ICT713 ADVANCED DATABASE DESIGN AND DEVELOPMENT T326 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
Master of Information Technology (MIT) Graduate Diploma of Information Technology (GDIT)	1 trimester	Postgraduate	Dr Divya Leekha divya.leekha@koi.edu.au P: +61 (2) 9283 3583 L: L7-11, 11 York St, Sydney Consultation: via Moodle or by appointment.

1.2 Core/Elective

This subject is
- a core subject for the Master of Information Technology (MIT)
- a core subject for the Graduate Diploma of Information Technology (GDIT)

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	MIT (64 Credit Points); GDIT (32 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***
3 hours/week plus supplementary online material	7 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 Nil

1.7 General Study and Resource Requirements

- Students are expected to attend classes with the weekly worksheets and subject support material provided in Moodle. Students should read this material before coming to class to improve their ability to participate in the weekly activities
- Students will require access to the internet and their KOI email and should have basic skills in word processing software such as MS Word, spreadsheet software such as MS Excel and visual presentation software such as MS PowerPoint
- 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.

Software resource requirements specific to this subject: MS Imagine, Office 365, 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 examines advanced areas of database design, implementation, and management. There is a strong emphasis on functional design and database implementation. Students will create and compare data and database design models with Entity Relationship Diagrams (ERDs) and Extended Entity Relationship Diagrams (EERDs). Strategies for data and database administration (DBA) for managerial, technical, and security roles are highlighted. The subject will also cover advanced topics including databases over the Internet, cloud data services, transaction management, database performance, distributed databases, business intelligence for decision making, big data, and NoSQL.

2.2 Graduate Attributes for Postgraduate Courses

Graduates of Postgraduate courses from King's Own Institute will achieve the graduate attributes expected from successful completion of a postgraduate degree under the Australian Qualifications Framework (2nd edition, January 2013). Graduates at this level will be able to apply advanced 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 master's level degree are summarised below:

	KOI Master's Degree Graduate Attributes	**Detailed Description**

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	Knowledge	Current, comprehensive and coherent knowledge, including recent developments and applied research methods
	Critical Thinking	Critical thinking skills to identify and analyse current theories and developments and emerging trends in professional practice
	Communication	Communication and technical skills to analyse and theorise, contribute to professional practice or scholarship, and present ideas to a variety of audiences
	Research and Information Literacy	Cognitive and technical skills to access and evaluate information resources, justify research approaches and interpret theoretical propositions
	Creative Problem Solving Skills	Cognitive, technical and creative skills to investigate, analyse and synthesise complex information, concepts and theories, solve complex problems and apply established theories to situations in professional practice
	Ethical and Cultural Sensitivity	Appreciation and accountability for ethical principles, cultural sensitivity and social responsibility, both personally and professionally
	Leadership and Strategy	Initiative, leadership skills and ability to work professionally and collaboratively to achieve team objectives across a range of team roles Expertise in strategic thinking, developing and implementing business plans and decision making under uncertainty
	Professional Skills	High level personal autonomy, judgement, decision-making and accountability required to begin professional practice

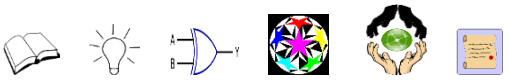
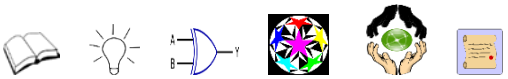
Across the courses, these skills are developed progressively at three levels:

- **Level 1 Foundation –** Students learn the skills, theories and techniques of the subject and apply them in stand-alone contexts
- **Level 2 Intermediate –** Students further develop skills, theories and techniques of the subject and apply them in more complex contexts, beginning to integrate the application with other subjects.
- **Level 3 Advanced** – Students have a demonstrated 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.

Generally, skills gained from subjects in the Graduate Certificate and Graduate Diploma are at levels 1 and 2 while other subjects in the Master's degree are at level 3.

