

Tall Poppies

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Science Scholars at UoA
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THEIR FUTURE - OUR CHALLENGE

Achieving the amazing for Tall Poppies at the University of Auckland

by Cather Simpson

What happens to 'Tall Poppies' when they leave school and go to university? When finding other Tall Poppies off whom to bounce ideas, with whom to have heated debates and to explore fascinating new understanding in depth – some of the best times for Tall Poppies – becomes challenging?

High achievers in the science, maths, engineering and technology (SMET) fields usually find themselves sitting in first year university classrooms, one new face in a sea of hundreds of other new faces, distanced literally and figuratively from the professor. Sure, high achievers also often find themselves at or near the top of the class. However, they can be profoundly bored at the depth and pace that must suit first the broad middle of the bell curve. Asking curiosity-driven questions, following thoughts where they lead and engaging in one-on-one conversation with the expert at the front

of the class – the stuff that would bash this boredom – is intimidating and is undermined by the structure of the course.

'Teaching large undergraduate classes can be a bit impersonal because there are so many students, they can get lost in the crowd. But in the Science Scholars class, we get to know the students better. Breaking down the barriers and making connections is very fun! The students are super motivated and really enjoy learning. This is a *very* rewarding experience for me.'

Dr Cate Macinnis-Ng, Senior Lecturer in Biological Science, Rutherford Discovery Fellow, Science Scholars coordinator

And what about those who are gifted in non-traditional ways? The creative, insightful dyslexic? The twice exceptional (2e) student? The student who can abstract and manipulate 3D images from a 2D projection on a

page with extraordinary facility, but whose dyscalculia makes 12 x 4 a challenge?

Unfortunately, these other-gifted students often get lost in year one university SMET programmes. Their gifts are not recognised by our traditional assessment methods, their initial 'failures' at these assessments undermine their confidence and they retreat further from academics' attention, and to the academic they are indistinguishable from the many, many students who perform poorly on tests and exams for other reasons. Many of these other-gifted students leave SMET, discouraged, long before they have had a chance to shine, and to make the transformative contributions of which they are clearly capable.

For all of these Tall Poppies, the large, first year university SMET lecture courses are far from ideal. And what a waste! These are exactly the students our universities are trying to attract, to educate, and to nurture to become the drivers of New Zealand's high-tech, knowledge economy,

'The best thing about being involved with the Science Scholars Programme is helping to guide the next generation of scientists. I get to interact with students who love science and want to excel.'

Dr Nicolette Rattenbury, Academic Coordinator for Science Scholars

Hamish and Caitlyn Jolleyman are first year Science Scholars in 2016. They comment: 'The best thing for us has been the community we have encountered through the programme, our fellow students and the many scientists who have come in to talk with us. Science Scholars has given us the opportunity to meet some incredible people who are also fascinated by science.'





The Science Scholars ethos

The Science Scholars Programme at the University of Auckland is designed to fix this – to positively transform the experience of Tall Poppies from New Zealand, and around the world. Our goal is to bring our scientifically minded Tall Poppies together, challenge them, enrich their learning experiences, and help them grow in extraordinary ways – to foster a true community of scholars in the Faculty of Science.

We achieve this with a combination of 'brain candy' in the form of a deeply enriched curriculum, enhanced contact and research experience with our top academics, and small class, collaborative learning with creative assessment tasks.

The students we are interested in attracting will not see the Science Scholars as yet another gold star on their resumes. In fact, in the first week of the programme the new Science Scholars must discuss and commit to uphold our central ENGAGE tenets:

- **Active engagement:** in educational, social, and service opportunities, and through their engagement strive to better themselves and the university.
- **New Zealand perspective:** examine what it means to be excellent New Zealand citizens, cultivate and develop a deep ap-

preciation of New Zealand, and embrace the diversity and complexity of its rich culture, peoples and environment.

- **Global outlook:** examine what it means to be excellent global citizens, cultivate and develop a deep appreciation of the diversity and complexity of the global culture, peoples and environment, study the world's complex, interdependent systems, and strive to understand New Zealand's place in the world.
- **Academic enrichment:** pursue academic excellence both in and out of the classroom, and construct purposeful and intellectually stimulating programmes of study.
- **Grounded leadership:** build upon educational experiences to become leaders in the university, their communities, New Zealand and the world.
- **Excellent research:** gain an understanding of the practice and value of research as an intellectual endeavour, through guided inquiry in the classroom, independent projects, and research experiences with our top academic researchers in the Faculty of Science.

