

BASEAI18- Bachelor of Software Engineering (Artificial Intelligence)

1. About the Bachelor of Software Engineering (Artificial Intelligence)

The proposed Bachelor of Software Engineering (Artificial Intelligence) (AI) course is part of a suite of courses offering software engineering knowledge and skills with four specialisations: Artificial Intelligence, Cloud Computing, Network & Cybersecurity and Blockchain. The structure of these courses consists of four main areas of study: Software Engineering Core, Creative Technology and Specialisation subjects, as well as Electives. Thirteen subjects of the course will be common across the four specialisations.

Software Engineering Core subjects provide the basis of software engineering knowledge and skills; their difference lies in the professional software engineering requirements developed over the last 40 years. Software Engineering Core subjects distinguish themselves by providing fundamental knowledge and skills required in the software development industry and as stipulated requirements for professional accreditation by the Australian Computer Society. These subjects provide a strong foundation in analysis, design and development skills essential in AI applications progressively strengthened every term. On the other hand, Creative Technology subjects include highly desired industry content such as Human Centered Design and Project-Based Learning (PBL) style subjects, augmenting career attributes by empowering graduates to better navigate contemporary professional software engineering AI environments and improve career outcomes. Specialisation subjects make up the bulk of AI specific learning deepening understanding whilst electives provide students with choices to broaden their skills and knowledge. Elective spaces are interspersed throughout the course at level 100, 200 and 300. The elective bank subjects are assembled from a number of Torrens University undergraduate courses including design, games and business, providing opportunities to expand on the learning.

Twenty-one subjects represent 10 credit points whilst the last subject represents 30 credit points involving work-integrated learning, culminating in a major production of work. All subjects are available in Online, Face-to-Face and blended mode, providing ample study opportunity to serve the needs of students. Assessments are varied and include interspersed examinations, projects, reports, tests and collaborations as well as industry immersion in the final project. They are all clearly mapped to the learning outcomes.

Graduate employment opportunities

To be employed in the industry, a job candidate requires high-level proof of their skills. The international measure of proof is benchmarked as a bachelor or postgraduate level qualification. In addition, a software engineer with major in artificial intelligence often needs to demonstrate their applied research and programming skills or a high-quality understanding of data if they are to focus on a data science field to be employed. The Bachelor of Software Engineering (Artificial intelligence) provides sufficient time for the learners to create a significant body of projects to demonstrate relevant expertise.

On successfully completing this qualification, students will have specific skills, knowledge and experiences to potentially gain employment in the artificial intelligence and wider software engineering industry in a variety of roles, such as (not limited to):

- Big Data Engineer
- Data Scientist/ Analyst
- Generalist C++ Programmer
- Algorithm specialists
- Junior/Associate Software Engineer
- Software Developer

- Computer Vision Engineer

Course Overview

Course Title	Bachelor of Software Engineering (Artificial Intelligence)		
Study Options – Domestic Australian students	<p>Face to Face delivery</p> <p>Online delivery</p> <p>Full-time and part-time options available.</p>	Study Options – International students	<p>International students on a student visa must not enroll into any more than a third or 33% of online subjects over their course and must study at least one subject that is face to face in each trimester.</p> <p>International students on a student visa are required to study full time, i.e. the student must complete a minimum of 1.0 EFTSL of study per year.</p>
Start Dates	<p>February, June, September</p> <p>For specific dates visit the website</p>	Course Length	<p>Full-time: 3 years</p> <p>Part-time: 6 years</p>
Payment Options - Domestic Australian students	<p>Upfront payment This means tuition fees will be invoiced each trimester and payment is required on or before the due date.</p> <p>FEE-HELP FEE-HELP is Australian Government’s loan scheme for higher education degree courses. It can assist you in paying for all, or part of, your course fees. Repayments commence via the tax system once your income rises above a minimum threshold. Just like with any other debt, a FEE-HELP debt is a real debt that impacts your credit rating.</p>	Payment Options – International students	<p>Upfront payment This means tuition fees will be invoiced each trimester and payment is required on or before the due date.</p>
Course study requirements	<p>Each subject involves 10 hours of study per week, comprising 3 hours of facilitated study and 7 hours self-directed study.</p>	Assessment	<p>Project/Application/Research Proposal, Process/Research Documentation, Application Outcome, Reflective Journal/Blog, Report/Essay, Presentation/Pitch, Examinations/Tests/Quizzes, Research, Collaboration, Individual self-directed major project, Work integrated learning</p>