2.3 Subject Learning Outcomes

Listed below, are key knowledge and skills students are expected to attain by successfully completing this subject:

Subject Learning Outcomes	Contribution to Graduate Attributes
a) Model and design databases based on given requirements using ERDs and EERDs	
b) Optimise querying, storing and indexing of databases	

c) Articulate the trade-offs in using distributed databases and data warehousing technologies	
d) Employ emerging trends in the field of database design and development	

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 26 October	Introduction and data models	Ch.2	Review questions on building blocks of data models and business rules. Formative not graded
Week 2 02 November	Advanced data modeling	Ch.5 and Appendix M	Review questions on Extended Entity Relationship models.
Week 3 09 November	Database design	Ch.9	Review questions on SDLC and DBLC.
Week 4 16 November	Transaction management and concurrency control	Ch.10	Review questions on transactions, ACIDS and locks.
Week 5 23 November	Database performance tuning and Advanced SQL and query optimisation	Ch.11	Review questions on transactions, ACIDS, and locks.Constraints, sub-queries, triggers, and sequence **Assessment 1: Quiz**
Week 6 30 November	Database security and privacy	General Data Protection Regulation GDPR, Australia's Privacy Principles	Review questions on GDPR and APP related to databases.
Week 7 07 December	Distributed database management systems	Ch.12	Review questions on remote DBMS, DDBMS, remote and distributed transactions, and requests. **Assessment 2: Database Project due**
Week 8 14 December	Business intelligence and data warehouses	Ch.13	Review questions on BI Decision-making, Architecture, Differentiation, Warehouse, Schemas, OLAP, Analytics, SQL, Visualization

Week (beginning)	Topic covered in each week's lecture	Reading(s)	Expected work as listed in Moodle
			Assessment 2: Demo of Database Group Project will be conducted in workshop class.
Week 9 04 January	Big data and NoSQL	Ch.14	Review questions on characteristics of Big data and NoSQL and HDFS.
Week 10 11 January	Database connectivity and web technologies	Ch. 15	Review questions on Connectivity, Technologies, Middleware, Services, XML, Cloud computing **Assessment 3: Research report and pre-recorded Presentations**
Week 11 18 January	Database administration	Ch.16	Review questions on Data quality, Decision-making, DBMS impact, DBA roles, Security framework, Standards, Cloud impact,
Week 12 25 January	Reflection and future	All chapters	Review questions on Key learnings, challenges faced, skill growth, real world applications and career pathways **Assessment 4: Database Privacy and Ethics Report due by Tuesday 9am**
Week 13 01 February	Study review week and Final Exam Week		
Week 14 08 February	- Final Exam Week - Continuing students - enrolments for T127 open		Please see the exam timetable for the exam date, time and location
Week 15 15 February	- Student Vacation begins - New students - enrolments for T127 open		
Week 16 22 February	o Results Released o Review of Grade Day for T326 – see Sections 2.6 and 3.2 below for relevant information. o Certification of Grades NOTE: More information about the dates will be provided at a later date through Moodle/KOI email.		
T127 01 March 2027			
Week 1 01 March	Week 1 of classes for T127		

2.5 Teaching Methods/Strategies

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

- *Lectures* (1 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 assessments (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 are:

- *HD High distinction* (85-100%): an outstanding level of achievement in relation to the assessment process.
- *D Distinction* (75-84%): a high level of achievement in relation to the assessment process.
- *C 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.
- *FW:* This grade will be assigned when a student did not submit any of the compulsory assessment items.

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: Quiz	Week 5	20%	a
Assessment 2: Database Project - Group assessment (2000 words + 500 words)	Week 7 - Project Week 8 - Demonstrations	30% (Group work- 20% and Individual contribution log 10%)	a, b

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Assessment Type	When Assessed	Weighting	Learning Outcomes Assessed
Assessment 3: Research Report and pre-recorded presentation - Individual assessment (2000 words)	Week 10	30%	c, d
Assessment 4: Database Privacy and Ethics- Individual assessment.	Due by Tuesday 9am Week 12	20%	a, b, c, d

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

Provided below, in formal reference format, is a list of the prescribed and recommended readings.

Prescribed Text:

Coronel, C. and Morris, S. (2022) Database systems: Design, implementation, & management. 14th edn. Boston, MA, USA: Cengage Learning. ISBN: 9780357673195.

Recommended Texts:

Çakırgöz, O. and Sevinç, S. (2021) 'Organization of Variation-Based Personal Genetic Data with Document-Based No-SQL Database', *International Journal of Informatics Technologies*, 14(4), pp. 391-402. https://izlik.org/JA48SH63WS.

Cong, Y., Du, H. and Vasarhelyi, M. A. (2021) 'Cloud Computing Start-ups and Emerging Technologies: From Private Investors' Perspectives', *Journal of Information Systems*, 35(1), pp. 47-64. DOI: https://doi.org/10.2308/ISYS-17-040.

Del-Real, C., De Busser, E. and van den Berg, B., 2025. A systematic literature review of security and privacy by design principles, norms, and strategies for digital technologies. *International Review of Law, Computers & Technology*. DOI: https://doi.org/10.1080/13600869.2025.2457227.

