

VCE Chemistry Teachers' Conference 2018

Tuesday 13 February 2018 at La Trobe University, Bundoora

The VCE Chemistry Teachers' Conference is an approved professional learning activity.

Conference Program

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| 7:30am | Registration opens | Union Hall Annexe |
| 7:30am - 9:30am | Delegates Breakfast - sponsored by Education Perfect | |
| 9:30am - 9:35am | Welcome by STAV President – Soula Bennett | Union Hall |
| 9:35am - 9:45am | CEA President Welcome – Drew Chan | Union Hall |
| 9:45am - 10:00am | Maria James – VCAA Update Brief Summary | Union Hall |
| 10:00am - 10:45am | Keynote Address 1 – Professor Richard O’Hair | Union Hall |
| 10:50am - 11:35am | Keynote Address 2 – Dr Georgina Such | Union Hall |
| 11:45am - 12:30pm | Workshops - Session A | |
| 12:35pm - 1:50pm | Lunch/Displays | Union Hall |
| 2:00pm - 2:45pm | Workshops - Session B | |
| 2:55pm - 3:40pm | Workshops - Session C | |
| 3:45pm - 4:30pm | Meet’n Greet - Sponsored by CEA | Eagle Café |

Wifi and laptops at the Conference

Wifi is available to participants, a username and password will be provided on the day.

Electrical Appliance Compliance

Please ensure that any electrical device you bring has a compliance tag on the power lead otherwise you may be prevented from using it.

Disclaimer

STAV does not accept any responsibility for any damages caused by any individual on the day.

Registration information, La Trobe University Map and all conference information is available on the **Science Victoria website: www.sciencevictoria.com.au/conferences.html**



**Science Teachers' Association of Victoria Inc.
VCE Conference Series 2018**

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VCE Chemistry Teachers' Conference 2018

Delegates Breakfast sponsored by
Education Perfect
7:30am to 9:30am



EducationPerfect

Welcome by STAV President -
Soula Bennett
9:30am – 9:35am

CEA President Welcome -
Drew Chan
9:35am – 9:45am

Maria James - VCAA Update
9:45am – 10:00am

Keynote 1 Address 10:00am – 10:45am

More than Just Fancy Weighing Machines: Using Mass Spectrometers to Design New Catalysts and Develop New Methods for Drug Metabolite Identification

Richard A.J. O'Hair
Bio21 Institute of Molecular Science
and Biotechnology,
The University of Melbourne



The need to measure mass is a common and ancient human endeavour. Born out of Sir JJ Thomson's investigations into the atom, mass spectrometers can be regarded as the ultimate weighing machines. This talk provides recent examples from the author's laboratory on how modern mass spectrometry is being used to:

- (1) Bridge the gas and solution phases to design new metal catalysts from the ground up.
- (2) Develop an automated and non-targeted procedure for detecting metabolites of drugs without authentic metabolite standards using stable isotope labelling, liquid chromatography mass spectrometry (LCMS), and high-performance computing. This methodology has the potential to be used to develop safe, new drugs.

Finally, I will describe ChREFT ("Chemistry Research Experience for Teachers") - a new, professional development program designed for Chemistry teachers that embeds them in research laboratories within the School of Chemistry at the University of Melbourne so that they can participate in frontier research projects.

Richard O'Hair is a Professor in the School of Chemistry, University of Melbourne. He is a founding Chief Investigator of the ARC Centre of Excellence for Free Radical Chemistry and Biotechnology and a Research Group Leader at the Bio21 Molecular Science and Biotechnology Institute.

Richard completed his undergraduate and post-graduate studies at The University of Adelaide (working with Professor John Bowie), where he also received a DSc in 2005. He undertook

post-doctoral studies at The University of Wollongong (working with Professor Roger Truscott) and The University of Colorado at Boulder (working with Professor Chuck DePuy) before taking up a position of Assistant Professor at Kansas State University in 1993. He returned to Australia in 1996 to take up the position of Senior Lecturer in the School of Chemistry, where he rose through the ranks to full Professor in 2006. Richard widely collaborates with major research groups locally and internationally and has published over 285 research articles. He has been:

