**Maria James** - Hello and welcome to this on-demand recording to introduce new study design for VCE chemistry. Implementation will begin in 2023. My name is Maria James, and I am the Science Curriculum Manager at the VCAA. In this session, I will provide an overview of the main changes and the intent of the new study design. Further webinars related to the implementation of Units 1 and 2 will be offered this year. Support for delivery of Units 3 and 4 will be offered in 2023 as part of our staged implementation. The purpose of this presentation is to support you in delivering the new study design. I will outline the VCAA resources that you can use in planning your teaching and assessment programme, and then I will outline the main features of the study design, including assessment. Both the VCE and VCAL Administrative Handbook and the VCE Chemistry Study Design are mandated and should be the first place you go to for planning and to find any answers about administration. While the same study design will be used between 2023 and 2027, the VCE and VCAL Administrative Handbook is updated each year.

A range of resources is provided by the VCAA on the VCE Chemistry study page to support the implementation of the study design. This includes planning advice, teaching and learning activities, assessment advice, examination specifications, and a sample examination. Resources will be added and updated regularly. Units 1 and 2 of the new study design will be delivered for the first time in 2023, while Units 3 and 4 will be delivered for the first time in 2024. The study design is underpinned by the scope of the study, the rationale and a set of aims. Spending time to understand these will allow you and your students to maximise the learning outcomes for each unit. We have updated the Cross-study specifications, and have included a new section, 'Terms used in this study', to explain how VCE Chemistry deals with particular terminology and key science skills. We have four units, 11 areas of study with key knowledge to which you can apply relevant key science skills as suits your programme, and assessment information related to both internal and external assessment. It is also important that you take the time to understand the safety requirements that are included on page eight of the study design.

I have posted the three aims for VCE Chemistry, which you can keep in mind throughout this presentation. The text in bold is new content. You can see that we have included a focus on developing an understanding of what it means to be involved in sustainable chemical endeavours. This shows how chemistry contributes to society and responsible citizenship. The key science skills are a core component of VCE Chemistry, and apply across Units 1 to 4 in all areas of study. In designing your teaching and learning programmes for each unit, and in assessing student learning for each outcome, you should ensure that students are given the opportunity to develop, use and demonstrate these skills in a variety of contexts. Revisiting these skills across Units 1 to 4 allow students to build understanding of how science knowledge relies on the application of these skills. There are some new inclusions in the key skills, including the nomination of eight scientific methodologies.

The main changes are that: ...the terms repeatability and reproducibility have replaced reliability; the quality of data should be looked at in terms of outliers and contradictory, provisional or incomplete data; and students will be expected to apply sustainability concepts to chemistry-based scenarios. Further changes should be identified by taking the time to examine the set of key science skills on pages 11 and 12 of the study design. Key science skills should be integrated into your programmes. You may look at the set of key science skills and think that there are a lot to cover, but many are explicitly included in the key knowledge, such as the one related to plotting graphs that show linear and non-linear relationships, as you can see in the examples in the table. It is up to you to decide what skill you want to teach in association with which key knowledge.

Your teaching plans should account for all key science skills. To help you, we have published planners for each of Units 1 and 2 and Units 3 and 4. We have streamlined content, and included opportunities for discussing contemporary examples of applied chemistry across Units 1 to 4. Inclusion of critical elements in Unit 1 gases in Unit 2, green hydrogen in Unit 3 and medicinal chemistry in Unit 4 are important new content areas. Major changes also relate to assessment, particularly in Units 3 and 4. New inclusions in the study design show how the capabilities in the Victorian Curriculum progress through to the VCE in the 'Cross-study specifications' section. Measurement terms, including expected treatment of significant figures, have also been defined so that there is a consistent understanding of these terms for VCE Chemistry. Sustainability will be considered in terms of the seven green chemistry principles listed on page 21 of the study design, as well as the move from a linear to a circular economy in the production of new materials for society. As a context, nine of the United Nations 17 Sustainable Development Goals relate particularly well to the new VCE Chemistry Study Design.

