessment in many subjects (see details in Section 3.1 for this subject). Supplementary tutorial material such as case studies, recommended readings, review questions etc. will be made available each week in Moodle.
- *Online* teaching resources include class materials, readings, model answers to assignments and exercises and discussion boards. All online materials for this subject as provided by KOI will be found in the Moodle page for this subject. Students should access Moodle regularly as material may be updated at any time during the trimester
- *Other contact* - academic staff may also contact students either via Moodle messaging, or via email to the email address provided to KOI on enrolment.

2.6 Student Assessment

Assessment is designed to encourage effective student learning and enable students to develop and demonstrate the skills and knowledge identified in the subject learning outcomes. Assessment tasks during the first half of the study period are usually intended to maximise the developmental function of assessment (formative assessment). These assessment tasks include weekly tutorial exercises (as indicated in the weekly planner) and low stakes graded assessment (as shown in the graded assessment table). The major assessment tasks where students demonstrate their knowledge and skills (summative assessment) generally occur later in the study period. These are the major graded assessment items shown in the graded assessment table.

Final grades are awarded by the Board of Examiners in accordance with KOI's Assessment and Assessment Appeals Policy. The definitions and guidelines for the awarding of final grades within the BIT degree are:

- HD High distinction (85-100%) an outstanding level of achievement in relation to the assessment process.
- DI Distinction (75-84%) a high level of achievement in relation to the assessment process.
- CR Credit (65-74%) a better than satisfactory level of achievement in relation to the assessment process.
- P Pass (50-64%) a satisfactory level of achievement in relation to the assessment process.
- F Fail (0-49%) an unsatisfactory level of achievement in relation to the assessment process.

Provided below is a schedule of formal assessment tasks and major examinations for the subject.

Assessment Type	When assessed	Weighting	Learning Outcomes Assessed
Assessment 1:Weekly Tutorial Exercises	Weeks 2-11	20%	a, b, c, d, e, f
Assessment 2: Online Quiz	Week 5	15% (2.5 MCQs, + remaining theory based or case study)	a, b
Assessment 3: Practical Exam	Week 8	30 %	b, c, d
Assessment 4: Group report	Week 11	35 % (30% report and 5% recorded presentation)	b, c, d, e, f

Requirements to Pass the Subject:

To gain a pass or better in this subject, students must gain a *minimum of 50%* of the total available subject marks.

2.7 Prescribed and Recommended Readings

Prescribed Text:

Kroenke, DM., Auer, D., Yoder, RC. and Vandenberg, SL., 2021. *Database Processing: Fundamentals, Design, and Implementation*. 16th Edition, Pearson Education Limited.

Recommended Readings:

Coronel, C. and Morris, S.A., 2022. *Database systems: design, implementation and management*. Cengage learning.

Ogli, R.A.R., 2022, February. The difference between the concepts of database and database

management system. In Archive of Conferences (pp. 33-34).

Zhang, Y. and Pan, F., 2022. Design and implementation of a new intelligent warehouse management system based on MySQL database technology. *Informatica*, *46*(3).

Co, Ltd, 2023. Database Principles and Technologies – Based on Huawei GaussDB. Singapore: Springer. DOI: 10.1007/978-981-19-3032-4.

Gillenson, M.L., 2023. *Fundamentals of database management systems*. John Wiley & Sons.

Recommended Journals

Chiriac, M.T., 2025. The Advantage of NoSQL Databases over SQL Databases. *Database Systems Journal*, 16.

Šušter, I., Karabašević, D., Stanujkić, D., Ranisavljević, T. and Brzaković, M., 2024. Physical design of MySQL database. *Quaestus*, (24), pp.309–323.

Fathima Nifra, N. and Razeeth, S., 2022. Database backup and recovery: a review with test implementation for MySQL and NoSQL databases.

Sicari, S., Rizzardi, A. and Coen-Porisini, A., 2022. Security and privacy issues and challenges in NoSQL databases. *Computer Networks*, 206, p.108828.

Khan, W.A., Kumar, T., Zhang, C., Raj, K., Roy, A.M. and Luo, B., 2023. SQL and NoSQL database software architecture performance analysis and assessments - a systematic literature review. *Big Data and Cognitive Computing*, 7(2), p.97.

