POSTGRADUATE PROGRAMS IN APPLIED DATA ANALYTICS

Domestic Students Only
Future-proof yourself.
There is a global shortage of graduates with skills in data analytics, needed to inform high-quality, data-driven decision-making.
ANU is pleased to offer new postgraduate study opportunities for professionals interested in developing skills, or reskilling, in the area of data analytics.

These programs are designed to address a global shortage of graduates with skills in data analytics to inform high-quality, data-driven decision-making.

This reflects a wider challenge to Australian businesses, government and the community in terms of the effective use of public data in decision-making.

The rapid expansion of a digitally-enabled environment has broadened both the threat of, and the opportunity for, data-driven innovation. Being able to understand, anticipate and direct developments will require a workforce with a diverse skill set ranging over computational, statistical and methodological concepts, which can be applied across a host of settings and industries.

Our ‘T-shaped’ programs are designed to develop inter-disciplinary knowledge across the three base disciplines of computing, statistics and social science as well as a specialisation in one of these areas. The integrated suite of programs is designed to have flexible entry and exit points across the stages and includes:

- Master of Applied Data Analytics – typically three years part-time (entry and exit)
- Graduate Diploma of Applied Data Analytics – typically two years part-time (entry or exit)
- Graduate Certificate of Applied Data Analytics – typically one year part-time (exit only)
- Non-award study.

These graduate programs are designed to allow students to apply their skills to solve real-world problems as well as become familiar with the underlying principles often used in ‘big data’ software systems. This is reflected by case studies embedded throughout key courses in the curriculum.

Through this program you will receive:

- exposure to best practice in data analytics;
- cutting-edge courses in areas of relevance to data analysts;
- an opportunity to deepen your knowledge in computation, statistics, or social science;
- professional development for practising data analytics professionals;
- the opportunity to undertake research of professional relevance.

Pathways and exit points

You may seek admission to the Graduate Diploma of Applied Data Analytics and use this as a pathway to the Masters degree. Both the Graduate Diploma and Graduate Certificate provide early exit points for those who do not wish to complete a longer qualification. Please note that the Graduate Certificate is an exit-only qualification and is not available for admission.

Delivery to meet your needs

We aim to deliver the program in a way that is sensitive to the needs of graduate coursework students, using a combination of online learning and a short on-campus component.

Typically, each course is designed around a 4+1+4 model – four weeks online learning, one week intensive on-campus, and a further four weeks of online learning and major assessment.

The on-campus component has been highly valued by students and provides the additional benefit of an opportunity to mix and learn from fellow practising professionals.

In some cases, some courses may be offered in a traditional on-campus mode.

Workload

The expected workload for ANU courses is 130 hours per course. This includes some preparation, approximately 10 hours per week for the online component, plus the intensive on-campus week.

“I really enjoyed the flexible learning system. Studying from home in my own time was great, with the intensive week really consolidating my learning.”

Hayley Purdon, Data Analyst
Department of Social Services
STRUCTURE

Stage 1
This presents a graduate-level reskilling opportunity comprising four courses. These courses are designed to introduce graduate students to the key concepts across the two technical disciplines (statistics and computation) relevant to data analytics: statistics and computation. Students with a technical background are highly likely to be granted recognition of prior learning for some or all of Stage 1. Students may choose to leave the program at the end of Stage 1 with a Graduate Certificate of Applied Data Analytics.

Stage 2
This presents a graduate-level upskilling opportunity by supporting the development of advanced knowledge across the three areas of statistics, computation and social science. In this stage the program will involve regular opportunities for students to apply their skills in teams, solving problems that reflect real-world conditions in an integrated fashion. Students with a strong discipline background may be granted recognition of prior learning for some courses in Stage 2. Students may choose to leave the program with a Graduate Diploma of Applied Data Analytics after completing four courses from Stage 2.

Stage 3
This presents an opportunity for specialisation by selection from an offering of advanced courses from the three areas of statistics, computation and social science. The Masters program incorporates two Stage 3 courses which build on six courses from Stage 2, to support students to acquire expertise in an area of their choice. Students who complete this stage of the program will be awarded a Master of Applied Data Analytics.

ANU is home to Raijin, Australia’s largest and most powerful university-based supercomputer.

“I wanted to learn new skills and expand my knowledge of how to use the power of new data analytics techniques to make sense of the explosion of data in the modern world.”

