ICT762 Data Analytics and Data Visualisation 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 System (MIS) Graduate Diploma of Information System (GDIS)	1 trimester	Postgraduate	Dr. Van Lanh Nguyen vanlanh.nguyen@koi.edu.au P: +61 (2) 9283 3583 L: Level 7-11, 11 York St. Consultation: via Moodle or by appointment

1.2 Core/Elective

This subject is
- an elective subject for the Master of Information System (MIS)
- an elective subject for the Graduate Diploma of Information System (GDIS) for students from a cognate background

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	MIS (64 Credit Points); GDIS (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 ICT761 Business Analytics and Business Intelligence

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.

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- 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: Office 365, MS Imagine, MS Excel, Data Analytics tools such as Power BI, Tableau,KNIME, AWS services.

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

Big data is increasingly used to understand customer behaviour and analyse business intelligence. This Data analytics can give businesses a competitive advantage by uncovering the hidden insights in data to make informed predictions. The aim of this subject is to equip students with the practical data analytics and data visualisation skills required to solve real-world problems across different disciplines e.g., finance, marketing, human resources, sales etc.,

Data analysis and visualisation drive the processes of decision making in modern businesses. This subject examines methods for discovering, using, translating, and presenting data in accessible ways. This allows various audiences, including those who are not technical, to identify current trends and predict future trends. In order to communicate with a wide variety of stakeholders this subject looks at how to combine strong analysis with great storytelling.

2.2 Graduate Attributes for Postgraduate Courses

Graduates of postgraduate courses from King's Own Institute will gain 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 in a range of contexts for professional practice or scholarship and as a pathway for further learning.

King's Own Institute's key generic graduate attributes for a postgraduate degree are summarised below:

	KOI Postgraduate Degree Graduate Attributes	**Detailed Description**
	Knowledge	Current, comprehensive and coherent knowledge, including recent developments and applied research methods

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	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 Course Graduate Attributes
a) Use KNIME, Tableau and PowerBI to analyse business data, make reliable recommendations and create convincing reports.	
b) Apply appropriate machine learning and data analysis techniques to develop analytical frameworks for a range of business scenarios.	
c) Evaluate theoretical concepts related to data ethics, data analytics and data visualisation to support evidence-based decisions.	
d) Communicate data-driven decision-making outcomes for both technical and non-technical audiences.	

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e) Apply critical thinking to potential analytics solutions in order to predict future trends.	  

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	Understand the potential of data/data management and its impact on business	Ch 1 Andrea (2021) and additional material will be provided on Moodle	Complete exercises in the tutorial on data and its impact on associated business.
Week 2 02 November	An overview of business intelligence, analytics, decision support, big data and data mining	Ch 1 Andrea (2021) and additional material will be provided on Moodle	Complete exercises in the tutorial on business analytics, big data and data mining. **Assessment 1: due** Biweekly reflection on business intelligence analysis
Week 3 09 November	Influence business decisions with effective data storytelling when delivering insights.	Ch 8 Andrea (2021) and additional material will be provided on Moodle	Complete exercises in the tutorial on using effective storytelling for delivering insights. KNIME Installation and Basic
Week 4 16 November	Overview of data ethics, information management and business reporting, formatting, and transformation of visualisations.	Ch 7 Andrea (2021) and additional material will be provided on Moodle	Complete exercises in the tutorial on business management and use of visualisations for reporting. Use of Excel for Advanced Data Visualisation. **Assessment 1: due** Biweekly reflection on data quality, cleaning, and transformation for business reporting
Week 5 23 November	Understanding the Value Creation Process by using some generic frameworks and applying them to business scenarios.	Ch 3 Andrea (2021) and additional material will be provided on Moodle	Complete exercises in the tutorial on value creation by using a case study provided.
Week 6 30 November	Getting started with KNIME	Ch 2 Andrea (2021) and additional material will be provided on Moodle	Complete exercises in the tutorial about KNIME that include installations and a basic overview of KNIME. **Assessment 1: due** Biweekly reflection on KNIME workflow automation and data preparation techniques **Assessment 2: due** **Data Analytics Project**
Week 7 07 December	Use KNIME to import, clean, transform, combine data feeds, and automate recurring workflows.	Ch 2 Andrea (2021) and additional	Complete exercises in the tutorial on cleaning and transforming data using KNIME.

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Week (beginning)	Topic covered in each week's lecture	Reading(s)	Expected work as listed in Moodle
		material will be provided on Moodle	
Week 8 14 December	Basics of AI, machine learning and AutoML to add value to organisations to address business issues	Ch 4 Andrea (2021) and additional material will be provided on Moodle	Complete exercises in the tutorial on machine learning and AI applications in business. **Assessment 1: due** Biweekly reflection on machine learning model selection and evaluation in business analytics **Assessment 3: due** **Quiz/In-class exam**
Week 9 04 January	Build, test, and validate supervised and unsupervised machine learning models with KNIME	Ch 4 Andrea (2021) and additional material will be provided on Moodle	Complete exercise in tutorial on business analytics and data mining
Week 10 11 January	Getting started with Tableau.	Ch 6 Andrea (2021) and additional material will be provided on Moodle	Complete exercises in the tutorial about Tableau that include installations and basic overview of Tableau. **Assessment 1: due** Biweekly reflection on Tableau dashboard storytelling for executive decision-making
Week 11 18 January	Use Tableau to build professional-looking and business centric visuals and dashboards.	Ch 6 Andrea (2021) and additional material will be provided on Moodle	Complete exercises in the tutorial about using Tableau for building dashboards. **Assessment 4: due Data Visualisation and Analytics Project Report**
Week 12 25 January	Exam preparation by using case studies.	All chapters	Revision **Assessment 4: due Data Visualisation and Analytics Project Presentation**
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	• Results Released • Review of Grade Day for T326 – 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.		