Teimoor, R.A., 2021. A Review of Database Security Concepts, Risks, and Problems. *UHD Journal of Science and Technology*, 5(2).

Bajaj, A. and Bick, W., 2020. The Rise of NoSQL Systems. *Journal of Database Managemen*t, 31(3), pp.67-82.

Mukherjee, S., 2019. SQL Server Development Best Practices. *International Journal of Innovative Research in Computer and Communication Engineering*, 10.

Bouamama, S., 2018. Migration from a Relational Database to NoSQL. *International Journal of Knowledge-Based Organizations*, 8(3), pp.63-80.

Malik, A., Burney, A. and Ahmed, F., 2020. A comparative study of unstructured data with SQL and NO-SQL database management systems. *Journal of Computer and Communications*, 8(4), pp.59-71.

Yang, J., Li, Y., Liu, Q., Li, L., Feng, A., Wang, T., Zheng, S., Xu, A. and Lyu, J., 2020. Brief introduction of medical database and data mining technology in big data era. *Journal of Evidence-Based Medicine*, 13(1), pp.57-69.

Dæhli, O., Kristoffersen, B., Lauvås Jr, P. and Sandnes, T., 2021. Exploring Feedback and Gamification in a Data Modeling Learning Tool. *Electronic Journal of e-Learning*, 19(6), pp.559-574.

Oaic (no date) Mobile privacy: A Better Practice Guide for Mobile app developers, OAIC. Available at: https://www.oaic.gov.au/privacy/privacy-guidance-for-organisations-andgovernment-agencies/more-guidance/mobile-privacy-a-better-practice-guide-for-mobile-appdevelopers (Accessed: 29 August 2024).

Data protection in the EU (no date) European Commission. Available at: https://commission.europa.eu/law/law-topic/data-protection/data-protection-eu_en (Accessed: 29 August 2024).

Australian Computer Society (ACS). (n.d.) Professional Ethics, Conduct, and Complaints. Available at: https://www.acs.org.au/memberships/professional-ethics-conduct-and-complaints.html (Accessed: 29 August 2024).

Database resources and articles

As we are using MS Access and SQL Server there are numerous resources available online.
For core concepts and platform-independent (irrelevant to the DBMS being used) Data Modelling and SQL useful links are also provided on Moodle. During lectures and tutorials, students will be informed where example databases and related files may be found. Students are also expected to use the library and the internet for additional learning. The following links are primarily for additional learning and future reference (be sure to bookmark them). Remember to use your textbook first – all of the information you should need is in the text.

Useful Websites:

The following industry websites are useful introductory sources covering a range of information useful for this subject. A larger resource of database information, tutorials, and exercises.

- Access 2013 Microsoft Official site for Access 2013
- Basic design from MS Office Database Design Basics
- SQL Server Central http://www.sqlservercentral.com/Articles
- Allen Browne Tips. Allen Browne is an Australian based Access developer with many years of experience. More for VBA and advanced coding problems.
- MSDN Community Forum. Microsoft Developer Network (MSDN)
- TechOnTheNet. More advanced on VBA forms
- https://www.w3schools.com/sql/
- https://www.sqlcourse.com/

Suggested Periodicals:

- Journal of Database Management: https://www.scimagojr.com/journalsearch.php?q=13581&tip=sid
- Database System Journal: https://www.dbjournal.ro/
- Database Trends and Applications (DBTA). (n.d.) DBTA. Available at: https://www.dbta.com/.
- Oracle Magazine. (n.d.) Oracle Blogs. Available at: https://blogs.oracle.com/oraclemagazine/.
- ACM Transactions on Computer Systems. Available from EBSCOhost research databases
- ACM Transactions On Database Systems. Available from EBSCOhost research databases
- Journal of Electronic Commerce Research www.jecr.org
- Journal of International Technology and Information Management https://www.sciencedirect.com/journal/international-journal-of-information-management
- https://medium.com/@pat.vishad/different-types-of-keys-in-dbms-ae61c5b352cc"https://medium.com/@pat.vishad/different-types-of-keys-in-dbms-ae61c5b352cc

Students are encouraged to read peer-reviewed journal articles and conference papers. Google Scholar provides a simple way to broadly search for scholarly literature. From one place, you can search across many disciplines and sources: articles, theses, books, abstracts, and court opinions, from academic publishers, professional societies, online repositories, universities, and other web sites.