Gareth Baker
Department of Defence
## Postgraduate Programs in Applied Data Analytics

### Stage 3
**Expertise in a discipline**
Masters

<table>
<thead>
<tr>
<th>College of Business &amp; Economics</th>
<th>College of Engineering &amp; Computer Science</th>
<th>College of Arts &amp; Social Sciences</th>
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<tbody>
<tr>
<td>STAT 5</td>
<td>COMP 5</td>
<td>SS 3</td>
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<td>STAT 6</td>
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### Stage 2
**Technical re-skilling across disciplines**
Graduate Diploma

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<th>College of Business &amp; Economics</th>
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<tbody>
<tr>
<td>STAT 4</td>
<td>COMP 4</td>
<td>SS 2</td>
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<td>STAT 3</td>
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### Stage 1
**Technical re-skilling**
Graduate Certificate

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<tr>
<td>STAT 2</td>
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<td>STAT 1</td>
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Master of Applied Data Analytics

Admission requirements
A completed honours-level degree or equivalent in any discipline from a recognised university or a completed three-year degree plus three years of relevant work experience. Students who are not eligible for direct entry to the Masters degree may initially apply for the Graduate Diploma and will be eligible for transfer to the Masters degree after completing a minimum of 24 units (four courses) with a GPA of 5.0/7.0.

Learning outcomes
Upon successful completion, students will have the skills and knowledge to:
> select, adapt, apply, and communicate advanced data analytics methods and techniques;
> apply data analytics principles to decision-making about policy, business and service delivery;
> examine current issues in data analytics using leading-edge research and practices in the field;
> demonstrate strong cognitive, technical, and communication skills, working independently and collaboratively to collect, process, interpret and communicate the outcomes of data analytics problems; and
> communicate complex data analytics outcomes to diverse audiences.

Graduate Diploma of Applied Data Analytics

The Graduate Diploma is intended for students who:
> wish to acquire a broad skills base in applied data analytics covering computing, social science and statistical topics;
> wish to complete a postgraduate qualification in two years of part-time equivalent study; or
> wish to start a postgraduate qualification after one year of relevant work experience.
> wish to transfer to the Masters program after successfully completing a minimum of 24 units with a GPA of 5.0/7.0.

Learning outcomes
Upon successful completion, students will have the skills and knowledge to:
> apply basic technical expertise in computer programming, databases, and statistical data analysis to solve data analytics problems;
> contribute effectively to the performance of a data analytics workplace;
> demonstrate basic technical expertise in computing, statistics, and social science as it pertains to data analytics;
> be able to work to deadlines and specification, document tasks undertaken, and report outcomes to a third party;
> be capable of independent learning with some ability to critically evaluate work undertaken.

Graduate Certificate of Applied Data Analytics

The Graduate Certificate is an exit qualification only. It requires the completion of 24 units, which are outlined below. Students will be considered to have met the requirements for the Graduate Certificate if they complete 24 units of which 18 units must be COMP and STAT courses, with a minimum of at least one course in each area.

Learning outcomes
Upon successful completion, students will have the skills and knowledge to:
> apply basic technical expertise in computer programming, databases, and statistical data analysis to solve data analytics problems;
> contribute effectively to the performance of a data analytics workplace;
> be able to work to deadlines and specification, document tasks undertaken, and report outcomes to a third party.

Non-award study
Students are able to enrol in individual courses on a non-award basis to meet their personal and professional interests and requirements. Non-award students will be able to convert these courses into credit towards a formal award at a later stage, subject to University policies on credit transfer.

The application process for non award study is different to that of a formal award. Students interested in this option are encouraged to contact us by email for more information: dataanalytics.cecs@anu.edu.au

Please note that FEE-HELP is not available to students choosing to study on a non-award basis.
Australia’s leading university

Be recognised with an in-demand qualification from Australia’s top university.

At the ANU College of Engineering and Computer Science, you will study at a leading centre for research and education in Australia. The College is at the cutting edge of numerous fields including:

- logic
- algorithms and data
- signal processing
- artificial intelligence
- computer vision and robotics

Join our community of students, teachers and researchers committed to finding sustainable solutions to the world’s greatest challenges. In return, receive education, research training and real-world experience that ensures you have a comprehensive understanding of a range of interconnected disciplines when you graduate.

