

# **An Alternate System to the Australian Tertiary Admission Rank**

**By  
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As documented in the 'Report in the Scaling of the 2018 NSW Higher School Certificate'  
<https://www.uac.edu.au/assets/documents/scaling-reports/Scaling-Report-2018-NSW-HSC.pdf>

"The Australian Tertiary Admission Rank (ATAR) is a numerical measure of a student's overall academic achievement in the Higher School Certificate (HSC) in relation to that of other students. This measure allows the overall achievement of students who have completed different combinations of HSC courses to be compared. The ATAR is calculated solely for use by tertiary institutions, either on its own or in conjunction with other criteria, to rank and select school leavers for admission. The ATAR, which aims to provide a fair and equitable method of ranking applicants from all states, is based on the assumption that the age cohorts from which the states' Year 12 cohorts are drawn are equally able to undertake tertiary study. That is, if everyone in the age group completed Year 12, it would be fair to consider the same proportion of each state's students as admissible to any particular university course. The ATAR is reported as a number between 0 and 99.95 with increments of 0.05. The ATAR is not a mark. Specifically, a student's ATAR indicates the position of that student relative to their Year 7 cohort. Students who receive an ATAR of 80.00 in 2018, for example, have performed well enough in the HSC to place them 20 per cent from the top of their Year 7 cohort if all the 2013 Year 7 students completed Year 12 and were eligible for an ATAR in 2018".

Calculation of the ATAR is complicated but essentially is averaged over your best 10 units. Subjects can be either 1, 2, 3 or 4 units. 2 units of English is compulsory. This system doesn't take into account outliers. For example, if a student scores particularly well in one subject but only average in all other subjects then the student's ATAR will be only "average". If the ATAR was only based on a student's best subject then the ATAR will be significantly higher than "average". This is best explained by the author's HSC results as given in table 1. The ATAR system at the time the author did the HSC in 1994 required a compulsory humanity unit and therefore had to do 1U General Studies. Also 2 units of English was not compulsory either. The author spent most of his time doing mathematics, a reasonable amount of time on the sciences of physics, chemistry and engineering science, minimal time on English and no time on general studies. The ATAR was based on a "averaged" performance of the author's top 5 subjects and scored 80.75. Note the significantly higher results in mathematics compared to the science subjects of physics, chemistry and engineering science. This indicates that this particular candidate is best suited to doing the highest level of mathematics at a university. Actuarial studies is recognized as being a "high" level of mathematics. The ATAR for actuarial studies at Macquarie University in 2017 was 97.05. If the ATAR was based on a student's best subject then the author could have potentially qualified for actuarial studies. This would also mean that the student would be spending more time on the subject/s that they are performing best at and hence increase this mark even further. If a student is particular brilliant

at either chemistry or biology and only “average” in other subjects then they could potentially qualify for a degree that utilizes chemistry and biology such as medicine. The ATAR for medicine generally requires at least 99, and under the current ATAR system a student would not qualify. But if the ATAR was based on their best subject then the student could potentially qualify for medicine. Note also that the compulsory 2 units of English in the current ATAR system would mean that the author would have an ATAR even lower than the mark of 80.75 that was obtained when the author did the HSC in 1994. Another interesting observation is that a previous ATAR is indicated as 88.9. That is a difference of 8.15 and indicates the instability of the ATAR system which changes over the years.

<b>Subject</b>	<b>Units</b>	<b>Mark</b>
Mathematics	3U	94.4%
Mathematics	4U	91.7%
Physics	2U	65.0%
Chemistry	2U	62.9%
Engineering Science	2U	62.6%
General English	2U	51.5%
General Studies	1U	24.1%

Table 1: HSC results for the author

The author qualified for a Bachelor of Science degree and graduated in 1999 majoring in mathematics. The results are given in table 2 where C represents a pass, B higher than a pass, A highest possible score, F failure, CQ pass without continuation as a prerequisite and FA withdrawal without failure. Notice the failures in Introduction to Psychology II, Mathematics IIB and Astronomy, and a pass without continuation in Introduction to Psychology I. Note that the author had to obtain special permission to enrol in Introduction to Psychology II. This indicates that the author should not be undertaking science subjects such as Psychology and Astronomy, and therefore more generally not be doing science subjects. Also note that the author scored the highest possible mark in the only subject being statistics/mathematics of sport, gambling and medicine. This implies that the author should be doing subjects on the statistics/mathematics of sport and gambling.

