DP unit planner 1

Teacher(s)	Brianna Davis	**Subject group and course**	Group 4, Biology		
Course part and topic	Molecular Biology; Topic 2.5: Enzymes	**SL or HL/Year 1 or 2**	SL/1	**Dates**	Semester 1
Unit description and texts		**DP assessment(s) for unit**			
A detailed look at enzymes, emphasizing that enzymes control the metabolism of the cell, in preparation for papers 1 and 2. Biology course companion (Oxford) and Standard Level Biology (Pearson) textbooks		• Paper 1, Multiple choice • Paper 2, Data based, short and extended response • ICT: Computer models and simulations, use of databases			

INQUIRY: establishing the purpose of the unit

Transfer goals

List here one to three big, overarching, long-term goals for this unit. Transfer goals are the major goals that ask students to "transfer" or apply, their knowledge, skills, and concepts at the end of the unit under new/different circumstances, and on their own without scaffolding from the teacher.

1. Students will understand that enzymes control the metabolism of the cell.

ACTION: teaching and learning through inquiry

Content/skills/concepts—essential understandings	**Learning process** *Check the boxes for any pedagogical approaches used during the unit. Aim for a variety of approaches to help facilitate learning.*
Students will know the following content: 1. Students will be able to describe that enzymes have an active site to which specific substrates bind. 2. Students will be able to understand that enzyme catalysis involves molecular motion and the collision of substrates with the active site. 3. Students will be able to describe how temperature, pH and substrate concentration affect the rate of activity of enzymes. 4. Students will be able to state how enzymes are denatured. Students will develop the following skills: 1. Students will be able to design experiments to test the effect of temperature, pH, and substrate concentration on the activity of enzymes. 2. Students will be able to use a scientific database such as uniport to compare similarities and differences between enzyme amino acid sequences. 3. Students will be able to design-accurate, quantitative measurements in enzyme experiments which require replicates to ensure reliability. Students will grasp the following concepts: (Knowledgeable: We develop and use conceptual understanding, exploring knowledge across a range of disciplines.) 5. Students will understand how immobilized enzymes are widely used in industry.	Learning experiences and strategies/planning for self-supporting learning: ☒Lecture ☐Socratic seminar ☒Small group/pair work ☒Powerpoint lecture/notes ☐Individual presentations ☒Group presentations (Communicators: We express ourselves confidently and creatively in more than one language and in many ways. We collaborate effectively, listening carefully to the perspectives of other individuals and groups.) ☐Student lecture/leading ☒Interdisciplinary learning Details: ☒Other/s: Database activity and research. Class discussion Case studies

6. Students will be able to outline methods of production of lactose-free milk and its advantages. .	**Formative assessment:** 1. Group diagram of enzyme substrate interactions 2. Diagram and graph of stages of enzyme activity 3. Uniprot database online activity 4. Enzyme catalysis lab 5. I scream for ice cream case study 6. Online research on immobilized enzymes and class discussion 7. Practice questions from past papers
	Summative assessment: 1. Enzyme quizzes 2. Mock exam 3. Lab write up on Enzyme Catalysis
	Differentiation: ☒ Affirm identity—build self-esteem ☐ Value prior knowledge ☒ Scaffold learning ☐ Extend learning Details:

Approaches to learning (ATL)

Check the boxes for any explicit approaches to learning connections made during the unit. For more information on ATL, please see the guide.

☐ Thinking

☐ Social

☒ Communication

☐Self-management

☒Research

Details: Individual and group research, discussing results an presenting results from catalysis lab.

Language and learning *Check the boxes for any explicit language and learning connections made during the unit. For more information on the IB's approach to language and learning, please see the guide.*	**TOK connections** *Check the boxes for any explicit TOK connections made during the unit*	**CAS connections** *Check the boxes for any explicit CAS connections. If you check any of the boxes, provide a brief note in the "details" section explaining how students engaged in CAS for this unit.*
☒Activating background knowledge ☐Scaffolding for new learning ☒Acquisition of new learning through practice ☒Demonstrating proficiency Details: Table marker diagrams, link to prior knowledge on proteins, quizzes and mock exam	☐Core theme ☐Optional themes ☒Areas of knowledge Details: Natural sciences	☐Creativity ☐Activity ☐Service Details:

Resources

List and attach (if applicable) any resources used in this unit

Pearson Baccalaureate: Standard Level Biology (and weblinks)

Oxford: Biology Course Companion

Enzyme presentations https://www.bioknowledgy.info/25-enzymes.html

Enzyme catalysis lab activity: https://www.carolina.com/traditional-ap-biology-kits/ap-biology-lab-2-enzyme-catalysis-kit/FAM_746430.pr

Uniprot database: https://www.uniprot.org/

Stage 3: Reflection—considering the planning, process and impact of the inquiry

What worked well *List the portions of the unit (content, assessment, planning) that were successful*	**What didn't work well** *List the portions of the unit (content, assessment, planning) that were not as successful as hoped*	**Notes/changes/suggestions:** *List any notes, suggestions, or considerations for the future teaching of this unit*
• Diagrams of enzyme substrate complexes & stages of enzyme activity, students were able to understand and visualize activity of enzymes. We're able to review peer's diagrams and engage in constructive feedback. • Uniprot database activity was engaging, fun, informative and challenging. • Enzyme Catalysis lab is fun and engaging. Students were able to evaluate the importance of repeats, indirect measurements, and precision of timing devices. • Use of practice problems and past paper questions helped them get familiar with examiner expectations and standards.	• Lab protocol is long. Some students did not read the procedure before class and were pressed for time in a 50 minute period. • Uniprot activity had some level of frustration for students who have not used scientific databases before (an opportunity to bolster risk-taking: We approach uncertainty with forethought and determination; we work independently and cooperatively to explore new ideas and innovative strategies. We are resourceful and resilient in the face of challenges and change.)	• A longer introduction, perhaps more modelling of uniport database. • Clear expectations of pre lab work before lab periods that are expected to take the entire 45 minutes. • Carefully look at which ATL can be used and reinforce these more in the struggling students.