**Erin Wilson:** Hello, and welcome to the second of a series of videos to introduce and support the implementation of Unit one and two Biology for 2022 to 2026. My name is Erin Wilson, and I am the Curriculum Manager for STEM at the Victorian Curriculum and Assessment Authority or VCAA. I would like to acknowledge the traditional custodians of the many lands across Victoria on which each of you are living, learning and working. For myself, I acknowledge the Dja Dja Wurrung as the traditional custodians of the land from which I am presenting from today. I pay my respects to elders past, present and emerging, for they hold the memories, traditions, culture, and hopes of all Aboriginal and Torres Strait Islander peoples across the nation. I would also like to acknowledge their continued care of the lands and waterways over generations and the ongoing contribution they make to our scientific thinking and understanding of the discipline of Biology and hope that they continue to walk with us on our journey to develop knowledge and understanding of biological models, theories, concepts and issues, as well as the impact of human endeavours on biological processes and the survival of species.

The purpose of this video is to familiarise teachers with the revised unit one and two course, to consider how key science skills, scientific investigation methodologies and practical work links to and supports the development of key knowledge, to consider the assessment structure for each outcome and unit, and to share some ideas and resources available for the implementation of each unit and area of study. It should ideally be viewed after watching the first video, Implementation of VCE Biology Study Design for 2022 to 2026

Introduction and Overview. So if you have not viewed that video yet, I suggest that you stop watching this recording and go and watch that video first. When starting to develop your curriculum and assessment programme for Units one and two in 2022, both the VCE and VCAL Administrative Handbook and Study Design are mandated and should be the first places you go to for planning and to find any questions that you may need answered. In particular, section seven of the Administrative Handbook provides teachers with important information about satisfactory completion of each unit. And section eight provides important information about school-based assessment. Just to remind you too, that across the course of the study, it is important that you refer to the VCE and VCAL Administrative Handbook for the year in which you are delivering VCE Biology. You can access the current VCE and VCAL Administrative Handbook by the QR code on the slide.

As mentioned in the first video, a new and improved VCE Biology study page will be published later in December 2021. This updated web page will include a range of support materials that incorporate the previously known advice for teachers, including planning advice, teaching and learning activities, and assessment advice. The new structure will provide the ability to update teaching and learning activities on a yearly basis. So please feel free to contact me once you start implementing the new course and let me know if there are any particular areas that you would like more support and/or resources for. Updates, as well as any webinars relating to Units one and two that will be delivered over the course of the study design will be published by the VCAA Bulletin and Notice to schools. You can subscribe to the Bulletin and access the Notice to schools via the QR code on the slide.

The 2022 to 2026 VCE Biology Study Design is underpinned by the scope of the study, rationale and the aims of the study. Spending time to read and understand the scope of the study, the rationale for the way that VCE Biology has been structured, as well as the aims will allow teachers and students to maximise the learning outcomes when studying each of units one and two. The cross-study specifications apply across units one and two, and each of units one and two include specific content contained within an area of study and is designed to achieve a set of outcomes for that unit. Each outcome is described in terms of key knowledge, which is complimented by relevant VCE Biology unit one to four key science skills that are included under the cross-study specifications at the front of the Study Design. So please make sure that you continually refer to these, not just the key knowledge included under each area of study. Students may undertake only unit one, or only unit two. And while most schools will deliver unit one followed by unit two, students are also able to complete unit two before completing unit one. At unit one and two, students are assessed in terms of satisfactory completion of each outcome, which is reported to the VCAA via VASS.

Students are also provided at the school level the opportunity to demonstrate their level of achievement through school-based assessment tasks. Procedures for levels of achievement, or assessment of levels of achievement in units one and two are a matter for school decision. As such, this assessment will vary from school to school. These two aims specific for VCE Biology are clearly evident when you look at the introductions, area of study blurbs and key knowledge for each of units one and two. Keeping these aims in mind when planning your curriculum and assessment programme will help to ensure that your programme is rigorous, engaging and provides relevant assessment and learning opportunities for your students. In addition, there are broad aims of VCE Biology that are indeed the aims of all the VCE sciences and these are represented here in a wordle graphic. These aims support the rationale for VCE Biology. They support the rationale across all the sciences and they ensure that students are provided with opportunities to be active and engaged learners, to apply their biological knowledge, as well as considering possible study and career pathways post VCE Biology.