- *A Senior Humboldt fellow (with Professor Konrad Koszinowski at Georg-August-Universität Göttingen).*
- *A Université Claude Bernard Professorial Fellow, Lyon (with Professor Philippe Dugourd).*
- *A Université Pierre et Marie Curie Professorial Fellow, Paris (with Professor Jean-Claude Tabet).*
- *Visiting Research Professor at the National High Magnetic Field Laboratory, Talahassee (with Professor Alan Marshall).*
- *A U.S. Department of Energy (DOE) Faculty Research Fellow at Oak Ridge National Laboratory (with Prof. Scott McLuckey).*

His major research interests cover a wide range of topics in fundamental and applied mass spectrometry. The general themes of the programs in which he has been engaged have dealt with the fundamental gas-phase chemistry of organic, inorganic and organometallic species. In recent years he has been involved in the development of mass spectrometry based approaches for the structural analysis of biological molecules.

Richard is a Fellow of the Royal Australian Chemical Institute, Fellow of the Australian and New Zealand Society for Mass Spectrometry, past President of the Australian and New Zealand Society for Mass Spectrometry, Associate Editor of the Journal of the American Society for Mass Spectrometry, has served on the Editorial advisory board of Organometallics and currently serves on the Editorial Advisory boards of The Chinese Journal of Chemistry and four Mass Spectrometry journals.

Richard has also made significant contributions to Chemistry Education in Australia, including serving on the Victorian Curriculum and Assessment Authority (VCAA) Science Expert Advisory Studies Committee and VCAA Chemistry Review Committee. These committees were charged with the responsibilities of making recommendations on the review of the Victorian curricula for the final two years of high school Chemistry, Biology and Environmental Science and developing a new Victorian curriculum for the final two years of high school Chemistry.

Keynote 2 Address

10:50am – 11:35am

Making Better Humans Using Polymers

Dr Georgina Such, Research Fellow,
Department of Chemical & Biomolecular
Engineering, The University of Melbourne



Polymers are an important material in modern society, used in many applications such as paints, packaging and cosmetics. In the last fifteen years there have been many advances in polymer chemistry that have made these materials even more useful. We can now engineer polymers with controlled size, shape and composition. This has led to their application in many advanced fields such as energy generation or biomedicine. One important advance is the ability to engineer polymers with regions of hydrophobic and hydrophilic character. These amphiphilic polymers can self-assemble to form nanoparticles. In this talk, I will discuss how we synthesise nanoparticles and how they can be used to enhance treatment for diseases such as cancer.

Dr Georgina Such completed her PhD in 2006 from the University of New South Wales. After her PhD, Dr Such commenced postdoctoral work in the Nanostructured Interfaces and Materials Science (NIMS) group headed by Professor Frank Caruso. Her research in this group focused on making nanoscale polymer carriers for targeted drug delivery. In 2013, she commenced a Future Fellowship in the School of Chemistry, The University of Melbourne, enabling her to start her own research group in the area of stimuli-responsive materials. Dr Such is now a senior lecturer at the University of Melbourne. Dr Such has authored 66 peer-reviewed publications including 3 book chapters. Her work has been recognized with the 2011 L'Oreal Women in Science Fellowship and a Tall Poppy award in 2012. Her research interests include polymer synthesis, self-assembly and stimuli-responsive materials.

Session A

11:45am-12:30pm

A1 VCAA Update

Maria James, VCAA

A detailed review of all the changes that took place to the curriculum last year and looking forward to implementing improvements.

Suitability: VCE Units 1, 2, 3 & 4

A2 Teaching Unit 3 & 4 Chemistry

Ben Williams & Clara Singh, Methodist Ladies' College & St Albans Secondary College

This session will support the teaching of Units 3 & 4 VCE Chemistry. Main focuses include -Sequencing the year from a teacher and student perspective, including unit outlines and scheduling of the AoS3 Practical Investigation.

* Demonstrations, practical activities, and writing risk assessments.

* Use of ICT resources including interactive simulations and the Pearson Lightbook.

* Structured revision activities.

* Design of SAC tasks.

* Design of the AoS3 investigation.

This workshop is targeted for Graduate and Early Career Chemistry Teachers.

The workshop is being presented by the Early Chemistry Careers Network (ECCN), which is part of the Chemistry Education Association.