			project work, Software development for social enterprise
Locations	Sydney Campus Melbourne Campus Online	Delivered by	Torrens University Australia
Provider	Torrens University Australia Ltd is registered as a self-accrediting Australian university by the Tertiary Education Quality and Standards Agency (TEQSA).	CRICOS Course Code	099352B
Provider obligations	Torrens University is responsible for all aspects of the student experience, including the quality of course delivery, in compliance with the Higher Education Standards 2015	Accrediting body	Torrens University Australia Ltd
Course Fees	For details, refer to the website .	Any other fees	For details, refer to the website .

2. Essential requirements for admission

The general admission criteria that apply to Torrens University Australia courses can be located by visiting the Torrens University Australia website - <https://www.torrens.edu.au/general-admission-information-for-torrens-university-australia-ltd>.

3. Student Profile

The table below gives an indication of the likely peer cohort for new students in this course. It provides data on students who commenced in this course in the most relevant recent intake period, including those admitted through all offer rounds and international students studying in Australia.

Applicant background	Trimester one / Full year intake [2020]	
	Number of students	Percentage of all students
(A) Higher education study (includes a bridging or enabling course)	<5	N/P
(B) Vocational education and training (VET) study	N/A	N/A
(C) Work and life experience (Admitted on the basis of previous achievement not in the other three categories)	<5	N/P

(D) Recent secondary education: <ul style="list-style-type: none"> Admitted solely on the basis of ATAR (regardless of whether this includes the consideration of adjustment factors such as equity or subject bonus points) Admitted where both ATAR and additional criteria were considered (e.g. portfolio, audition, extra test, early offer conditional on minimum ATAR) Admitted on the basis of other criteria only and ATAR was <i>not</i> a factor (e.g. special consideration, audition alone, schools recommendation scheme with no minimum ATAR requirement) 	<5	N/P
	N/A	N/A
	N/A	N/A
International students	15	79%
All students	19	100%

Notes: "**<5**" – the number of students is less than 5.
 N/A – Students not accepted in this category.
 N/P – Not published: the number is hidden to prevent calculation of numbers in cells with less than 5 students.

4. Admission Criteria

Title of course of study	Bachelor of Software Engineering (Artificial Intelligence)
Applicants with higher education study	<ul style="list-style-type: none"> • A completed higher education qualification at AQF level 5 (diploma) or above, or equivalent, from an Australian University or another accredited higher education provider OR • Successful completion of at least 1 EFTSL (equivalent full time student load, or one full year) of an AQF level 6 (Associate Degree) or above, or equivalent, from an Australian University or another accredited higher education provider
Applicants with vocational education and training (VET) study	<ul style="list-style-type: none"> • A completed vocational education qualification at AQF level 4 (Certificate IV) or above, or equivalent, from a registered training organisation (RTO) OR • Successful completion of at least 1 EFTSL (equivalent full time student load, or one full year) of an AQF level 5 (Diploma) or above, or equivalent, at a registered training organisation (RTO)
Applicants with work and life experience	<p>Demonstrated ability to undertake study at the required level:</p> <ul style="list-style-type: none"> • broadly relevant work experience (documented e.g. CV), demonstrating a reasonable prospect of success; AND • a discipline specific portfolio; AND <p>a recommendation letter from 2 most recent employers</p>
English Language Proficiency (applicable to international students, and in addition to academic or special entry requirements noted above)	Equivalent IELTS 6.0 (Academic) with no skills band less than 5.5
Applicants with recent secondary education (within the past two years) with ATAR or equivalent* (for applicants who will be selected wholly or partly on the basis of ATAR)	Completed year 12 or equivalent

