


School of Chemical Engineering research and innovation

NESA aligned teacher resource


Conceptual links between UNSW Chemical Engineering research & the NESA syllabus	Direct links to NESA syllabus with associated UNSW Chemical Engineering outreach activities/resources			
	Syllabus	Outcomes	Content	Related UNSW Chemical Engineering outreach activity/resources
<p>SHiNE 3.0 & Sustainable Hydrogen from Waste Biomass</p> <ul style="list-style-type: none"> - Chemical reactions; decomposition reactions - Factors that affect the rate of a chemical reaction; temperature, catalysts - Organic chemistry; biofuels - Analysis of chemical systems and the associated implications for society and the environment; sustainability considerations 	<p>Stage 6 Chemistry (Prelim)</p>	<ul style="list-style-type: none"> explores the many different types of chemical reactions, in particular the reactivity of metals, and the factors that affect the rate of chemical reactions CH11-10 	<p>Module 3 - Chemical reactions Inquiry question: What are the products of a chemical reaction?</p> <p>Students:</p> <ul style="list-style-type: none"> conduct investigations to predict and identify the products of a range of reactions, for example: <ul style="list-style-type: none"> - synthesis - decomposition - combustion - precipitation - acid/base reactions - acid/carbonate reactions (ACSCH042, ACSCH080) <p>Rates of Reactions Inquiry question: What affects the rate of a chemical reaction?</p> <p>Students:</p> <ul style="list-style-type: none"> analyse and report on how the rate of a chemical reaction can be affected by a range of factors, including but not limited to: <ul style="list-style-type: none"> - temperature - surface area of reactant(s) - concentration of reactant(s) - catalysts (ACSCH042) 	<ul style="list-style-type: none"> Hydrogen Car Race Challenge Yr 11 Chemistry lab experience (catalysts)

		<ul style="list-style-type: none"> analyses the energy considerations in the driving force for chemical reactions CH11-11 	<ul style="list-style-type: none"> investigate the role of activation energy, collisions and molecular orientation in collision theory explain a change in reaction rate using collision theory (ACSCH003, ACSCH046) <p>Module 4 - Drivers of Reactions</p> <p>Energy Changes in Chemical Reactions Inquiry question: What energy changes occur in chemical reactions?</p> <ul style="list-style-type: none"> model and analyse the role of catalysts in reactions (ACSCH073) 	<ul style="list-style-type: none"> Yr 11 Chemistry lab experience (catalysts)
	Stage 6 Chemistry (HSC)	<ul style="list-style-type: none"> analyses the structure of, and predicts reactions involving, carbon compounds CH12-14 describes and evaluates chemical systems used to design and analyse chemical processes CH12-15 	<p>Module 7- Organic Chemistry</p> <p>Alcohols Inquiry question: How can alcohols be produced and what are their properties?</p> <ul style="list-style-type: none"> compare and contrast fuels from organic sources to biofuels, including ethanol <p>Reactions of Organic Acids and Bases Inquiry question: What are the properties of organic acids and bases?</p> <ul style="list-style-type: none"> draft and construct flow charts to show reaction pathways for chemical synthesis, including those that involve more than one step <p>Module 8 - Applying chemical ideas</p> <p>Chemical Synthesis and Design Inquiry question: What are the implications for society of chemical synthesis and design?</p>	



			<p>Students:</p> <ul style="list-style-type: none"> evaluate the factors that need to be considered when designing a chemical synthesis process, including but not limited to: <ul style="list-style-type: none"> availability of reagents reaction conditions (ACSCH133) yield and purity (ACSCH134) industrial uses (eg pharmaceutical, cosmetics, cleaning products, fuels) (ACSCH131) environmental, social and economic issues 	 <p>Watch video: UNSW SHiNE 3.0 with Scientia Professor Rose Amal</p>
	<p>Stage 5 Science (new syllabus)</p>	<ul style="list-style-type: none"> evaluates current and alternative energy use based on ethical and sustainability considerations SC5-EGY-01 analyses the impact of human activity on the natural world SC5-ENV-01 	<p>Energy</p> <p>Sources of Energy</p> <p>Students:</p> <ul style="list-style-type: none"> Identify different types of energy sources Describe how electrical energy can be produced from different types of sources Evaluate the advantages and disadvantages of using renewable and non-renewable sources of energy to generate electricity, including efficiency, economical and technological considerations <p>Global future energy needs</p> <p>Students:</p> <ul style="list-style-type: none"> Evaluate ways to optimise current energy use Examine data to identify past trends in energy use, and predict possible future demands, at a state, national and global level Explain reasons for the development of alternative sources of energy <p>Environmental Sustainability</p> <p>Sustainability</p> <p>Students:</p> <ul style="list-style-type: none"> Identify the principles and goals of sustainability Apply scientific understanding to propose valid solutions to identified problems relating to sustainability 	



		<ul style="list-style-type: none"> describes a range of reaction types SC5-RXN-01 	<p>Reactions</p> <p>Reactions in context</p> <p>Students:</p> <ul style="list-style-type: none"> Investigate a chemical or nuclear reaction used in industry to produce an important product 	 <p>Read article: New 'artificial leaf' can create ammonia directly from pure sunlight</p>
<p>Related UNSW degrees:</p> <p>Bachelor of Engineering (Honours)(Chemical)</p> <p>Bachelor of Engineering (Honours) (Chemical Product Engineering)</p> <p>Bachelor of Engineering (Honours) (Renewable Energy)</p> <p>Bachelor of Engineering (Honours) (Geoenergy & Geostorage)</p> <p>Related career fields:</p> <ul style="list-style-type: none"> Pharmaceuticals Food and Beverage Chemical Processing Energy Generation and Storage Environmental Services Minerals <p>For more information on this and other activities within the School of Chemical Engineering, please follow the links:</p> <p>UNSW School of Chemical Engineering - https://www.unsw.edu.au/engineering/our-schools/chemical-engineering</p> <p>Particles and Catalysis Research Group - https://www.pcrq.unsw.edu.au/</p>				



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