During our consultation period, there was particular interest from teachers in accessing resources related to Aboriginal and Torres Strait Islander knowledge and perspectives. This is one example of the resources that will be provided - a practical activity that is preceded by background information about saponins and their use to make soaps. Minimum materials are required for this activity. Another resource that we have produced is a set of PowerPoint slides that show you how collaboration between Aboriginal and Western researchers is undertaken to investigate possible medicinal properties of bush plants. Content related to research protocols, specimen collection, separation and isolation of active ingredients, instrumentation, and outcomes should provide you with the confidence to incorporate Aboriginal and Torres Strait Islander knowledge in meaningful and appropriate ways. Teachers, through our consultation process, also indicated that sustainability was another area in the new course where resources were required.

For each of the nine sustainable development goals relevant to chemistry, the support materials on our website provide examples of learning activities that you can use. The materials include hands-on activities, as well as opportunities for exploring ideas in greater depth, as you can see from the example for goal nine on the slide. In relation to the seven green chemistry principles relevant to VCE chemistry, this slide shows some examples of possible activities. Further activities, again, are suggested in the support materials. In the move from a linear to a circular economy, we have got examples of activities that relate to the different components of the circular economy, as listed on page 22 of the study design. It is not important that students identify names of the different stages of a circular economy - and there are different names for stages depending on the resources that you consult - but what they should understand is the significance of the closed-loop representation of a circular economy, as opposed to a linear economy where disposal is the end-point.

Three key points underpin scientific investigations no matter what methodology you may use: asking questions; testing ideas; and using evidence. Eight methodologies have been outlined in the study design, and further information will be available on our website. Some examples of scientific methodologies are shown in the slide. The learning activities on our website have been tagged with the relevant methodology to help you with your planning. Practical work may be used to introduce and consolidate understanding of chemistry concepts, and to develop scientific skills. Practical work may also be used to develop assessment tasks such as data analysis, the production of a scientific report or poster based on logbook records, and annotations from a logbook of practical activities. The new study design has slightly increased the time allocated for practical work. For the purposes of VCE Chemistry, the use of logbooks by students has been extended from only being a record of their primary data to including activities such as note-taking, observations made during excursions, simulation data, calculations, and recording of work outside class. You can also use logbooks to authenticate and assess your students' work. The Data Book and examination specifications are currently under review for the new study design.

These will be published along with a sample examination in December 2023 after students have sat for the 2023 VCE Chemistry examination, so there is no confusion about which exams apply to which year. Across Units 1 to 4, units and areas of study are structured as a series of curriculum-framing questions that reflect the inquiry nature of chemistry. Units 1 and 2 are generally undertaken in that sequence, but schools do have the option of offering Unit 2 before Unit 1 to meet their individual situations, resources and needs. Unit 1 Area of Study 3 is a totally new area of study. It will be expected that schools will provide students with choice, as far as practicable, of topics to investigate. Flipped classroom and problem-based learning approaches, as well as the use of Socratic seminars, can facilitate student agency. Further information about these is available in our support materials. As well as being a stand-alone area of study, the content of the Unit 1 Area of Study 3 investigation topics can be used across the Unit 1 core components of the study design by providing real-world examples and applications. The examples in the PowerPoint slide provide some ideas for you to consider. Unit 3 must be undertaken before Unit 4.

While reported in VASS as part of Unit 4, the Unit 4 Outcome 3 student-designed scientific investigation can be undertaken in either Unit 3 or Unit 4, or across both Units 3 and 4. The investigation involves the generation of primary data relating to the production of energy and/or chemicals, and/or the analysis or synthesis of organic compounds. Because each school is different, and because students have different strengths, talents and resources, schools have flexibility in designing curriculum programmes and developing assessment tasks that meet the needs of their cohort and individual context. All programmes, however, should be aligned with the VCE Chemistry Study Design and the VCE Assessment Principles. The planning template that you can see on the slide is generally used for new schools delivering VCE studies. However, they are useful for all teachers in planning their program/s. Our sample teaching plans in the support resources on our website utilise these templates to give you an example of how you may sequence a teaching programme.