So please take the time to make sure that you understand the broader aims that exist across all VCE Sciences and consider not only how you can support them in terms of unit one and two biology, but perhaps across all of the VCE sciences at a faculty level.

Unit one and two in the 2022 to 2026 Study Design looks at How do organisms regulate their functions? There is a focus on how cells function in area of study one, and then how plants and animal systems function in area of study two. Students are then provided the opportunity to apply relevant unit one to four Biology key science skills through a student-designed or student-adapted investigation in area of study three. Unit two explores how inheritance impacts on diversity, with a focus on how inheritance is explained in area of study one and then how inherited adaptations impact on diversity in area of study two. In area of study three, students again apply key science skills however this time in particular relevant approaches to bioethics and ethical concepts to investigate how humans use science to explore and communicate contemporary bioethical issues. It is important to recognise that there is inherent flexibility within the structures of unit one and two for schools to develop a curriculum and assessment programme that is tailored for the specific needs of their student cohort. We want as many students as possible to be engaged with and studying VCE Biology so I encourage you to take all of the information that is presented in the rest of the video and use it and adapt it to design the best programme for your school that is reviewed yearly and targets each cohort of students at your school that will study VCE Biology.

At the beginning of each of unit one and two, students should be provided with the timeline that outlines what work will be required for satisfactory completion of an outcome, as well as any assessment tasks that will be used to determine levels of achievement. Again, it is important to note that levels of achievement at units one and two are a school-based decision, and there will therefore be variation between schools in terms of grades, percentages, and assessment task structure. Each of the cross-study specifications provide opportunities for schools and teachers to support the aims and rationale of VCE biology, as well as providing students with opportunities to access indigenous content where relevant, encourage active, informed, and responsible citizenship, and encourage ongoing consideration of the ethics and values of Biology as a discipline.

The next few slides that I'm going to present provide further support and scaffolding in terms of how to support the cross-study specifications when selecting learning activities and assessment tasks as part of your curriculum and assessment programme. Different schools will have different ways that they implement the VCE Biology unit one to four key science skills. Consideration will include the level of achievement that your students have made in terms of the Science Inquiry Skills as part of the Victorian Curriculum F to 10, as not all students may have demonstrated the Level 10 Achievement Standard for Science Inquiry Skills prior to entering unit one and two Biology. Formative assessment is critical to understanding the prior skills that your students have entering into unit one or two Biology. Formative assessment will help inform you in terms of which key science skills you may need to spend extra time on explicitly developing and teaching within units one and two. Some schools and students may be ready to deploy the skills to new and novel contexts earlier within unit one than other schools and students. It is important that therefore teachers explicitly identify the relevant key science skills that they will be supporting students to develop and practise in each outcome, as well as providing multiple opportunities to practise and apply each specific unit one to four Biology key science skill that has been contextualised specifically for VCE Biology.

We do encourage you to plan and regularly refer to the key science skills on pages seven to nine of the study design to ensure that you are providing appropriate opportunities for students to develop skills before they are asked to apply them in unit one area of study three and unit two area of study three. You will find that there is a natural fit between some learning activities and key science skills or particular key knowledge and key science skills. Making the most of this will enable you to ensure that the key science skills are not taught as just something that is seen as an 'add on' to the key knowledge or something taught as a separate topic, but instead that students understand how the knowledge in Biology continues to change and develop in response to new evidence and discoveries. The 10 hours of class time required for practical work across area of study one and area of study two in units one and two can be allocated in whatever way best suits your school and students.

You may find that based on the learning activities and assessment tasks that you select and how you develop the key science skills in each unit, that perhaps you allocate five hours to area of study one and five hours to area of study two. Other schools and teachers may allocate four hours to area of study one and six hours to area of study two and vice versa. For area of study three, a minimum of seven hours should be allocated. But again, you may find that depending on the type of the investigation and prior knowledge and skills that your students have, that you need to allocate more than 10 hours to undertaking and communicating the findings or that students need more time in the investigation exploration phase or planning phase of their investigation. A range of examples of practical work that relate to each scientific investigation methodology is included under each area of study later in this presentation. Use the flexibility afforded and have fun choosing practical work that suits your school context, your local area, your school's equipment, resources, and also most importantly, your students' interests.