ElDahshan, K., Elsayed, E. K. and Mancy, H. (2020) 'Enhancement Semantic Prediction Big Data Method for COVID-19: Onto-NoSQL', *IAENG International Journal of Computer Science*, 47(4), pp. 613–622. Available at: https://search.ebscohost.com/login.aspx?direct=true&db=iih&AN=147305103&site=ehost-live

Garba (2020) 'A Comparison of NoSQL and Relational Database Management Systems (RDBMS)', *KASU Journal of Mathematical Science*. https://mathsaccess.org.ng/index.php/kjms/article/view/21.

Gupta, B. B., & Panigrahi, P. K. (2023). Analysis of the Role of Global Information Management in Advanced Decision Support Systems (DSS) for Sustainable Development. Journal of Global Information Management, 31(2), 13 pages. DOI: https://doi.org/10.4018/JGIM.320185.

Han, S. et al. (2020) 'A health management system for large vertical mill', *International Journal of Distributed Sensor Networks*, 16(3), pp. 1–15. DOI: https://doi.org/10.1177/155014772091211.

Lawson-Body, A., Illia, A., Lawson-Body, L., Rouibah, K., Akalin, G., & Tamandja, E. M. (2024). Big Data Analytics and Culture: Newly Validated Measurement Instruments for Developing Countries' Value Proposition. Journal of Organizational and End User Computing, 36(1), 30 pages. DOI: https://doi.org/10.4018/JOEUC.344453

Makris, A., Tserpes, K., Spiliopoulos, G., Zissis, D. and Anagnostopoulos, D. (2021) 'MongoDB Vs PostgreSQL: A comparative study on performance aspects', *GeoInformatica*, 25(2), pp. 243-268. DOI: https://doi.org/10.1007/s10707-020-00407-w.

Medina, M., Blanco, I. J. and Pons, O. (2022) 'A fuzzy database engine for MongoDB', *International Journal of Intelligent Systems*, 37(9), pp. 5691-5724. DOI: https://doi.org/10.1002/int.22807.

Smirnova, Y. and Travieso-Morales, V., 2024. Understanding challenges of GDPR implementation in business enterprises: a systematic literature review. *International Journal of Law and Management*, 66(2), pp.182–201. DOI: https://doi.org/10.1108/IJLMA-08-2023-0205.

Sushkov, V. M., Leonov, P. Y., Nadezhina, O. S. and Blagova, I. Y. (2023) 'Integrating Data Mining Techniques for Fraud Detection in Financial Control Processes', *International Journal of Technology*, 14(8), pp. 1675-1684. DOI : https://doi.org/10.14716/ijtech.v14i8.6830.

Teodorescu, C.A., Ciurea, C.-E., Saftiuc, B.-P. and Staicu, D., 2025. The evolution of mobile cybersecurity regulations in the European Union. *Management & Marketing*. DOI: 10.2478/mmcks-2025-0004.

Tolsdorf, J., Dehling, F. and Lo Iacono, L., 2022. Data cart – designing a tool for the GDPR-compliant handling of personal data by employees. *Behaviour & Information Technology*. DOI: https://doi.org/10.1080/0144929X.2022.2069596.

Xian, W., Guomin, C., Arya, V., & Chui, K. T. (2024). Examining the Influence of AI Chatbots on Semantic Web-Based Global Information Management in Various Industries. International Journal on Semantic Web and Information Systems, 20(1), 14 pages. DOI: https://doi.org/10.4018/IJSWIS.344037

Yadav Yanamala, A.K. & Suryadevara, S., no date. *Navigating data protection challenges in the era of artificial intelligence: A comprehensive review*. https://www.scitepress.org/Papers/2025/138629/138629.pdf.

Yang, W. (2024) 'Analysis and Application of Big Data Feature Extraction Based on Improved K-Means Algorithm', *Scalable Computing: Practice & Experience*, 25(1), pp. 137-145. DOI: https://doi.org/10.12694/scpe.v25i1.2281.

Suggested Periodicals:

- Journal of Database Management: https://www.igi-global.com/journal/journal-database-management/1072
- International Journal of Database Management Systems: http://airccse.org/journal/ijdms/index.html
- Database Systems Journal : http://www.dbjournal.ro/

Conference/ Journal Articles:

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.

Useful Websites:

- Oracle Database***: https://docs.oracle.com/en/database/***
- Microsoft SQL Server: https://learn.microsoft.com/en-us/sql/sql-server/?view=sql-server-ver16
- PostgreSQL: https://www.postgresql.org/docs/

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