

University of
Strathclyde
Glasgow

Tackling Real-World Sustainability Challenges with Chemistry: Experiential Career Learning Module

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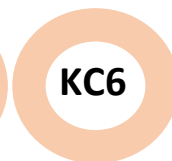
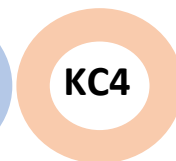
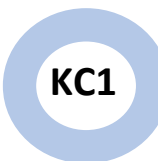
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For investigative participation, action competence
and group discussion.

- This module is a redesign of an existing "experiential career learning" class, in which students are introduced to approaches to real-world chemical industry/chemistry-relevant problems.
- Students initially participate in interactive, gamified and role-play workshops, gaining an understanding of "solutions", and the impact of climate change on society, the environment, economy, and the sector.
- The delivery incorporates a blended learning model, as students work collaboratively to address a set problem/potential scenario, applying their knowledge of chemistry, and skills in systems thinking and future thinking to provide potential solutions. Students work in-class and online, on case studies, problem-based learning, group workshops, literature reviews and reflective exercises, as well as receiving mini-lectures from industry professionals, and regular mentoring sessions.
- Students are encouraged to explore interlinkages between SDGs, identifying opportunities, benefits, tensions, and negatives, and think critically on the industry's approaches to climate change. SDGs are explored in detail in the early sessions, before a more specific focus for the main case study.



How specific learning objectives have been achieved:

At the end of the module students were able to:



- Understand sustainable development and competencies.
- Interpret the impact of actions on SDGs.



- Analyse relationships between environmental/social/economic systems, and discuss factors contributing to different outcomes.
- Identify, evaluate and reflect on own awareness of SDGs and competencies.



- Design a potential solution to the initially set solution that uses chemical knowledge and considers impact on SDGs.

How specific learning objectives were assessed:

- Regular reflective blogs, discussing that week's material, the student's approach individually, and within their group, and how they have exercised ESD competencies that week. Students receive feedback from their group mentor. Blogs also contribute to a Competencies ePortfolio as part of their final submission to the larger 20-credit class.
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- A written summary and group presentation showcasing their solution to the scenario problem. This would show that students have assessed the scenario, displayed systems-thinking in the interconnections of potential solutions, and strategised their own solution. They would also display collaboration skills within the write-up and presentation.



How SDGs have been included:



SDG 12 was the main SDG used in the design of this class, with the aim being that students understand their – and their industry's – responsibilities in production and waste, and how these affect all aspects of climate change, and the three pillars of environment, society and economy.

Students will **explore** the flow of goods to produce products and waste streams using GoogleEarth, and **evaluate** the impact on all stakeholders. Students will also **develop solutions** that address the challenges, whilst **considering impact** on other SDGs, EDI and stakeholders.



The reflective assignments will encourage students to think more critically on their own approaches to the tasks, and how they work alongside others. This will foster self-reflection as a key tool throughout the students' careers, instilling an attitude of life-long learning.

Students are **exposed to all SDGs** in several activities. Depending on the case study / chemistry problem used a wide range of other **SDGs are potentially included in more detail.**

How have the designed teaching and learning activities been delivered?

Participatory Enquiry and Action Activities

- Climate Fresk and En-Roads workshops, involving group-work, discussions, and knowledge and skills development. Mini-lectures and guest-speaker activities. On-line learning activities to test knowledge and understanding. Literature review, as the first step of the group project.

Group Project Work

- GoogleEarth exploration activity, to understand and assess situations. Development of action plan, as a means of collaboration, and setting group aims and responsibilities. Group Report and summary of solution – a written piece to accompany the presentation. Group presentation, displaying collaboration, communication skills, and knowledge and understanding of the ESD.