In VCE Biology, the use of log-books as mentioned in the previous presentation has been extended beyond the standard scientific practises of recording primary data to include note-taking by students or the collation of secondary data, as well as to support teachers to authenticate and assess student work, to both to demonstrate satisfactory completion of an outcome and/or their level of achievement in particular assessment tasks. Again, you have the flexibility to decide how you want students to use their log-book. There is also flexibility between unit one and two, as well as between areas of study to vary how log-books are used by students within your overall curriculum and assessment programme and you can consider these in terms of student needs, skills, and prior experiences of using a log-book.

As mentioned earlier in the presentation, each of the Cross-study specifications provides opportunity for schools and teachers to support the aims and rationale of VCE Biology, as well as providing students with the opportunities to access indigenous content where relevant, to encourage active, informed, and responsible citizenship, and also to encourage the ongoing consideration of bioethics in relation to Biology.

The next four slides that I'm going to present provide prompting questions for you to consider and address when developing your curriculum and assessment programme for unit one and two. Using them as a bit of a checklist and making sure that you have addressed these questions, make sure that your students are provided with a rich and engaging programme that meets the requirements of the VCE Biology 2022 to 2026 Study Design. You don't necessarily need to have addressed each question presented on these four slides in every area of study in units one and two. But we do recommend that you consider each of these and identify where there is opportunity to support each of the cross-study specifications within each area of study and unit.

You will find that opportunities also develop over time as your knowledge and expertise increases in relation to these cross-study specifications as new resources become available, and your students' prior knowledge perhaps increases based on the way that you're delivering F to 10 Science in your school. Therefore, it's useful to regularly check back in with these questions each time you deliver unit one and two to see how you can further support the cross-study specifications each year. Teachers are encouraged to include Aboriginal and Torres Strait Islander perspectives in the design and delivery of teaching learning programmes related to units one and two, and as well as these questions that are provided here, there is further advice that will be made available under the new Biology support materials.

In terms of school-based assessment, students should be provided with multiple opportunities up until the results are due in VASS for unit one or unit two to demonstrate satisfactory completion of a unit. Section seven, as mentioned earlier, of the Administrative Handbook provides teachers with important information about satisfactory completion. So please take the time to review these in relation to units one and two when you were thinking about the assessment component of your curriculum or assessment programme in your school. As mentioned in the first video presentation, the VCE Assessment Principles state that assessment will be valid and reasonable, equitable, balanced, and efficient. Assessments should be unique to the school to ensure that the assessment principles can be followed and supported and that at unit one and two, students' work can be authenticated as their own. The nature of the tasks and the requirements to select different tasks within an outcome or across an outcome already inherently supports the VCE assessment principles at unit one and two. However, school policies, as well as task design can also ensure that your assessment at unit one and two is compliant, rigorous, but most importantly, also engaging and accessible for all your students. If you've not yet accessed the overview and explanation of the VCE assessment principles, you can do so via the hyperlink that's included on this slide which gives you access to the word document.

We know that assessment is an integral part of teaching and learning at the senior secondary level. It helps to measure student achievement. It helps to articulate and maintain the standards of the VCE. It ensures that there are opportunities for further learning identified, and then it also provides the basis of the award, the Victorian Certificate of Education. So, like the prompts presented earlier in relation to the cross-study specifications, in terms of integrity and authentication, I would ask that you consider how will you develop and implement robust implementation strategies to ensure that you can verify students' work is their own? And also, how will you build a culture of integrity and trust? How will you use ongoing formative assessment to gather knowledge and evidence of students' learning and abilities? Remembering that this formative assessment can take place over time and that satisfactory completion of an outcome is not just one decision at one point in time. I think it's important to note that the nature of science does involve individual and collaborative endeavour. And there will be likely many times during your delivery of unit one and two where students will work collaboratively, where they will actively participate and share ideas together, where they will complete tasks and solve problems together.