Starting the Science Scholars Programme

The Science Scholars programme started rather unusually. Twice per year, the Univer-

sity of Auckland holds graduation for (literally) thousands of students. Academics dress up in our robes and funny hats, and parade down Queen Street with the students, and sit on the stage while the new graduates formally receive their degrees and shake the Chancellor's hand.

What parents and students don't see is the tea room in the back, where the academics sit around eating scones while waiting for the next graduation ceremony to start. It's a hot-bed of conversation, because we are trapped with lots of tea and nothing to do but talk to each other! And since the academics who volunteer to represent the University of Auckland on stage tend to be those whose dedication to education is both high and action-oriented, the topic of our heated conversation often focuses on improving students' experiences and outcomes in our university classes.

Over about four years, some of our university academic 'Tall Poppies' from Maths, Physics, Psychology, Biology, Chemistry and other SMET departments mused about how frustrating it was to *know* we have excellent students in our classes but to never 'see' them. Intense discussions and arguments ensued about how to remedy that problem, and how to enrich the SMET educational experiences of our 'best and brightest' students – and enrich our teaching experience

as well. Tall Poppies are often the most fun and rewarding for us to teach, because they actively engage in the very topics that made us want to become university academics.

'The Science Scholars acts as a bit of a meeting place for high quality in the Faculty of Science and others. I was a bit surprised by the level of interest to participate by my colleagues – to the extent that if they are *not* asked, they take it slightly amiss! A lot of very good scientists are really keen to teach these students.'

Professor James Sneyd, Mathematics, Science Scholars coordinator.

Eventually, we decided it was time for action, so David Williams (Professor, Chemical Sciences) and I led an application from the Faculty of Science to the Vice-Chancellor's Strategic Development programme for seed funding. It was denied. Undaunted, we added Richard Easther (Professor, Physics) to the leadership team, tweaked the proposal, and applied again. Success! And the Science Scholars programme was born – with the caveats from the Vice-Chancellor's office that the Faculty of Science be willing to continue the programme after the seed stage completed, and that we provide leadership and advice for extending the approach across the university, with which we were delighted to comply. The target date for enrolling the first Science Scholars students was first semester 2015.

One of the first things we did was examine international best practice, with an eye to adapting proven excellence to the New Zealand context, and minimising growing pains. On a whirlwind USA tour, I received excellent advice and insight from staff and students in leading programmes at Vanderbilt University, NYU, Ohio State University, the University of Wisconsin – Madison, the University of Virginia, the University of Pennsylvania, Penn State University and Michigan State University.

We learned the value of community and collaboration, of healthy competition, and of creativity in the content we use to challenge the students' intellectual development. Building a strong ethos of excellence and achievement, national and global context, was found to add considerable value. Attentive, responsive mentoring – by academics and students – was particularly effective in encouraging success in underrepresented groups.

Finally, we were ready to transform our ambitious plans into a coherent, well organised and well run programme. Academic researchers are excellent at coming up with great ideas, bringing in best practice from research, creatively designing educational initiatives; we are often hopeless at the details.

The Science Scholars needed Nicolette Rattenbury, a PhD-level Mathematician who is a Tall Poppy herself in being creative, clever *and* organised. We also needed Genda Haines, the head of the Student Centre in the Faculty of Science, to provide that critical link to student needs and academic programmes. The two of them added to the three of us became the group tasked with creating and deploying the Science Scholars programme. The hard work began.

The Science Scholars Programme

The call to science academics was made, and the response was phenomenal. Scientists from all 10 departments and disciplines worked – argued intensely and constructively – for months to hash out a vibrant and challenging programme. A set of exciting 'Big Challenges' and deep topics in the 'Art, Practice and Impact of Science' were collected into a curriculum delivered through six courses (one per semester) designed to stimulate engagement and provoke thought in the Science Scholars in once-per-week, two-hour discussion seminars.

'Gwen and I really enjoyed our day with the Science Scholars – they are such a lovely, intelligent and interesting group of students. We would be happy to do it again next year.'

Associate Professor Kerry Gibson, Psychology, Science Scholars Lecturer

Unlike in most university classes, the curriculum is only loosely tied to the content; the emphasis in each course will adapt to reflect the passions and pedagogical goals of the pair of hands-on coordinators. 'Big Challenges' they can choose as a focus include topics such as climate change, energy, biodiversity, inequality, the universe, the brain, and others.

