Written submission: Consultation on the draft Leaving Certificate Engineering specification

NCCA is redeveloping Leaving Certificate Engineering. The aim of this consultation is to obtain the open and honest views of all stakeholders: students, teachers, parents, and other interested parties. The feedback gained from the consultation will inform the work of the development group in preparing the final specification.

NCCA would greatly appreciate your feedback on the draft specification which can be found here: Leaving Certificate Engineering

When providing feedback, observations or comments, please reference the specific section and / or relevant learning outcomes.

The closing date for this consultation is 2nd May 2025 at 5pm.

Data protection and open data section

NCCA is committed to protecting your privacy and does not collect any personal information about you through this written submission, other than information that you provide by your own consent. Where a respondent selects 'yes' to the question: *Are you consenting to be listed as a respondent to this consultation*, respondents are consenting to having their name / organisation's name published in the final report as respondents to the consultation.

Where a respondent selects 'yes' to the question: *Are you consenting for your submission to be published*, respondents are consenting to having their submission published on ncca.ie.

Any personal information you volunteer to the NCCA will be respected and NCCA will apply the highest standards of security and confidentiality in accordance with GDPR (2016) and the Data Protection Acts (1998 - 2018). Further information on the NCCA's Data Protection Policy can be found at https://ncca.ie/en/legal-disclaimer-and-data-protection/.

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NCCA may use the data you provide in the form of quotations. Where this happens, the quote will be anonymised.

Respondent's details

What organisation are you submitting on behalf of?

IDEA (Irish Development Education Association) Formal Education Working Group

Are you consenting to be listed as a respondent to this consultation?

- o **Yes**
- o No

If yes, please enter the name you wish to have published in the final report.

IDEA Formal Education Working Group

Are you consenting to have the submission published on ncca.ie?

- o **Yes**
- o No

Rationale, Aim, and Key Competencies [Pages 2,3 and 5]

Rationale: The rationale (P.2) outlines the nature of Engineering and the role and importance of Engineering in realising the purpose and vision of senior cycle.

Aim: The Aim (P.3) outlines the over-arching purpose of the subject and the relevance and expected impact of the subject on student learning.

In your opinion, do the rationale and aim capture the overarching purpose and nature of Engineering; the importance of the subject in realising the vision of senior cycle and the relevance and expected impact of this subject on student learning. Please provide specific feedback / observations / comments.
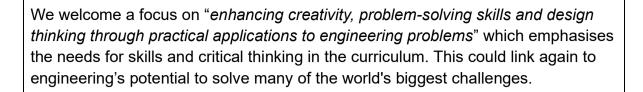
We agree that the rationale and aim capture the overarching purpose and nature of Engineering, the importance of the subject in realising the vision of senior cycle and the relevance and expected impact of this subject on student learning. We have made some further comments below.

It is good to see the rationale incorporates the role of engineering in "*promoting sustainable living within a circular economy*" and in addressing "*local, national, and global challenges".* We feel there is an opportunity to integrate themes such as global responsibility, interconnectedness, social justice and sustainability here. It could also link to progress towards the Sustainable Development Goals and how engineering can contribute to all 17 of them. We highly value the inclusion of "*ethical responsibility and the value of repair over replacement"* but also see the value of exploring the role of systemic change over individual action.

"Social and environmental consequences" could be expanded to refer specifically to the climate emergency, issues with plastic pollution, biodiversity loss and economic inequality, and the role of engineering as both a cause and a potential solution.

We suggest that "*Leaving Certificate Engineering reflects the importance of engineering in society*" is expanded to refer to the potential of engineering to solve many of the world's issues.

In the aim, it is good to see the inclusion of "*foster an awareness of the environmental, social, and economic impacts of engineering decisions and promote sustainable practices and ethical responsibility*". We feel teachers may need some guidance on exactly what these impacts are as there will be varying levels of knowledge on sustainable practices and ethics. The glossary could support this.

We welcome a focus on "*enhancing creativity, problem-solving skills and design thinking through practical applications to engineering problems*" which emphasises the needs for skills and critical thinking in the curriculum. This could link again to engineering's potential to solve many of the world's biggest challenges.

Key Competencies: Key competencies is an umbrella term which refers to the knowledge, skills, values and dispositions students develop in an integrated way during senior cycle. These competencies are linked and can be combined; can improve students' overall learning; can help students and teachers to make meaningful connections between and across different areas of learning; and are important across the curriculum.