So, as well as providing these valuable opportunities for students, it is often necessary, particularly to determine satisfactory completion, to know what individual students know and don't know after participating in these collaborative opportunities. So, we encourage you to think about how will you determine what each student knows and what they don't know? How will you determine what each student can do and what they can't do? Strategies such as conferencing, individual discussions, individual student reflections at the end of a learning activity, as well as individual analysis and reporting of investigations provides opportunities for you as the teacher to individually assess students' understanding while also providing those important collaborative activities.

Let's now look more specifically at unit one and some of the main considerations when planning your curriculum and assessment programme for unit one. The questions provided here really summarise the information and considerations that we have discussed earlier in this presentation. And so, I would encourage you to use these questions as well as the earlier ones when you begin to plan your teaching, but then again as a checklist once you have developed your draught curriculum and assessment programme, to ensure that you have covered all the necessary components. I think this is important to recognise that things change. And as we know from the last couple of years, sometimes more than once, so we often need to revise what we have planned. So, returning to these questions, whenever you have to make necessary adaptations to your plan will also help to make sure that you continually deliver unit one in the way that it's intended to be delivered.

Unit one, as noted in the study design, is designed to involve at least 50 hours of scheduled classroom instruction. So, on this basis we have provided some approximate times. However, I do recognise that some schools will allocate more time to particular areas of study based on the prior knowledge and skills that students have prior to starting that area of study. It should also be noted that you don't necessarily have to deliver area of study one followed by area of study two followed by area of study three, within unit one, you may choose to embed area of study three within either area of study one or within area of study two, or you could choose to deliver area of study one followed by area of study three followed by area of study two.

So, as long as you're assessing students against each outcome statement and providing satisfactory completion of an outcome, there is flexibility within unit one to deliver the areas of study in a way that best suits your school and students. Again, remembering that to satisfactorily complete each outcome, students will need to engage with and complete practical work to be able to demonstrate the related key science skills in each unit.

If we look at unit one area of study one, you will see that there are two components to this outcome that students need to be able to satisfactorily demonstrate, they need to be able to explain and compare cellular growth and functions, and they need to be able to analyse the cell cycle and cell growth, death and differentiation. The key knowledge is important to draw on, but also the related key science skills that you identify from pages seven to nine in the study design. All of the outcomes should be assessed to determine an S or an N, noting the cognitive level of the command terms. When you were assessing students' level of achievement however, you do not necessarily need to assess all of the outcome in terms of that assessment decision.

As mentioned in the first presentation, there are now nine scientific investigation methodologies explicitly included on pages nine and 10 of the Study Design. Within unit one, it is not expected that opportunities to engage with all nine scientific investigation methodologies will be provided necessarily in each area of study. Where you provide opportunities to engage with each scientific investigation methodology will depend on your school context, depend on the learning activities chosen, depend on your students' needs and abilities and overall depend on your curriculum and assessment programme. So, on this slide, I've included examples for unit one area of study one to show how you could explicitly include each one of the methodologies if they suited your school context and curriculum and assessment programme.

This slide provides some sample learning activities in relation to the first part of the outcome statement for unit one area of study one. Explain and compare cellular structure and functions. The highlighted command terms provide guidance in terms of which unit one to four Biology key science skills could be embedded or explicitly taught as part of each learning activity. You will note that the sample learning activities have been provided in the context of the outcome statement for unit one area of study one, and this slide focuses on analyse the cell cycle and cell growth, death and differentiation. You could of course also use the key knowledge sub-headings 'cell structure and function' and 'the cell cycle, cell growth, death, and differentiation' to guide you in terms of the learning activities you choose to include in your curriculum and assessment programme.

Unit one area of study two again has two components to consider in terms of completion of an outcome - explain and compare how cells are specialised in plants and animals and analyse how specific systems in plants are regulated. Within each of these examples that are provided for unit one area of study two, in relation to scientific investigation methodologies there are varying levels of opportunity for scaffolding and/or student independence. The way students are supported to engage with each of the scientific investigation methodologies will be dependent on where you include them as part of unit one area of study two, as well as what prior knowledge and experience students bring from area of study one and the way that the scientific investigation methodologies were included in that area of study.