Repeated in B4

Suitability: VCE Units 3 & 4

A3 Building student competence in the key science skills

Adele Hudson, Aitken College

The AOS3 practical investigation is challenging for students in that as well as being competent in the laboratory they must also be able to think critically about their data and communicate their ideas in a clear and concise manner. With the additional requirement that AOS3 comprises one fifth of the Unit 3&4 exam, it is imperative that students are provided with sufficient opportunities to build competency in the key science skills. In this session, examples of both practical and theoretical skill development tasks will be shown, along with strategies that can be used to help students successfully complete AOS3 style exam questions.

Suitability: VCE Units 1, 2, 3 & 4

A4 Metacognition and Johnstone's triangle

Paul Waldron, Girton Grammar School

2017 CEA travel scholarship recipient Paul Waldron attended the 2017 IUPAC conference in Sao Paulo, Brazil. This workshop discusses some key elements presented surrounding research into Chemistry education. In particular, metacognition - why educators take some thinking steps for granted, and Johnstone's triangle - the three main conceptual levels of Chemistry and how we cross-walk between them (macro, sub-micro and representational/symbolic). The workshop will present an opportunity to discuss other ideas such as Science communication - boosting community scientific literacy, increase female participation in science disciplines, and building a narrative in curriculum development across VCE Chemistry.

Suitability: ALL

A5 Gender Equity in Science Education - Supporting girls to choose science at and beyond high school

Eroia Barone-Nugent & Keith Nugent, University of Melbourne & La Trobe University

Content rich science curricula lack the experiential factors that inspire girls to remain enrolled in sciences beyond Year 10. The pedagogies and career or opportunity awareness required to increase the desirability of studying sciences beyond Year 10 are alarmingly few, and is especially the case for physics and maths. We will outline a tried tested and successful pedagogical framework to empower teachers and curriculum leaders to inspire girls to remain enrolled in science and especially physics and mathematics. This session will outline a school partnership framework, provide curriculum documents and workshop the application to specific school scenarios and requirements.

Suitability: VCE Units 1, 2, 3 & 4

A6 Model Rocketry in the science classroom.

Peter Razos, Trinity Grammar

Australia will finally have its own space agency and the interest in rocketry will increase. The fascination with rockets for many students starts in the science classroom with the building of their own model rocket. Participants will be shown how model rocketry is used in the classroom to engage students in the study of forces and energy as well as space science. All participants will be given the opportunity to build and launch their own rocket and experience the thrill of model rocketry first hand.

Suitability: Years 7 - 10

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A7 Using Wolfram tools to advance exploration in Chemistry

Craig Bauling, Wolfram Research

For over 25 years, Wolfram Research has been serving Educators. In the past 5 years, we have introduced many award winning technology innovations like Wolfram|Alpha Pro, Wolfram System Modeler, Wolfram Programming Lab, and Natural Language computation. Victoria schools have all these tools available to teachers and students for free. Join Craig Bauling as he guides us through the capabilities of these tools in Chemistry. Craig will demonstrate the key features that are directly applicable for use in teaching, assessment and student projects. Topics of this technical talk include

- Natural Language Input (<http://www.wolfram.com/broadcast/screencasts/free-form-input/>)
- Market Leading Statistical Analysis Functionality
- Creating interactive models that encourage student participation and learning
- Practical applications in Engineering, Chemistry, Physics, Biology, and Mathematics
- On-demand Chemical, Biological, and Social data

Suitability: All

A8 An philosophical approach to instrumental analysis for secondary students

Marino Dereani, Eutectic Educational

Instrumentation and its implications on the structural determination of organic molecules is both a challenge and at the same time, fascinating. It's an area of the VCE Chemistry Unit which allows students to question the validity of scientific data and more importantly what type of processing was involved.

It's not about fulfilling the expectations of the study design nor is it preparing for that question on the examination paper in November, I believe it's about romancing the stone and making students aware of one of the many secrets Chemistry hold. It's virtually knowing how to open Pandora's box !! Why not book yourself a seat on this trip of discovery into the world of instrumental analysis?