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Week (beginning)	Topic covered in each week's lecture	Reading(s)	Expected work as listed in Moodle
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 within the BIT degree 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.

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Assessment Type	When Assessed	Weighting	Learning Outcomes Assessed
Assessment 1: Biweekly Reflection - Week 2: Reflection on Business Intelligence Analysis - Week 4: Reflection on Data Quality, Cleaning, and Transformation for Business Reporting - Week 6: Reflection on KNIME Workflow Automation and Data Preparation Techniques - Week 8: Reflection on Machine Learning Model Selection and Evaluation in Business Analytics - Week 10: Reflection on Tableau Dashboard Storytelling for Executive Decision-Making	Week 2, Week 4, Week 6, Week 8 and Week 10	20% Week 2 – 0% Week 4 – 5% Week 6 – 5% Week 8 – 5% Week 10 – 5%	a, b, c, and d
Assessment 2: Analytics Tool Evaluation and selection based on given case study - Individual (Data Analytics Project - 1500 words)	Week 6	30%	a and b
Assessment 3: Quiz	Week 8	15%	a, b, and c
Assessment 4: Business Case Study Group Report & Presentation (Data Visualisation and Analytics Project - 2000 words)	Week 11 – Report Week -11 & 12 Presentation	Report - 25% Presentation - 10%	c, d, and e

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

Camm, J.D., Cochran. J.J., Fry, M.J. and Ohlmann, J.W., 2024, *Data Visualization: Exploring and Explaining with Data,* 2nd edition. Cengage.
https://au.cengage.com/c/data-visualization-exploring-and-explaining-with-data-2e-camm-cochran-fry-ohlmann/9780357929766/

Recommended Books

Pramanik, S. and Bandyopadhyay, S.K., 2023. Analysis of big data. In *Encyclopedia of data science and machine learning* (pp. 97-115). IGI Global. DOI: 10.4018/978-1-7998-9220-5.ch006

Schwabish, J., 2021. *Better Data Visualizations: A Guide for Scholars, Researchers, and Wonks*. Columbia University Press. https://cup.columbia.edu/book/better-data-visualizations/9780231193115/

Vincent, N. and Igou, A., 2023. Emerging Technologies for Business Professionals: A Nontechnical Guide to the Governance and Management of Disruptive Technologies.

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https://www.wiley.com/en-us/Emerging+Technologies+for+Business+Professionals%3A+A+Nontechnical+Guide+to+the+Governance+and+Management+of+Disruptive+Technologies-p-9781119987369

Recommended Journal Articles

Golfarelli, M., Rizzi, S., 2020. A model-driven approach to automate data visualization in big data analytics. *Inf. Vis*. 19, 24–47. https://doi.org/10.1177/1473871619858933.

Hadjimichael, A., Schlumberger, J. and Haasnoot, M., 2024. Data visualisation for decision making under deep uncertainty: current challenges and opportunities. *Environmental Research Letters*, *19*(11), p.111011. DOI 10.1088/1748-9326/ad858b, https://iopscience.iop.org/article/10.1088/1748-9326/ad858b/pdf

Jha, S., Jha, M. and O'Brien, L., 2021, December. Analysing Computer Science Course Using Learning Analytics Techniques. In *2019 IEEE Asia-Pacific Conference on Computer Science and Data Engineering (CSDE)* (pp. 1-6). IEEE. DOI:10.1109/CSDE48274.2019.9162369

Jönsson, D., Steneteg, P., Sundén, E., Englund, R., Kottravel, S., Falk, M., Ynnerman, A., Hotz, I., Ropinski, T., 2020. Inviwo — A Visualization System with Usage Abstraction Levels. *IEEE Trans. Vis. Comput. Graph*. 26, 3241–3254. https://doi.org/10.1109/TVCG.2019.2920639.

Liang, R., Huang, C., Zhang, C., Li, B., Saydam, S. and Canbulat, I., 2023. Exploring the fusion potentials of data visualization and data analytics in the process of mining digitalization. *IEEE Access*, *11*, pp.40608-40628. https://ieeexplore.ieee.org/stamp/stamp.jsp?arnumber=10103681

Narechania, A., Srinivasan, A., Stasko, J., 2021. NL4DV: A Toolkit for Generating Analytic Specifications for Data Visualization from Natural Language Queries. *IEEE Trans. Vis. Comput. Graph*. 27, 369–379. https://ieeexplore.ieee.org/document/9222342

Nkhoma, C., Dang-Pham, D., Hoang, A.-P., Nkhoma, M., Le-Hoai, T., Thomas, S., 2020. Learning analytics techniques and visualisation with textual data for determining causes of academic failure. Behav. Inf. Technol. 39, 808–823. https://doi.org/10.1080/0144929X.2019.1617349.

Recommended Journals:

International Journal of Big Data Intelligence

Data mining and knowledge discovery

Information visualization

International journal of data science and analytics

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