The sample learning activities included here in relation to explain and compare how cells are specialised in plant and animals could be completed individually or collaboratively, or some components of the activity could be completed collaboratively and some components individually. You could use the log-book to record evidence of student work, and like mentioned earlier in the presentation, if work is undertaken collaboratively, do consider what strategies you will use to individually assess students' understanding in relation to satisfactory completion of an outcome. The learning activities that you choose as part of your curriculum and assessment programme may also be influenced by the assessment tasks that you choose to demonstrate levels of achievement for that outcome. Remembering that the VCE assessment principles state that assessment should be valid and reasonable, equitable, balanced, and efficient, you may choose particular learning activities to also form the basis of assessment tasks.

For example, if you were to choose a data analysis of generated primary and/or collated secondary data as one of your assessment tasks for unit one area study two, you may also like to include a range of learning activities that enable primary data to be generated and recorded in a student's log-book, and then use this data to form the basis of the data analysis task. Unit one area of study three, as mentioned earlier, may be embedded as part of area of study one, after area of study one, as part of area study two or after both area of study one and two. Where you choose for students to undertake area of study three will be dependent on factors such as the level of student independence that they will have, i.e. whether it's a guided inquiry, a coupled inquiry or an open inquiry, the content that the investigation will be related to, whether the same inquiry approach and/or methodology is undertaken by the whole class or whether different inquiry approaches and/or methodologies for the scientific investigation are used.

Also, you might find that the way that students are asked to convey their findings also influences where you undertake the task. How the log-book is used as part of area of study three is a school decision and deciding on the format used to report their investigation is also a school decision. You may also choose to assess components of the student log-book as well as their final reporting of the investigation. You may choose to only assess the reporting of the investigation, and regardless of the report format chosen or how you will assess levels of achievement, all students should be assessed on whether they have satisfactorily completed all aspects of the outcome relating to unit one area of study three.

Unit two focuses on How does inheritance impact on diversity? And just like for unit one, we would encourage you to use these questions to guide your planning when you are developing your curriculum and assessment programme for unit two. And like unit one, unit two is designed to involve at least 50 hours of scheduled classroom instruction. So again, on this basis, approximate times are provided, but please use the flexibility within your curriculum and assessment programme to allocate time in a way that best suits your school and context. And just like unit one, you do not necessarily have to deliver unit two area of study one followed by area of study two followed by area of study three. You may choose to also embed area of study three within either area of study one or within area of study two.

No matter what option you choose, you do need to make sure that you are assessing students in terms of satisfactory completion for each outcome. Unit two area of study one has two components that require assessment in terms of satisfactory completion. The first thing you need to assess is whether the students are able to explain and compare chromosomes, genomes, genotypes, and phenotypes, and then, whether they can analyse and predict patterns of inheritance. Just like all of the areas of study in unit one, students will need to draw on the key knowledge outlined under the area of study, and also the related key science skills in page 7 to 9 of the study design. In terms of scientific investigation methodologies for unit two area of study one, you will note here that there is a suggested example for field work, and that is to undertake a survey investigating the views of school, family, and local community members in terms of gene therapy and cloning.

So field work, just to note, may include both qualitative and/or quantitative investigations, and really they are investigations that are conducted outside of the laboratory. And depending on the relevant key knowledge, surveys, interviews, and questionnaires can be an appropriate field work technique for students to undertake, and the benefit of these is that they will also provide students with the opportunities to consider the ethical conduct of scientific investigations and how they should demonstrate ethical conduct when undertaking and reporting investigations as well.

In terms of these sample learning activities, note here that there is an example of problem-based learning that is included as a sample learning activity for unit two area of study one. A problem-based learning approach is often conducive to examining science-based issues in society. You can develop scenarios from actual case studies reported in scientific journals, from local scenarios and issues that are presented in local media or from a fictional case study or scenario. Problem-based learning scenarios don't necessarily have to have a single solution and class problem-based learning approaches can be used to generate different questions for students to investigate, particularly for experimental investigations and further advice regarding problem-based learning is included under Scientific Investigations in the support materials.