Title of course of study	Bachelor of Software Engineering (Artificial Intelligence)									
<p><i>*ATAR profile for those offered places wholly or partly on the basis of ATAR in T1 2020:</i></p> <table border="1"> <thead> <tr> <th>(ATAR-based offers only, across all offer rounds)</th> <th>ATAR (OP in QLD) (Excluding adjustment factors) *</th> </tr> </thead> <tbody> <tr> <td>Highest rank to receive an offer</td> <td><5</td> </tr> <tr> <td>Median rank to receive an offer</td> <td><5</td> </tr> <tr> <td>Lowest rank to receive an offer</td> <td><5</td> </tr> </tbody> </table> <p><i>Notes: * "<5" – indicates less than 5 ATAR-based offers were made</i></p>			(ATAR-based offers only, across all offer rounds)	ATAR (OP in QLD) (Excluding adjustment factors) *	Highest rank to receive an offer	<5	Median rank to receive an offer	<5	Lowest rank to receive an offer	<5
(ATAR-based offers only, across all offer rounds)	ATAR (OP in QLD) (Excluding adjustment factors) *									
Highest rank to receive an offer	<5									
Median rank to receive an offer	<5									
Lowest rank to receive an offer	<5									

Other admission options

(For applicants who will be selected on a basis other than ATAR)

Special Entry	Applicants in any category whose study, work or life experiences have been impacted by disability, illness or family disruption will be given special consideration for admission. Each application will be considered on its merit, based on the evidence supplied by the applicant attesting to the circumstances of the applicant. Applicants for special entry may need to complete written or numerical tasks to assist with assessing eligibility for admission.
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5. How to apply

Via direct application to the institution

- o <https://apply.torrens.edu.au/b2b/fcta/>

6. Advanced standing/academic credit/recognition of prior learning (RPL)

You may be entitled to credit for prior learning, whether formal or informal. Formal learning can include previous study in higher education, vocational education, or adult and community education. Informal learning can include on the job learning or various kinds of work and life experience. Credit can reduce the amount of study needed to complete a degree.

Applicants admitted based on prior higher education study may be eligible for Advanced Standing in the form of credit and/or recognition of prior learning (RPL) under the Torrens University Australia [Credit Policy - \(https://www.torrens.edu.au/policies-and-forms\)](https://www.torrens.edu.au/policies-and-forms).

- Students with completed subjects may be eligible for specified credit and/or elective exemptions
- Students who have completed a qualification at AQF level 5 (diploma) or above may be eligible for block credit (where a block credit agreement exists)
- Students with a mix of formal study and informal and/or non-formal learning may be eligible for recognition of prior learning in addition to any credit approved.

Credit will not be applied automatically. Applicants must apply for credit and/or RPL as early as possible prior to each study period, with applications not accepted after week 2.

For further information about credit and recognition of prior learning please see <http://www.torrens.edu.au/apply-online/course-credits>.

7. Where to get further information

- Torrens University Australia (TUA) Website
 - <https://www.torrens.edu.au/>
- Universities Admissions Centre (UAC) Website
 - <http://www.uac.edu.au/>
- Quality Indicators for Learning and Teaching (QILT) Website
 - <https://www.qilt.edu.au/>

8. Additional Information

Course Structure

The course structure comprises 22 subjects over levels 100, 200 and 300. A total of 240 credit points is required to satisfactorily complete the course.

- 8 core subjects.
- 11 specialisation subjects
- 3 elective subjects.

*Electives available to students may be chosen from the elective bank (please refer to the Course Structure on the Student HUB) or can be taken from any Torrens University course at the appropriate level with approval from the Program Director (or delegate).

Course Rules

To be awarded the Bachelor of Software Engineering (Artificial Intelligence), students must complete 240 credit points over 22 subjects as outlined in the course structure. Each subject has a value of 10 credit points, with one subject having a value of 30 credit points (ATW306 – Advanced Tech Work Integrated Learning).