The 'Art, Practice and Impact of Science' addresses science and governance, knowledge and technology, unintended discoveries, money and science, popular science,

bias in science, error and fraud, the history of science, the point of science and lots more. The only certain thing about an individual student's curriculum is that it will be new, thought provoking and will lead to engaging, intense discussions.

'Most interesting was the session run by two Professors of Philosophy. The philosopher asks them seemingly simple questions. The students barge in like bulls in a china shop. But slowly, as the philosopher asks more and more probing questions about their answers, you can see the students beginning, finally, to realise that it's not quite as simple as they thought at first. I'm not saying the students were humbled, but you could see them realising that more thought was required.'

Professor James Sneyd, Mathematics, Science Scholars coordinator

The Science Scholars earn traditional science degrees, enriched by the Science Scholars curriculum. In order to foster healthy competition and encourage creative risk taking, the six courses are all graded pass-fail. Assignments are designed to elicit active student interest, engagement and insight rather than to test knowledge. We accomplish this through blogs, artwork, videos, creative writing, poster displays and debates.

'I really liked writing the creative short story! That really opened my mind to the kind of thinking expected of us as Science Scholars. Having the opportunity to exercise our imagination and creative writing skills was really rewarding. I mean, you get to write SciFi. Enough said.'

Catherine Webb, Science Scholar

'I really enjoyed reading the stories about alternate realities – writing a scientifically styled story was difficult, but eye-opening for me. I also really enjoyed some of the practical demonstrations that went along with the presentation on space and the universe.'

Isabella Francis, Science Scholar

Mentoring is one of the more important components of the programme. Every student is assigned a mentor from the research leaders in the Science Faculty. They meet several times during each semester to discuss science, career pathways, course selection – whatever the student needs to succeed.



A typical Science Scholars class: Professor Hinke Osinge (Mathematics, Science Scholars coordinator) and Dr Siouxsie Wiles (Bioluminescent Superbugs Lab, Faculty of Medical & Health Sciences, Winner 2013 Prime Minister's Prize for Science Media Communication, Science Scholars coordinator) examine a presentation with the students. The discussions that follow are intense and fun.

'The best thing for me is the fortnightly one-on-one mentoring sessions. My mentor, the Head of the Physics Department, Professor Richard Easther, provides insight, guidance and direction which helps me create the future I want – to be a researcher, educator, and pioneer in the science field.'

Tristan Pang, Science Scholar

One of the more novel aspects of the programme is the incorporation of novel hands-on, brains-on research into the undergraduate experience. In the second year, the Science Scholars develop a research question they would like to answer. Throughout the second and third year, they work on answering it. We are at the start of developing these questions now with the students who entered in 2015, and like the rest so far, this part of the programme is looking to be very successful!

What the Science Scholars think

We are in the second year of this exciting new programme, and the Science Scholars seem to be really loving it. They are a joy to

teach and learn from, and the feedback we have received is phenomenal.

'SCISCHOL 101 has helped me grow as a scientist, I've now learnt more about the diversity and the future of science. The way these concepts were presented in the course was really good and format of teaching was excellent'

'This has been my favourite course by a country mile. Being engaged by smart people to have a discussion about smart topics with other smart people is my joy. The friends I have made in SCISCHOL are some of my best and I am proud to say I am a member of such a passionate and bright group of young men and women. Thank you for starting this. Thank you. Thank you. Thank you!'

'My mentor is very understanding and supportive and gives good advice. And he acts as if he is not too busy to see me. It is nice to be prioritised.'

'I really enjoyed learning about bad science and publication bias that exists in the scientific world!'

'I've spent years thinking about climate change and it was amazing to realise how many different areas of science are involved ... I find the politics also interesting, and disturbing that people still don't listen.'

The enrichment programme we have created to help our science-minded Tall Poppies reach their potential is thriving, and so are the students. The future is bright indeed for the Science Scholars programme.

If you are interested in more information about the Science Scholars programme, please contact Dr Nicolette Rattenbury at nicolette.rattenbury@auckland.ac.nz or visit the Science Scholars website at <http://www.science.auckland.ac.nz/en/for/future-undergraduates-4/sciencescholars.html>

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