The draft specification sets out examples of how key competencies can be developed in Leaving Certificate Engineering (P.5 – 8)

In your opinion, does this section effectively capture the development of student key competencies in Leaving Certificate Engineering? Please provide specific feedback / observations / comments.

We value the emphasis on "*critical thinking*" and applying "*engineering principles to real-world challenges*" but think this could be enhanced with references to challenges such as adapting to the effects of climate change, reducing plastic waste and enabling universal access to facilities such as schools and hospitals, for example. This would enhance the 'knowledge' strand and provide more structure for teachers delivering this course.

It is welcome to see a push to "*consider different perspectives*"*,* the "*importance of working ethically and sustainably*" and *"the environmental impact of materials and processes".*

The section that mentions *"informed decisions that consider both technical and ethical factors"* could be expanded to include social and environmental factors which would link well to the rationale. This would contribute to the key competencies of: Thinking and Solving Problems and Participating in Society.

Strands of study and learning outcomes [ADD PAGE NUMBERS]

Course overview: The course overview sets out the knowledge, skills, values and dispositions for students in four strands. The specification emphasises a non-linear, integrated approach to learning across the strands. The details of the strands are described on pages 8 - 22 of the specification.

The details of the cross-cutting themes are described on pages 8 – 9 of the specification.

In your opinion, does the structure illustrate the connected nature of the strands and the development of student knowledge, skills, values and dispositions in an appropriate way? Please provide specific feedback / observations / comments.

> We agree that the structure illustrates the connected nature of the strands and we value the inclusion of the theme "Ethics and Sustainability". We suggest that more direction could be given on what this should look like, or particular topics that should be covered, or this may too heavily rely on teacher experience and expertise.
>
> The "*the critical assessment of technological advancements"* links well to the themes of ethical and environmental responsibility in the rationale and the skill of critical thinking. The "*Ethics and Sustainability"* section also supports the rationale. It links knowledge, skills and values well.

Strand 1: Engineering Processes (P.12 – 14)

Please provide your views on the learning set out in this strand with reference to

- clarity for planning for teaching and learning
- alignment with the rationale and aims
- opportunities for the development of key competencies and
- access and challenge for all students.

Please provide specific feedback / observations / comments.

> We value the inclusion of "*1.6 evaluate the environmental considerations, economic, and societal impacts of engineering decisions in historical and modern times*", however, in order for there to be 'clarity for planning for teaching and learning' we suggest there is more direction on what this should look like. Some more specific examples include: raw material extraction, workers' rights, use of non-renewable resources, greenhouse gas emissions etc.

> "*Ethical issues involved in engineering*" could again include some more concrete examples and direction for teachers e.g. human rights, supply chains, workers' rights, in order to provide clarity for planning for teaching and learning. We would value the inclusion of the concept of 'greenwashing' or deceptive marketing for profit.
>
> "*1.6 evaluate the environmental considerations, economic, and societal impacts of engineering decisions in historical and modern times.*" - as well as looking at different times, different countries or communities could be considered. E.g. how did an engineering project impact the local community vs. the company who created it? How are people impacted differently in low and high income countries? *Unsustainable* engineering could be explored as well as good practice.
>
> We value the inclusion of "*Rethink, reduce, reuse, recycle, and the right to repair*" but we also emphasise a need for pressure to be shifted from an individual level, towards the systems level: there is a need for systemic change to solve the world's biggest problems, it cannot rely on individual actors.

Strand 2: Automation and Control Systems (P.15-16)

Please provide your views on the learning set out in this strand with reference to

- clarity for planning for teaching and learning
- alignment with the rationale and aims
- opportunities for the development of key competencies and
- access and challenge for all students.

Please provide specific feedback / observations / comments.

> We feel that commenting on this section is beyond the scope of our expertise, but would value the inclusion of case studies and examples from a range of countries and contexts.

Strand 3: Design Capability (P.17 – 19)

Please provide your views on the learning set out in this strand with reference to

- clarity for planning for teaching and learning
- alignment with the rationale and aims
- opportunities for the development of key competencies and
- access and challenge for all students.

Please provide specific feedback / observations / comments.

We would value the inclusion of case studies and examples from a range of countries and contexts, particularly when asking students to "*develop solutions to real-world problems*".