Subjects

SUBJECT DETAILS
SUBJECT TITLE, DESCRIPTOR
LEVEL 100
<p>MAT101 Maths 1</p> <p>This subject introduces students to foundational mathematical concepts necessary for specialisation subjects in their degree. Main topics covered are – Linear Algebra, Discrete Maths and Geometry. The delivery consists of theoretical elements, a demonstration, and then the lecturers allow students to put these skills into practice. The students collaborate and share mathematical problem-solving approaches during frequent in-class discussions and are expected to provide these solutions for class reviews.</p>
<p>ISE102 Introduction to Software Engineering</p> <p>This subject provides an introduction to the information and skills needed to begin working in software engineering. This subject will cover the concepts of object-oriented programming with a particular focus on learning to use the C++ programming language. An understanding of C++ will form the basis of the necessary skills needed for developing professional and complex software packages such as video games.</p>
<p>CAI104 Concepts in Artificial Intelligence</p> <p>The goal of this subject is to familiarise the student with the basic concepts of artificial intelligence and the problems AI is used to solve. The course content is organised around the three main areas of AI: Search, Logic and Learning. Topics covered include basic search, heuristic search, adversarial search, constraint satisfaction, logical agents, logic and inference, knowledge representation, probabilistic reasoning, knowledge in learning, learning probabilistic models, reinforcement learning and ethics of AI.</p>
<p>ADS103 Algorithms & Data Structures</p> <p>Students learn the fundamental data structures and algorithms that are needed to solve common software engineering problems. Students improve their learning throughout this subject by working on a large number of projects. They solve common problems by designing, developing, implementing, testing, and enhancing a collection of data structures and algorithms.</p>
<p>ICG202 Introduction to Computer Graphics</p> <p>Students are introduced to the fundamental theory of core computer graphics, 3D graphics programming and</p>

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<p>the rendering pipeline. Topics included are the graphics pipeline, primitive rendering, basic camera systems, lighting, texturing, software engineering design principles and testing strategies. Students will complete practical tasks utilising 3D graphics concepts as introduced by the content.</p>
<p>MSA106 Microservices Architecture</p> <p>In this subject students learn the fundamentals and core concepts of Service Oriented Architecture and characteristics of microservices. They compare microservice architecture with monolithic style, emphasising why the former is better for continuous delivery. They also deal with operational complexities that are created while managing, monitoring, logging and updating microservices, and learn about the tools used to successfully manage, deploy and monitor applications based on microservice.</p>
<p>PST107 Probabilities and Statistics</p> <p>This subject provides an elementary introduction to probability and statistics with applications. In probability, students will learn about probability and distribution theory by defining probability and then studying its key properties. The subject will also introduce concepts of random variables, outcomes of random experiments and data analysis techniques using the statistical computing package R or SPSS. In statistics, students will study data and uncertainty. Students will learn how to use statistics in the design of effective experiments and in determining the type of data collected. Underlying these techniques is the assumption that these data are samples of a random variable that follows a probability distribution describing their behaviour.</p>
LEVEL 200
<p>IDS201 Introduction to Data Science</p> <p>The aim of this subject is to provide students with fundamental knowledge of data, questions, and tools that a data scientist deals with. Students will not only be introduced to the ideas behind turning data into information but will also be introduced to the data scientist's toolbox. Topics include: data scientist skills and responsibilities in a business including planning, performing and presenting projects; data science code of ethics; data manipulation tools and techniques.</p>
<p>AAI202 Applications of Artificial Intelligence</p> <p>This subject builds on the skills and knowledge students acquired from Concepts of Artificial Intelligence (AI). The subject begins by exploring different classifications of AI (e.g. Expert Systems, Planning and Robotics, Natural Language Processing (NLP) and Speech Recognition, Machine Learning, and Computer Vision) and their current applications. Students will be presented with case studies focusing on the overview of the development of NLP, Speech Recognition and Computer Vision (most commonly used applications of AI and Machine Learning). This subject also covers the AI for Good movement and how AI is being used to address economic and socially relevant problems.</p>
<p>NDS203 Networking & Database Systems</p> <p>This subject introduces students to core concepts of Networking and Database Systems. Students learn fundamentals of Database Management Systems and network topology including network architecture. They are introduced to relational database models and learn fundamentals of structured query language (SQL). Students will apply these concepts through completing multiple software engineering projects.</p>
<p>CLR204 Classification & Regression</p> <p>This subject introduces students to the statistical models for regression and classification necessary for more specialised subjects in this degree. The main topics covered are Classification Algorithms and Regression Algorithms; the practical use of both methods, how to evaluate the proposed models and how to choose between the different available methods. Theoretical lectures about the main concepts to be studied are followed by demonstrations of the different applications. Then the students are asked to apply the learned concepts on different classification and regression problems.</p>

