ICT104 PROGRAM 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
Bachelor of Information Technology (BIT) Diploma in Information Technology (DIT)	1 trimester	Level 1	Dr Hui Wu hui.wu@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 for BIT
Elective subject for DIT

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) DIT(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***
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 ICT102 Introduction to Programming

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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: Sun's Java 8 JDK and NetBeans IDE, Eclipse, Office 365, MS Imagine.

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

Programming is a vital skill that enables problem solving through the use of computers across a range of disciplines. This subject covers intermediate and advanced features of the Java programming language as a continuation of ICT102 Introduction to Programming. Topics covered include object-oriented programming concepts of inheritance, interfaces, abstract classes, abstract methods, and polymorphism. Students will learn about implementing Java's graphical FX components and Java Applets, and acquire practical knowledge of developing Java programs.

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**

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	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

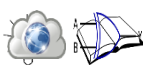
Across the course, these skills are developed progressively at three levels:

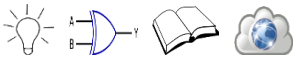
- **Level 1 Foundation** – Students learn the basic skills, theories and techniques of the subject and apply them in basic, standalone contexts
- **Level 2 Intermediate** – Students further develop the skills, theories and techniques of the subject and apply them in more complex contexts, and begin to 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 1 subject.

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

Subject Learning Outcomes	Contribution to Graduate Attributes
a) Analyse and model object-oriented programming using Java	
b) Design object-oriented programs using object oriented features such as encapsulation, inheritance and polymorphism in Java	

c) Design and develop a well-designed event driven application using JavaFX which correctly implements a solution to a problem defined in a specification	
d) Design and implement graphical user interfaces for applications	
e) Understand recursion and apply a recursive approach to decompose a problem into smaller problems and solve it.	

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	Object oriented design concepts	Chapter 6	Tutorial exercises on accessor methods, mutator methods, objects, classes, primitive variables, and objects as well as installation of Eclipse. Formative, not graded.
Week 2 02 November	Classes, objects and methods	Chapter 6, 8	Tutorial exercises on passing objects as arguments, overloading methods and constructors, packages and import statements, passing objects as arguments to methods. Summative assessment.
Week 3 09 November	UML diagram and garbage collection	Chapter 8	Tutorial exercises on returning objects from methods, string class, equals method, methods that copy objects, copy constructor, aggregation, returning references to private fields, NULL references, this reference, enumerated types and garbage collection, Summative assessment.
Week 4 16 November	Inheritance, and method overriding	Chapter 10	Tutorial exercises on Inheritance, superclass constructor, overriding superclass methods, protected members, chains of Inheritance, and the object class. Summative assessment.

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Week (beginning)	Topic covered in each week's lecture	Reading(s)	Expected work as listed in Moodle
Week 5 23 November	Type conversion, polymorphism, interfaces and abstract classes	Chapter 10	Tutorial exercises on polymorphism, abstract classes, abstract methods, and interfaces. Summative assessment.
Week 6 30 November	GUI design and event-driven programming (I)	Chapter 12	Tutorial exercises on Swing component's introduction, creating windows and equipping GUI classes with a main method. Summative assessment.
Week 7 07 December	GUI design and event-driven programming (II)	Chapter 12	Tutorial exercises on Swing components, design, layout managers, radio buttons and checkboxes, borders, focus on problem solving, extending classes from JPanel. Summative assessment.
Week 8 14 December	JavaFX – Basic Controls	Chapter 12	Tutorial exercises on basic controls using JavaFX. Summative assessment. **Assessment 2: In-Class Quiz Summative assessed 15%**
Week 9 04 January	Collections- Arrays, two dimensional arrays and Array List class	Chapter 7	Tutorial exercises on processing array contents, passing arrays as arguments to methods, some useful array algorithms and operations, returning arrays from methods, string arrays, arrays of Objects, 2D arrays and the array list class. Summative assessment.
Week 10 11 January	Recursion	Chapter 15	Tutorial exercises on Java programs using recursive methods to solve problems. Summative assessment.
Week 11 18 January	Analysis of algorithms and linked lists	Additional material	Tutorial exercises on analysis of algorithms and linked lists. **Assessment 3: Java Practical Exam. Summative worth 30%**
Week 12 25 January	Stacks and Queues	Additional material	Tutorial exercises on stacks and queues, and help students with Assessment 4. Formative, not graded.