Again, you'll see that we're presenting the sample learning activities in terms of the outcome statements. So, this one is looking at analyse and predict patterns of inheritance, but you can also structure your curriculum and assessment programme in terms of the key knowledge subheadings. For unit two area of study two, we are looking at how students are able to analyse advantages and disadvantages of reproductive strategies. So that's a different cognitive level than considering how to evaluate how adaptations and interdependencies enhance survival of species within an ecosystem. So just like in your planning for unit one, please ensure that you are using the cognitive level of the command terms to think about what satisfactory completion of each outcome looks like for your students. What you will note is that environmental groups, including Landcare, often produce newsletters. And these will include examples of local case studies that can be engaging for students as well as providing them with the opportunity to be involved with local citizen science activities.

In terms of these example scientific investigation methodologies, you'll note that there is one from the Wombat ForestCare Newsletter, and they do provide some excellent examples that could be used as part of unit two area of study two. And in terms of this example, it's the Treecreepers of the Wombat. Obviously it is ideal if you're in Central Victoria, because it is a local case study. And if you're not in central Victoria, you can of course use these case studies, but I would also encourage you to find similar organisations and resources that exist in your local area.

Here are some further sample learning activities that are provided, and of course, in the new support materials, there will be a range of extra sample learning activities provided for unit two area of study two. In terms of unit two area of study three, there will be a VCE Biology Student Ethical Issue Reflection Tool available as part of the support materials. This tool provides scaffolding and guiding questions for students and teachers when identifying, analysing, and justifying responses to bioethical issues.

Responses that students create as part of this area of study may take a variety of formats, including a multimodal or oral presentation, an opinion article, a letter to the editor, a graphic organiser, an infographic, an essay, or a response to set of questions based on the ethical reflection tool. Students may work individually or in a group to identify and analyse the selected bioethical issue. However, the selection and justification of the response to the bioethical issue should be individually completed by the student. In terms of identifying bioethical issues, teachers should use their own judgement to select bioethical issues and learning activities that best suit your school and student cohorts. As part of this, it will be important to consider the type of bioethical issues that will support appropriate and engaging discussion with your students in your classroom. We know that for this classroom discussion to be successful, it needs to be done in a positive, safe atmosphere and environment and there is more advice around setting classroom norms and managing classroom discussions as part of the planning advice in the new support materials.

We are lucky to be in Victoria. Victoria is a nucleus for biological research, and there is a multitude of ways in which research is made accessible and communicated to the public in terms of Facebook, Instagram, Twitter, podcasts, popular science publications, newsletters, online blogs, and then also subscription services as well, either free subscription newsletter services or paid subscription as well. The other way that you can also access contemporary science contexts is by searching for biology organisations Australia, or if you put in the search term, citizen science, Victoria, biology, that will also locate local opportunities for you. When you are adapting contemporary science research for the classroom, it's important that you review the information source, that you may need to edit the information source to make it an appropriate readability and length for your students at your school, and that then deciding on the way that you will support students to use that information source in your classroom. These specific resources are useful for unit one and two in terms of VCE resources.

So there's the Administrative information for School-based Assessment in the VCE VCAL handbook, there is the VCAA bulletin and notices to schools, which the QR code, again, just a little reminder in case you haven't signed up is to be accessed by the QR code on the slide. You will need to obviously develop your curriculum and assessment programme to suit your school calendar, your school's teaching and learning programme, the way that your timetable is structured in terms of how many hours per week, how many sessions per day, whether it's a one-week time table or two-week time table, so please use all of those resources as well to consider how you're going to best structure your curriculum and assessment programme. Just a reminder from the first presentation too that there are also now resources available to support teachers and students to engage with bioethical issues in F to 10. And again, which you can access by the QR code on the slide. And like the bioethics issues, if you haven't had time yet to access the recordings of the webinars that were conducted in 2020 to provide support to make visible Aboriginal perspectives in the Victorian curriculum, these again can be accessed by the QR code on the slide.

Thank you for listening. I wish you all the best in delivering unit one and two Biology in 2022. If you have any questions, suggestions, ideas, things that worked well, I'd love to hear them and you can contact me via 9059-5157 or via email, erin.wilson@education.vic.gov.au.

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