SUBJECT DETAILS
SUBJECT TITLE, DESCRIPTOR
<p>PBT205 Project Based Learning Studio: Technology</p> <p>This subject provides students with an opportunity to work collaboratively on a series of projects, enhancing skills such as project management, time management, prioritisation, resilience and a gamut of interpersonal skills within a team of people across multiple specialisations. Additionally, students will be challenged to find creative solutions to product development and small-scale rapid prototypes. Students will engage in peer learning through agile development and processes. This learning experience will enhance self-development and enable continuous learning.</p>
<p>HCD206 Human Centred Design</p> <p>This subject helps students explore several important fields of general inquiry pertaining to significant intellectual issues related to human beings so they can view everyday problems and formulate solutions in new ways. Broadly, the subject covers the theory of knowledge, human cognition, ethical and moral values, analysis of human history, critical analysis, appreciation of literature and arts and social interaction among human beings through a technological context. Human Centred Design is to give students an appreciation of the factors that influence human behaviour and interactions so that they can apply specialised skills to help solve problems that affect diverse societies.</p>
<p>CEN207 Creative Enterprises</p> <p>This subject introduces students to the fundamentals of entrepreneurship and the concept of entrepreneurial mindset in the technology sector. It stimulates new ways of thinking about enterprising behaviour in a multi-disciplinary manner. Students will learn to identify opportunities, creatively solve problems, network, communicate persuasively and work effectively in a team. In addition, this subject will empower students to propose new ventures that focus on social change for good.</p>
LEVEL 300
<p>MLP301 Machine Learning Principles</p> <p>This subject aims to introduce students to the applications of machine learning, such as robotics, data mining, computer vision, bioinformatics and natural language processing, but will also discuss risks and limitations of machine learning. The subject also covers machine learning concepts and techniques such as supervised and unsupervised machine learning techniques; learning theory, reinforcement learning and model performance improvement.</p> <p>This subject requires students to have programming skills and knowledge in probability, statistics, regression, and classification.</p>
<p>DMV302 Data Mining & Visualisation</p> <p>The aim of this subject is to teach students data mining techniques for both structured and unstructured data. Students will be able to analyse moderate-to-large sized datasets, data preparation, handling missing data, modelling, prediction and classification. Students will also be able to communicate complex information in results of data analytics through effective visualisation techniques.</p>
<p>NLP303 Natural Language Processing & Speech Recognition</p> <p>This subject extends students' skills and knowledge learned in Machine Learning Principles and Applications of Artificial Intelligence. It discusses application of statistical and other machine learning algorithms to intelligently analyse written and spoken language. It begins with discussion of foundation concepts in natural language processing (NLP) and speech recognition such as language modelling, formal grammars, statistical parsing, machine translation, and dialog processing. Students will then be presented with modern NLP and speech recognition quantitative techniques. Students will be working around different examples applying techniques and NLP toolkits.</p>
<p>DLE305 Deep Learning</p> <p>This subject builds on the skills and knowledge students acquired from Machine Learning Principles and focuses on deep learning. It introduces students to foundational topics on neural networks, its applications to</p>

SUBJECT DETAILS

SUBJECT TITLE, DESCRIPTOR

sequence modelling, computer vision, generative models and reinforcement learning. Focus will be given on learning how to model and train neural networks to implement a variety of computer vision applications. Students will be presented with practical examples of how to develop applications using deep learning.

Knowledge in programming and understanding of machine learning concepts is required in this subject.

ATW306 Advanced Technology – Work Integrated Learning

This subject is designed to provide students with professional experience in an area related to their specialisation. The aim of providing industry-specific opportunities is to enable students to develop skills that will enhance their prospects of gaining meaningful employment and building their career for the future.