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Week (beginning)	Topic covered in each week's lecture	Reading(s)	Expected work as listed in Moodle
			Assessment 3: Java Practical Exam. Summative worth 30% **Assessment 4: Java GUI application (20%) and video presentation (15%). Summative worth 35%**
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.		
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* (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.

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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.
- 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.
- 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: Tutorial Exercises	Weeks 2 - 11	20%	a, b, c, d, e
Assessment 2: Quiz	Week 8	15%	a
Assessment 3: Java Practical Exam	Week 11, Week 12	30%	a, b, c, d, e
Assessment 4: Java GUI application and video presentation	Week 12	Java GUI Application: 20% Video Presentation: 15% **Total: 35%**	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.

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2.7 Prescribed and Recommended Readings

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

Prescribed Text:

Gaddis, T., 2024. *Starting Out with Java: From Control Structures through Objects*. 8th ed. Pearson Publications, Australia. ISBN number: 9781292453248.

Recommended Readings:

- Loy, M., Niemeyer, P. and Leuck, D., 2023. *Learning Java: An Introduction to Real-World Programming with Java*, 6th Edition, O'Reilly Media, Inc. ISBN: 9781098145538.
- Violetta, S., 2023, *Refactoring in Java*, Packt Publishing. ISBN: 978-1805127789.
- Horstmann, C. S., 2024. *Core Java Volume I: Fundamentals*, 13th ed., Prentice Hall: Australia. ISBN: 9780135328385.
- Liang, D., 2021. *Intro to Java Programming and Data Structures*, Comprehensive Version, 12th ed., Pearson Publications: Australia. ISBN: 978-1292402079.
- Evans, B.J., Clark, J. and Flanagan, D., 2023. *Java in a Nutshell*. O'Reilly Media. ISBN: 9781098130961.
- Bloch, J., 2018. *Effective Java*, 3rd ed. Addison-Wesley. ISBN: 9780134686042.

Recommended Journals:

- Zhao, X. and Li, X., 2024. The Latest Trends and Challenges in Enterprise Application Development with Java. *Advances in Computer, Signals and Systems*, 8(2), pp.44-50. doi:10.23977/acss.2024.080207
- Qodirov, F. and Jo'rayev, S., 2023. JAVA programming language development of software products as an example of the android system. *Theoretical aspects in the formation of pedagogical sciences*, *2*(13), pp.137-141. https://doi.org/10.5281/zenodo.8064149
- Lu, X., Funabiki, N., Aung, S.T., Jing, Y. and Yamaguchi, S., 2023. An implementation of Java programming learning assistant system in university course. *In: 2023 11th International Conference on Information and Education Technology (ICIET)*, Fujisawa, Japan, pp.215–220. doi: 10.1109/ICIET56899.2023.10111422
- Vyas, B., 2023. Java in Action: AI for Fraud Detection and Prevention. *International Journal of Scientific Research in Computer Science, Engineering and Information Technology*, pp.58-69. doi: https://doi.org/10.32628/CSEIT239063
- Traini, L., Cortellessa, V., Di Pompeo, D. et al., 2023. Towards effective assessment of steady state performance in Java software: are we there yet?. *Empirical Software Engineering*, 28, p.13. https://doi.org/10.48550/arXiv.2209.15369.
- Kyaw, H.H.S. et al., 2020. A code completion problem in Java programming learning assistant system. *IAENG International Journal of Computer Science*, 47(3), pp.350–359. Available at: https://search.ebscohost.com/login.aspx?direct=true&db=iih&AN=145355240&site=ehost-live.

References available from EBSCOhost research databases:

- ACM Transactions on Computer Systems
- ACM Transactions on Programming Languages & Systems

Recommended references:

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- Journal of Functional and Logic Programming
- Journal of Functional Programming
- International Journal of Parallel Programming

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:
The following websites are useful resources covering a range of information relevant to this subject. Students are also expected to use the library and the internet.

- http://java.sun.com/docs/codeconv
- http://java.sun.com/docs/books/tutorial/index.html
- http://codingbat.com/
- http://www.tutorialspoint.com/java/

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