<b>Subject</b>	<b>Mark</b>
Human Biology	C
Introduction to Computing	C
Mathematics IA	C
Mathematics IB	B
Introduction to Psychology I	CQ
Introduction to Psychology II	F
Statistical Data Analysis	B
Introduction to Statistical Practice	C
Mathematics IIA	C
Mathematics IIB	F
Mathematics IIC	C

Physics IA	C
Applied Statistics	CQ
Applied Probability	C
Operations Research I	C
Mathematics IIB	B
Geometry and Topology	C
Applied Algebra	C
Physics IB	B
Astronomy	F
Applied Statistics	C
Statistical Theory	FA
Operations Research II	C
Mathematical Methods	C
Differential Equations	CQ
Algebra IIIB	FA
Astronomy	C
Statistical Theory	CQ
Statistical Design	FA
Gambling, Sport and Medicine	A

Table 2: Author's undergraduate results at Macquarie University

The author enrolled in a Graduate Diploma in Operations Research at University of Technology Sydney and graduated in 2002. The results are given in table 3 where credit is higher than a pass and distinction is higher than a credit. The highest possible result is a high distinction. With three credits and two distinction implies that the author is best suited to Operations Research subjects as well as the statistics/mathematics of sport and gambling. Note also the author undertook two subjects in operations research in the undergraduate degree and passed these subjects.

<b>Subject</b>	<b>Mark</b>
Optimisation 2	Credit
Probability and Stochastics Processes	Distinction
Simulation Modelling	Credit
Operations Research Practice	Distinction
Network Optimisation	Credit

Table 3: Author's graduate diploma results at University of Technology Sydney

The author enrolled in a PhD at Swinburne University 'Mathematical modelling in hierarchical games with specific reference to tennis' and graduated in 2006. This is consistent with the author best suited to the statistics/mathematics of sport. From the completion of the PhD to 2019 the author has written about 58 articles on the mathematics/statistics of sport and gambling. Two of these articles involve game theory techniques. Also, game theory was used in the authors PhD in relation to optimizing tennis resources. Game theory is essentially the mathematics of conflicts. As of 2019 the author has self-published books on 'The Mathematics of Tennis', 'Operations Research in Tennis', 'Resolving Problem Gambling: a mathematical

approach', 'The Mathematical Modelling of Sport: using recurrence formulas in Excel' and 'The Mathematics of Conflicts'. This implies that the author is best suited to the mathematics/statistics of sport, gambling and conflicts. Therefore, the subjects undertaken in coursework degrees for this particular student should be on the mathematics/statistics of sport and gambling, and on game theory. Note that as of 2019 only Macquarie university is the only university that offers a subject that involves the mathematics/statistics of gambling. Note also that as of 2019 only Swinburne University, RMIT and Macquarie University offer undergraduate subjects on the mathematics/statistics of sport. And Latrobe university offer a Master of Sport Analytics that involves the mathematics/statistics of sport. Note also that game theory is offered in undergraduate subjects in the majority of universities but it is generally within microeconomics and rarely within mathematics (despite game theory being highly mathematical). In the author's undergraduate degree game theory was offered in one of the operations research subjects within statistics (and the author undertook this subject and passed). But in the authors Graduate of Diploma degree in Operations Research no game theory subjects were offered. Game theory is a part of operations research. Even further, there have been many Nobel Prizes in Economics based on game theory. For example, John Nash in 1994, Robert Aumann in 2005, Roger Myerson in 2007 and Lloyd Shapley in 2012. These Nobel Prize winners are essentially mathematicians (rather than economists). In particular John Nash (as depicted in the movie 'A Beautiful Mind') is arguably one of the best mathematicians of all time.