Much of the benefit of work integrated learning comes from observation, practicing under supervision and reflection. Work Integrated Learning is an excellent way to broaden the students learning environment while they are studying. It allows them to see first-hand how what they are learning in their degree translates into practice, as well as how ‘real world’ practice relates to what they are learning at University.

This subject will develop work ready skills and boost students’ employability while they are studying.

There are two work integrated learning options available to students:

Option 1: Industry Placement

Students are offered the opportunity to work within a technology company as an intern or volunteer at a technology non-profit organisation. It encourages students to build long-term relationships with the tech industry and provides an opportunity for them to work with and learn from people who may end up becoming colleagues, bosses or mentors. It also provides a context in which to enhance their communication skills and work collaboratively in a professional arena. Students will undertake a series of industry-led tasks that are relevant to their field of study in order to understand the key concepts of working in and managing a professional technology team with emphasis placed on the operation of the environment.

Option 2: Industry Live Brief

This subject requires students to respond to criteria set within the context of an Industry Live Project. An understanding of research methodologies appropriate to professional practice and the documentation of personal creative investigation will be explored. Students will also further investigate and examine entrepreneurial and commercial opportunities through collaborative work practice. The subject is delivered from a cross specialisation perspective and draws on both specialised and common software engineering practices.

Students are required to work both independently and as part of a collaborative team in order to conduct research, analyse and define project parameters and deliver innovative solutions that expand the notion of an industry live brief.

Locations

The Bachelor of Software Engineering (Artificial Intelligence) can be studied fully online or at the below Torrens University Campuses:

- Sydney: Level 1, 46-52 Mountain Street, Ultimo NSW Australia 2007
- Melbourne: 196 Flinders Street, Melbourne, VIC 3000

Campus Facilities and Services

All campuses are designed to provide students with professional spaces in which to learn and work. They have been planned with student study needs in mind with well-equipped accessible learning spaces as well as student breakout areas for group work and spending time with friends.

Facilities and Services include:

- The Customer Service Hub – our friendly and experienced staff can give help and advice about courses, your enrolment and campus life, including all services and activities on campus.
- Counsellors are available for students to consult with on a range of personal issues
- Student wireless access throughout the Campus
- Student break-out and relaxed study spaces for group work
- Student lounge areas – most with microwaves, kitchenette facilities and vending machines
- The Learning Hub, home to the Learning Support Team, encompasses Learning Skills Advisors, Learning Technology Advisors, and Library & Learning Skills Officers. It provides an integrated, holistic support program for students throughout the study lifecycle within a library/collaborative study environment. The service includes:
 - Support and workshops with highly qualified staff in the areas of Academic skills, Library skills, and Technology skills, both on campus and online.
 - Physical and digital resources relevant to studies, such as books, journals, multimedia, databases
 - Self-check kiosks for library loans and print and copy facilities

A positive student experience

Torrens University Australia values the importance of a positive student experience, and therefore has robust processes to resolve student complaints. The Student Complaints Policy, and associated procedures, can be accessed from the [website](https://www.torrens.edu.au/policies-and-forms) (<https://www.torrens.edu.au/policies-and-forms>).

Paying for your qualification

We offer two payment options for this course:

- **Upfront payment**
If you want to complete your qualification debt-free you can choose to pay as you go. This means tuition fees will be invoiced each semester and payment is required on or before the due date using EFTPOS, credit card or direct transfer.
- **FEE-HELP**
FEE-HELP is Australian Government's loan scheme for higher education degree courses. It can assist you in paying for all, or part of, your course fees. Repayments commence via the tax system once your income rises above a minimum threshold. Just like with any other debt, a FEE-HELP debt is a real debt that impacts your credit rating.

Further information about FEE-HELP, including eligibility, is available at:

- [FEE-HELP website:](http://studyassist.gov.au/sites/studyassist/help-payingmyfees/fee-help/pages/fee-help)
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- [FEE-HELP booklets:](http://studyassist.gov.au/sites/studyassist/helpfulresources/pages/publications)
<http://studyassist.gov.au/sites/studyassist/helpfulresources/pages/publications>

Austudy and Abstudy

Students enrolled in this course may be eligible for government assistance, such as [Austudy](#) or [Abstudy](#).