You will benefit from a dynamic and pioneering research environment where you will learn in small classes, where you will work alongside teachers who are some of the world’s brightest researchers.

Our researchers collaborate with an extensive network of academic, government and industry partners around Australia, in Europe, across the Asia-Pacific and the United States.

Our large-scale computational research is supporting product development at some of the largest global tech companies, including Microsoft Research, Facebook, Google, Intel, IBM and Oracle.

See for yourself how an ANU degree can provide you with the tools to enable change in your world.
Courses

Stage 1

COMP1
Introduction to Programming for Data Scientists (COMP7230)
This course teaches introductory programming within a problem-solving framework applicable to data science. An emphasis is placed on technical programming, data processing, and data manipulation.
The course focuses on designing and writing correct code. Testing and debugging are treated as integral to the programming enterprise, with the course also teaching how to use computational tools for effective data analysis.

COMP2
Introduction to Database Concepts (COMP7240)
This course is an introduction to database concepts and the general skills needed to design and use databases. The topics include the relational data model, SQL, the entity-relationship model, dependencies, query processing and optimisation, and database transactions and security.
In order to expand students’ understanding of relational databases, the current industry development of database systems such as NoSQL databases will be introduced.

STAT1
Introductory Statistics for Business and Finance (STAT7055)
This course will introduce students to basic statistical methods, with a focus on applying these methods to the business world. This course assumes no statistics background.

STAT2
Applied Statistics (STAT7001)
This course builds on Statistics STAT1 (STAT7055) and provides an introduction to common applied techniques for carrying out statistical analysis. This course assumes knowledge of STAT7055.

Stage 2

COMP3
Data Mining (COMP8410)
Large amounts of data are increasingly being collected by public and private organisations, and research projects. Additionally, the Internet provides a very large source of information about almost every aspect of human life and society.
This course provides a practical focus on the technology and research in the area of data mining. It focuses on algorithms and techniques, rather than on mathematical or statistical foundations.

COMP4
Data Wrangling (COMP8430)
Real-world data is commonly messy, distributed, and heterogeneous. This course introduces core concepts of data cleaning, standardisation and integration, it also discusses data quality, management, and storage issues as they pertain to data analytics.

SS1
Introduction to Social Science Methods and Types of Data (SOCR8201)
This course provides an introduction to the main empirical social science methods, types of data, and techniques for collecting social science data.

SS2
Using Data to Answer Policy Questions and Evaluate Policy (SOCR8202)
This course will provide students with a range of analytical techniques, which can be used to answer policy and service delivery questions and measure the impact of policy.

Stage 3

COMP5 & COMP6
Statistical Machine Learning (COMP8600)
This course provides a broad but thorough introduction to the methods and practice of statistical machine learning. The course covers a broad range of topics including the major techniques used in machine learning.

Document Analysis (COMP6490)
Processing of semi-structured documents such as Internet pages, PDF brochures and RSS feeds and accompanying news items, is considered from the perspective of interpreting the content.
This course considers the ‘document’ and its various genres as a fundamental object for business, government and community.

Bio-inspired Computing (COMP8420)
Bio-inspired Computing is the combination of computational intelligence and collective intelligence. This course introduces the fundamental topics in bio-inspired computing, and builds proficiency in the application of various algorithms to real-world problems.
SS3 & SS4
Advanced Techniques in the Creation of Social Science Data (SOCR8203)
This course will provide students with a detailed understanding of the main techniques for the collection of policy relevant social science data. Students will be well placed to design and undertake their own research and to commission others to design and undertake fieldwork and analysis.

Advanced Social Science Approaches to Inform Policy Development and Service Delivery (SOCR8204)
This course will provide a more advanced treatment of how social science approaches can be used to inform policy development and service delivery approaches.

STAT5 & STAT6
Statistical Learning (STAT7040)
This course provides an introduction to statistical learning and aims to develop skills in modern statistical data analysis.

Introduction to Bayesian Data Analysis (STAT7016)
The aim of this course is to equip students with the skills to perform and interpret Bayesian statistical analyses.