You can use the QR code to access a template for your own purposes. For school-based assessment across all Units 1 to 4, you need to report to the VCAA as to whether each of your students has achieved a Satisfactory or Non-satisfactory result for each outcome. This is separate from determining levels of achievement. For Units 1 and 2, levels of achievement are a school-based decision. For Units 3 and 4, levels of achievement are determined through School-assessed Coursework, noting that School-assessed Coursework is moderated against the end-of-your exam. The VCE assessment principles should be considered when developing assessment tasks. All VCE assessment, both internal and external, should be valid and reasonable, equitable, balanced and efficient. Assessment tasks need to be valid, which means that they should be fair and reasonable and that students are adequately informed about what they can expect in the assessment task. Assessment tasks need to be equitable so that all students in your cohort are able to undertake the task on a level playing field. All assessments should be balanced, which means that you should provide different ways for students to be able to show their understanding and skills in chemistry.

All assessments should be efficient, particularly in not over-assessing or under-assessing the outcomes. You should think about formative as well as summative assessment, so that students are provided with feedback for improvement. All assessments at Units 1 and 2 are school-based, although the assessment for Unit 1 Outcome 3 requires students to provide a response to a question involving the production or use of a selected chemical, and Unit 2 Outcome 3 requires that students report on a scientific investigation - student-designed or adapted - that they have completed. For the remaining outcomes across Units 1 and 2, we have provided 13 suggested tasks on pages 30 to 31 and page 37 of the study design for you to consider. You are free to develop different task types as meets your needs. The on-line assessment support materials include examples of assessment tasks, including the newer types, that you can adapt for your own purposes. Selecting tasks that assess different types of skills in different ways aligns with the assessment principle of balance. Schools that use only one assessment task type, for example, a test comprised of multiple-choice items and short answer questions, are not meeting the assessment principle of balance. Only a representative sample of skills and knowledge needs to be assessed to meet the assessment principle of validity. If an assessment task is based on data from practical investigations, then you should check before the task that all students have appropriate data to enable analysis and evaluation, to meet the assessment principle of equity. The weightings of School-assessed Coursework have changed, so each SAC task contributes 10% to a student's study score for Units 3 and 4.

You have a choice in allocating tasks to outcomes. We have nominated times for assessment tasks, so that the assessment principle of efficiency is achieved. A major assessment change is that the weighting for the examination has been reduced from 60% to 50% of a student's study score. Apart from the Unit 4 Area of Study 3 student investigation task, four other tasks must be undertaken across Units 3 and 4. These four new tasks are listed in the table on the right. Many existing tasks that you have used can be adapted to suit this new set of tasks. Further VCAA webinars will be held in 2023 to unpack these tasks, prior to implementation in 2024. To show you what we mean by allocating tasks, the table provides a teacher example of how the tasks have been distributed across Units 3 and 4. You can see that each task type has only been used once. The tasks each assess different skills in different ways, therefore adhering to the assessment principle of balance.

The scientific poster has been streamlined so that students focus on communicating science. Teachers may use logbook entries in assessing the outcome, for example, assessing students' more detailed data analysis or discussion of results. You can use the QR code for a short video that explains the importance of succinct communication for scientific posters. This, and the next slide, show examples of Unit 2 scientific posters. Many schools utilise the poster template for Unit 2 to build skills to prepare students for the Unit 4 Outcome 3 task. A large part of the poster has been allocated to students explaining the outcome of their investigation findings and why the results are important. This is a new aspect of the scientific poster to emphasise the skill of science communication. The poster should not be seen simply as a scientific report cut up into pieces and presented as a poster. The poster itself may only form a small part of the assessment for this outcome. You have the flexibility of how to allocate marks to other aspects of investigative skills, such as experimental design, data analysis, and discussion of results which might not appear on the poster itself. A number of VCE resources are provided for you to develop your teaching, learning and assessment programme.

Some resources are available via the VCAA website, some are available as part of your school policies and procedures, and others are available via the school's VASS platform. Teacher subject associations also provide excellent support, and many teachers form local networks. If you haven't already subscribed to the VCAA Bulletin, you can do so via the QR code included. We have planned Q&A sessions for 2022 and 2023, but please contact me if you have any questions at any time. My contact details are on the slide. Thanks for your attention today. I hope the information has been helpful.

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