Delegates Note: Bring your laptop fully charged

Suitability: VCE Unit 4

A9 Education Perfect - Empowering and promoting self-regulated learning

Clare Feeney and Michael Villanti, Education Perfect

Formative assessment is specifically intended to generate feedback on performance to improve and accelerate learning, and is a process to help instructors understand and improve their students' day-to-day learning and through appropriate interventions. Education Perfect presents a platform that allows students to gain an understanding of topics through rich images and video, and provides feedback for teachers to inform ongoing teaching and learning. This session is a demonstration that shows how Education Perfect allows teachers to locate, assign and customise Australian Curriculum-aligned content, set tasks, build assessments and track student progress. This can inform teachers on their teaching, assessment and reporting cycle of the differentiated classroom.

Delegates Note: Please bring your laptop
Repeated in B6 & C9

Suitability: Years 7 - 10

A10 - Flipped Learning in the Chemistry Classroom

Nic Volkmann, Edupreneur, VolkScience

With the huge amount of content in the Chemistry Study Design, it can be difficult to cover all areas in detail. By 'flipping' the chemistry classroom, students can learn content outside class and then utilise class time to work on problem solving and application of their knowledge. The use of custom made videos, specifically constructed for the new Study Design, will be shown and effective methods of utilising these will be discussed.

Suitability: VCE Units 1, 2, 3 and 4

Lunch/Displays
12:35pm - 1:50pm

Session B 2:00pm - 2:45pm

B1 Designing VCE Assessment Tasks That Are Not Just Examination Mimics

Maria James, VCAA

Although schools are increasingly turning their attention in upper primary and lower secondary years to teaching and assessing what is variously termed as capabilities, enterprise skills, 21st century skills and/or future work skills, such attention is not reflected in the selection of School-assessed Coursework (SAC) tasks in the VCE, as demonstrated through the annual VCAA SAC audits. The majority of tasks are still examination-mimicking tasks. This workshop will focus on using a backwards-design process to explore and develop SAC tasks that assess a broader range of skills than is possible to assess through examinations and tests. Participants will be provided with take-away exemplars and SAC planners.

Suitability: VCE Units 1, 2, 3 & 4

B2 Teaching Units 1 and 2 VCE Chemistry

Carolyn Drenen & Michelle Roberts, Keilor Downs Secondary College & Whittlesea Secondary College

This session will focus on how you might like to teach Units 1&2 VCE Chemistry in 2018.

Come along for some useful information on how to sequence the year from a teacher and student perspective. We will work through Unit outlines, ideas for engaging students with practical activities, demonstrations, writing risk assessments for the laboratory and developing SAC tasks.

This workshop is targeted for Graduate, Early Career Chemistry Teachers or returning teachers to VCE Chemistry. The workshop is being presented by the Early Chemistry Careers Network (ECCN), which is part of the Chemistry Education Association.

Repeated in C5

Suitability: VCE Units 1 & 2

B3 Ideas for conducting the Practical Investigation for AOS 3 Unit 4 Chemistry

Louise Lennard, Melbourne Girls Grammar School

The new VCAA Unit 4 Chemistry Study Design includes AOS3, a Practical Investigation regarding energy and / or food. This workshop will look at suggestions for planning, conducting and assessing the Practical Investigation (AOS 3), including student submission of a scientific poster.

Suitability: VCE Units 3 & 4

B4 Teaching Unit 3 & 4 Chemistry

Ben Williams & Clara Singh, Methodist Ladies' College & St Albans Secondary College

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- Demonstrations, practical activities, and writing risk assessments.
- Use of ICT resources including interactive simulations and the Pearson Lightbook.
- Structured revision activities.
- Design of SAC tasks.
- Design of the AoS3 investigation.

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Repeat of A2

Suitability: VCE Units 3 & 4

B5 Fun with ideas and resources for chemistry in the Junior and Senior years.

Peter Razos, Trinity Grammar

VCE and junior chemistry - the resources you need.

We will outline and provide online resources to assist participants in delivering engaging units of work in junior years. Through units such as "The science of magic" and "Bad Science" we can engage students in understanding the chemistry around them and how chemistry is used to entertain and explore their world. Participants will be given full access to the online resources which include VCE Unit 3 and 4 online notes. Participants are encouraged to bring their own device to log onto the internet at www.dynamicscience.com.au/tester/solutions1/Curindex.asp. For the VCE we will explore the online assessment facility that allows for the creation of online, self assessed tests to be created.