Course Schedule
The schedule of when courses will be offered in each year can be found at the data analytics website:
W cecs.anu.edu.au/study/dataanalytics

Prerequisites

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<tr>
<th>Stage</th>
<th>Course</th>
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<tbody>
<tr>
<td>1</td>
<td>COMP7230 Introduction to Programming for Data Scientists</td>
<td>None</td>
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<tr>
<td>1</td>
<td>COMP7240 Introduction to Database Concepts</td>
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<tr>
<td>1</td>
<td>STAT7055 Introductory Statistics for Business and Finance</td>
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<tr>
<td>1</td>
<td>STAT7001 Applied Statistics</td>
<td>STAT7055</td>
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<tr>
<td>2</td>
<td>COMP8430 Data Wrangling</td>
<td>COMP7230 AND COMP7240</td>
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<td>2</td>
<td>COMP8410 Data Mining</td>
<td>COMP7230 AND COMP7240</td>
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<tr>
<td>2</td>
<td>STAT7026 Graphical Data Analysis</td>
<td>STAT7055 OR STAT6039</td>
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<td>2</td>
<td>STAT6039 Principles of Mathematical Statistics</td>
<td>STAT7001</td>
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<td>2</td>
<td>SOCR8201 Introduction to Social Science Methods</td>
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<tr>
<td>2</td>
<td>SOCR8202 Using Data to Answer Policy Questions</td>
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<tr>
<td>3</td>
<td>COMP8600 Statistical Machine Learning</td>
<td>Email <a href="mailto:dataanalytics.cecs@anu.edu.au">dataanalytics.cecs@anu.edu.au</a> to confirm</td>
</tr>
<tr>
<td>3</td>
<td>COMP6490 Document Analysis</td>
<td>Email <a href="mailto:dataanalytics.cecs@anu.edu.au">dataanalytics.cecs@anu.edu.au</a> to confirm</td>
</tr>
<tr>
<td>3</td>
<td>COMP8420 Bio-inspired Computing: Applications and Interfaces</td>
<td>Email <a href="mailto:dataanalytics.cecs@anu.edu.au">dataanalytics.cecs@anu.edu.au</a> to confirm</td>
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<td>3</td>
<td>STAT7016 Introduction to Bayesian Data Analysis</td>
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Application to the Master and Graduate Diploma of Applied Data Analytics is via the Universities Admissions Centre.

UAC application process
This application and enrolment process has five key steps.

1. Lodge an application through the Universities Admissions Centre (uac.edu.au/postgraduate). You should include details of any work experience as well as your qualifications.

2. You will receive an email from the University’s Domestic Admissions team, containing an offer for study.

3. Complete the online acceptance process, and receive your ANU logon and enrolment instructions from the Data Analytics Team.

4. Log on to ISIS, the University’s Interactive Student Information System, to enrol yourself in your chosen courses.

5. Log on to Wattle, the University’s online learning portal, to access your course materials.

Non-award study application process
Students who would like to complete courses from these programs as a non-award student can apply directly to the University.

For details on direct application processes please email dataanalytics.cecs@anu.edu.au.

Please note that these programs are available for international students, but only in on-campus delivery mode.

Recognition of Prior Learning
Credit for previous formal learning may be considered if the learning outcomes and amount of learning match that of courses for which credit is being sought. Note that credit will not be granted for studies undertaken more than seven years before the application date.

Exemption may also be considered – note that exemption does not reduce the units required to complete a program, while credit typically will.

Refer to the College Data Analytics program site for more information.
W cecs.anu.edu.au/study/dataanalytics

Fees
The majority of domestic graduate coursework and non-award students at ANU are required to pay domestic tuition fees (DTF).

The amount of tuition a student pays is determined by the courses in which that student enrols. Each course has a defined tuition fee and the total tuition fees for all enrolled courses in a given academic session are invoiced collectively.

Domestic students who are required to pay DTF, and who also meet the citizenship and residency requirements may defer the payment of part or all of their tuition fees using FEE-HELP.

Please check the Programs and Courses website for individual course tuition fees.
W programsandcourses.anu.edu.au
"At the Australian Institute of Health and Welfare it is abundantly clear that high level capability in data management and data analytics across the organisation is key to meeting our objectives.

Our people, and their skills, is our capability!

Good data is the foundation and infrastructure for good policy and good services. The right data at the right time is needed to guide the development of the policy or the service and to assist with the measurement of outcomes.

This is only achieved by having people with the qualifications and knowledge in relevant data-related fields.”
Postgraduate Programs in Applied Data Analytics
ANU College of Engineering and Computer Science
E  dataanalytics.cecs@anu.edu.au
W  cecs.anu.edu.au/study/dataanalytics
CRICOS #00120C