We are pleased to see this section included: "*Students learn to incorporate environmental considerations and ethical decision-making into their designs. By exploring concepts such as product life cycles and the sustainable use of materials, they develop an understanding of how their choices in materials and processes can impact both the product and society over time*" however we note that "product life cycles" are only mentioned here and could therefore easily be overlooked. The concept of a 'life cycle assessment' could be introduced as a core idea and used to link many of the themes and ideas in this specification (currently students are only asked to *3.9 **describe** the main stages and characteristics of the product lifecycle*, rather than **assess**). This would support the focus on environmental impact mentioned throughout - it is a simple concept for students to understand and helps them think beyond the use/disposal of an item. It would be a useful tool to frame the conversation around overall environmental impact and would support critical thinking.

Strand 4: Engineering Principles and Energy (P.19 – 22)

Please provide your views on the learning set out in this strand with reference to

- clarity for planning for teaching and learning
- alignment with the rationale and aims
- opportunities for the development of key competencies
- access and challenge for all students.

Please provide specific feedback / observations / comments.

We are pleased to see the inclusion of "*evaluate the energy requirements for various control systems, considering efficiency and the use of renewable energy sources*" and "*an analytical approach in solving real-world engineering problems*" but again feel there could be more direction for teachers to support "clarity for planning for teaching and learning". Could direction on real-world examples be provided?

Section "*4.3 explain the impact of production and disposal of materials on the environment*" is another area that would benefit from the inclusion of the concept of a life cycle assessment - this brings the focus to the entire life of a product and

could include the specific example of plastic, to highlight its overuse and non-renewable nature.

In the section "*4.4 identify approaches used to conserve natural resources*" we would like to see renewable/non-renewable options mentioned, perhaps with a specific example on why wood/paper is a better option than e.g. plastic (despite them both being derived from natural resources). A lack of examples or direction could lead to great variation in how much students learn, depending on teacher interest and expertise.

Additional Assessment Component (AAC)

The design and manufacture project provides an opportunity for students to display evidence of their learning across all strands of the specification. The senior cycle key competencies of thinking and solving problems, being creative, communicating, working with others, and managing learning and self, developed through working with learning outcomes across the specification, will be applied through the student's engagement with the project.

A Design and Manufacture Project brief will be issued annually by the SEC. The brief will set out the requirements for the Design and Manufacture Project and will:

- set a context for the project
- provide guidance to students in the development of their project work
- allow students to develop their knowledge and understanding in areas related to the brief
- facilitate teachers and students in their planning.

This experience will allow students to demonstrate their creativity, showcase the breadth and depth of their practical and manufacturing ability, and refine their communication techniques as they develop, implement, and document their progress through the design and manufacturing process.

Please provide specific feedback / observations / comments on the AAC in Leaving Certificate Engineering with reference to how the AAC might motivate students, how it aligns to the learning outcomes in the specification and how it facilitates the development of key competencies.

We see the AAC as a great opportunity for students to display evidence of their learning whilst developing the key competencies. As the SEC will set the context for these projects, we would love to see these set in the context of global issues, such as mitigating for or adapting to the impact of climate change, reducing plastic waste or supporting the shift towards renewable energy. This is an excellent

opportunity for students to demonstrate their creativity and showcase their practical and manufacturing ability whilst facilitating the development of key competencies. This could also include a 'connecting global to local section' encouraging students to link their engineering project to their lives and their communities, whilst also considering the bigger picture.

Supports for Successful Enactment

Please provide specific feedback / observations / comments on supports that might be needed for successful enactment of this subject specification.

This specification gives clear guidance on how skills and competencies should be developed throughout this course. It provides a strong foundation for teaching about engineering's role in the world as both a cause of issues and a solution, whilst developing practical skills. We are pleased to see sustainability, ethics and the environment considered throughout.

We feel that the specification lacks detail at points, and although this provides freedom for teachers, it could lead to great variation in what and how much students are taught depending on teacher interest and expertise. We suggest that some core themes, examples or pointers are given to ensure that important topics are not overlooked. For example, inclusion of the issue of climate change, plastic as a material and the issue of labour exploitation, would provide extra structure for teachers, without prescribing exact content. This would further support educational policy goals that encourage the integration of global perspectives and a citizenship focus.

To further support teachers, Appendix 1: Glossary of terms should be extended to provide definitions of terms such as sustainability, ethical, social justice, environmental responsibility etc. to support non-specialists of citizenship or ethics education.