Repeated in C6

Suitability: ALL

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Repeat of A9 And repeated in C9

Suitability: Years 7 - 10

B7 Instrumental Analysis - An Overview

Phebe Sabbarapu & Rachel Meredith, La Trobe University

This session emphasizes on the principles and applications of different instrumental techniques with a focus on VCE unit 2 and unit 4 study design. Delegates attending this session will not only gain theoretical knowledge about analytical instruments such as AAS, HPLC and UV-Vis but also will get a hands on experience on the instruments. In addition, the workshop provides a better insight into practical applications offered as a part of school's Outreach program which could lead to SAC investigations.

****THIS IS A DOUBLE SESSION B7 & C7****

Suitability: VCE Units 2 & 4

B8 Evolution of Applied Chemistry in 21st Century and impact on Chemistry Education

Paul Webley, The University of Melbourne

Chemical engineering and industrial chemistry has undergone a transformation over the last two decades coinciding with the digital revolution - we now have far more predictive knowledge and control of chemistry and chemical processes than ever before, aided by vast databases and expert knowledge. This change will require a change in the way we educate the next generation of scientists and engineers. In this presentation we will examine this revolution and how it impacts the education of chemistry to best prepare of chemists and chemical engineers of the future.

Repeated in C8

Suitability: VCE Units 1, 2, 3 & 4

B9 SACs and Experiments

Pat O'Shea, Loreto College Ballarat

Review of SACs and Prac used for Unit3 and 4

Suitability: VCE Units 3 & 4

B10 Isomers, Chirality and organic naming

Dr Sonia Horvat, University of Melbourne

Chirality and geometric isomers in organic compounds will be discussed. The interactive nature of this workshop will allow teachers to see how they might provide this information to their students in a practical way.

Suitability: VCE Units 3 & 4

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Session C

2:55pm-3:40pm

C1 Exam Review

Chris Dwyer, Chief Assessor
Review of last year's Exam.

C2 Science at La Trobe: Revised Bachelor of Science and Early Intervention for Success

Dr Ian Potter, Senior Lecturer, Department of Chemistry and Physics, La Trobe Institute for Molecular Science

There has been some concern in recent years about the supposed decline in writing, numeracy and science skills of some first-year university science students. Any real lack of preparedness could significantly affect the ability of students to be successful at university and in the workplace. This workshop will detail the revised science degree and early intervention program in chemistry to develop graduate skills.

Suitability: All

C3 VCE Chemistry Scientific Posters: The Good, the Bad and the Ugly

Maria James, VCAA

Have you used the scientific poster task across Units 3 and/or 4? What about in Units 1 and/or 2? We are all still in a "learning" phase with the implementation of this assessment task, so things will only get better! This workshop will provide participants both those who have already used the poster task and those who will be new to the task this year - with VCE chemistry-specific examples of student poster extracts so that we can discuss what makes a poster good or bad or ugly? Does being ugly actually matter? Suggestions for personalising student independent investigations will also be discussed.

Suitability: VCE Units 1, 2, 3 & 4

C4 Access new horizons through the Quantum Victoria Online Learning Portal

Carlie Alexander & Joel Willis, Quantum Victoria

Quantum Victoria has developed an Online Portal where students and teachers can access engaging programs that educate and inspire anytime, anywhere. Teachers will be able to observe students' growth throughout the robust programs, and provide their students with the necessary scaffolding that deepens their discipline knowledge.

Quantum Victoria's Online Portal offers a blended approach to learning and will include

- VCE Revision Lectures
- Cyber security Programs
- Extension activities complementing Quantum Victoria's onsite programs

Quantum Victoria is a Centre of Excellence and Innovation in STEM Education. Join our presenters and discover how our exciting new Online Portal can enhance your teaching and learning beyond the classroom.

Suitability: All

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Repeat of B2

Suitability: VCE Units 1 & 2

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Repeat of B5

Suitability: ALL

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Repeat of A9 & B6

Suitability: Years 7 - 10

Meet'n Greet sponsored by CEA

3:45pm - 4:30pm

