# IMPERIAL

# Toolkit for Professional Competencies development in our UG students

**María Ribera Vicent** (Aeronautical Engineering)

**Esther Perea Borobio** (Electrical and Electronic Engineering)

01/05/2024
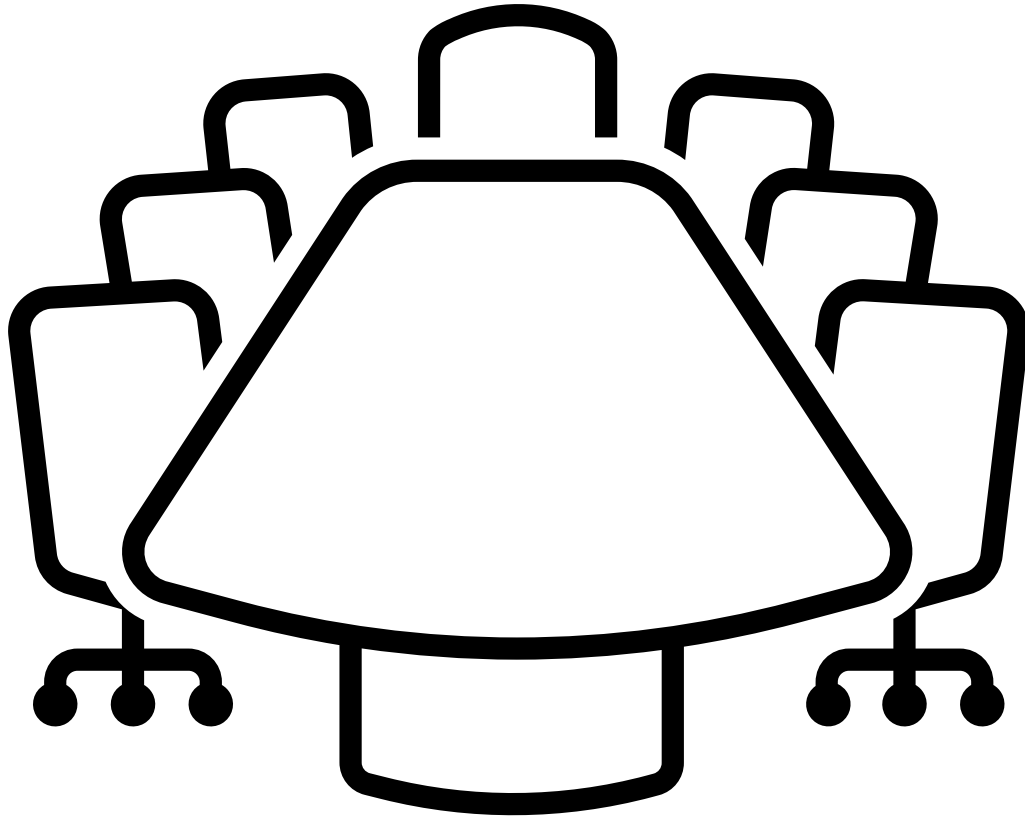
# Agenda

# Who we are

## Maria Ribera Vicent

- Senior Teaching Fellow in Aeronautics

- Former Strategic Teaching Fellow working on Aeronautics Curriculum Review

- Former Chair of the Equality, Diversity, Culture, Communications and Inclusion Committee

- Aeronautics Representative in the Faculty of Engineering Digital Learning Group

## Esther Perea Borobio

- Principal Teaching Fellow in Electrical and Electronic Engineering

- Departmental lead for engineering design and professional skills

- Industrial Liaison Director

- 3rd Year Industrial Placements module leader

# The challenge
## Feedback from Industry

Feedback from Industry Board:

Students are very strong academically

Students' professional skills and competencies could be improved
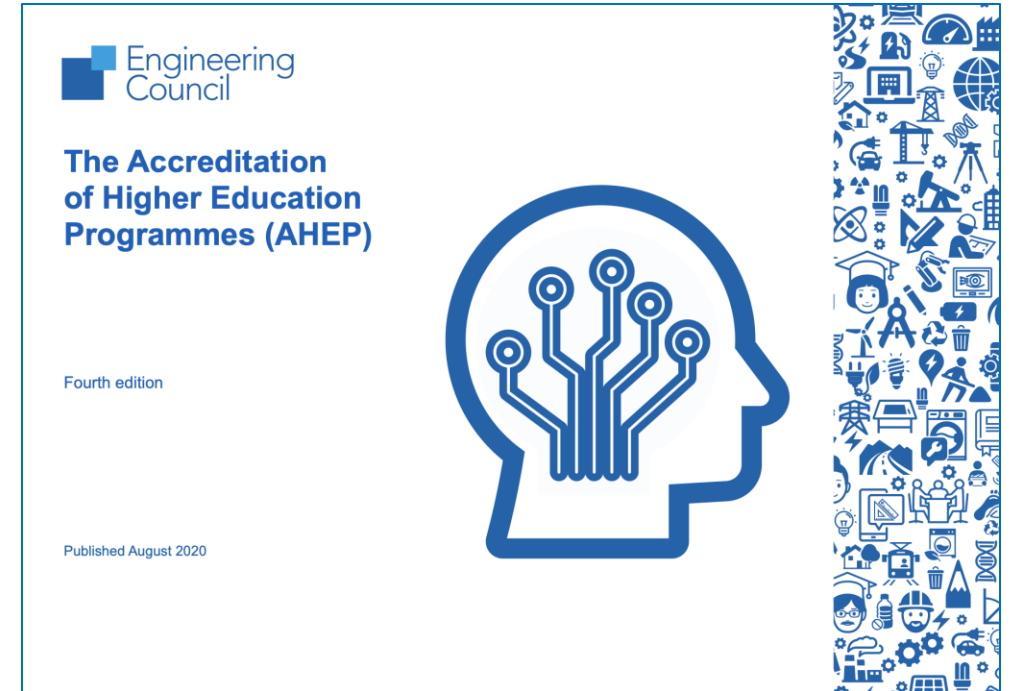
Students do not excel at interviews

Students are individualistic and not always good team players

# The challenge
## Accreditation requirements

- Our courses are accredited by several Engineering institutions:

  Aeronautics  >  Royal Aeronautical Society
  > Institution of Mechanical Engineers

  EEE    > Institution of Engineering and Technology

- We must be able to demonstrate that the Learning Outcomes in the 5 areas of **AHEP4** are met

- Therefore, it would be helpful to keep a record of the attainment and assessment of the Learning Outcomes



https://www.engc.org.uk/media/3410/ahep-fourth-edition.pdf

# The challenge
## Accreditation Requirements in AHEP4

Five areas of interest:
- Science and mathematics
- Engineering analysis
- Design and innovation
- The Engineer and society
- Engineering practice

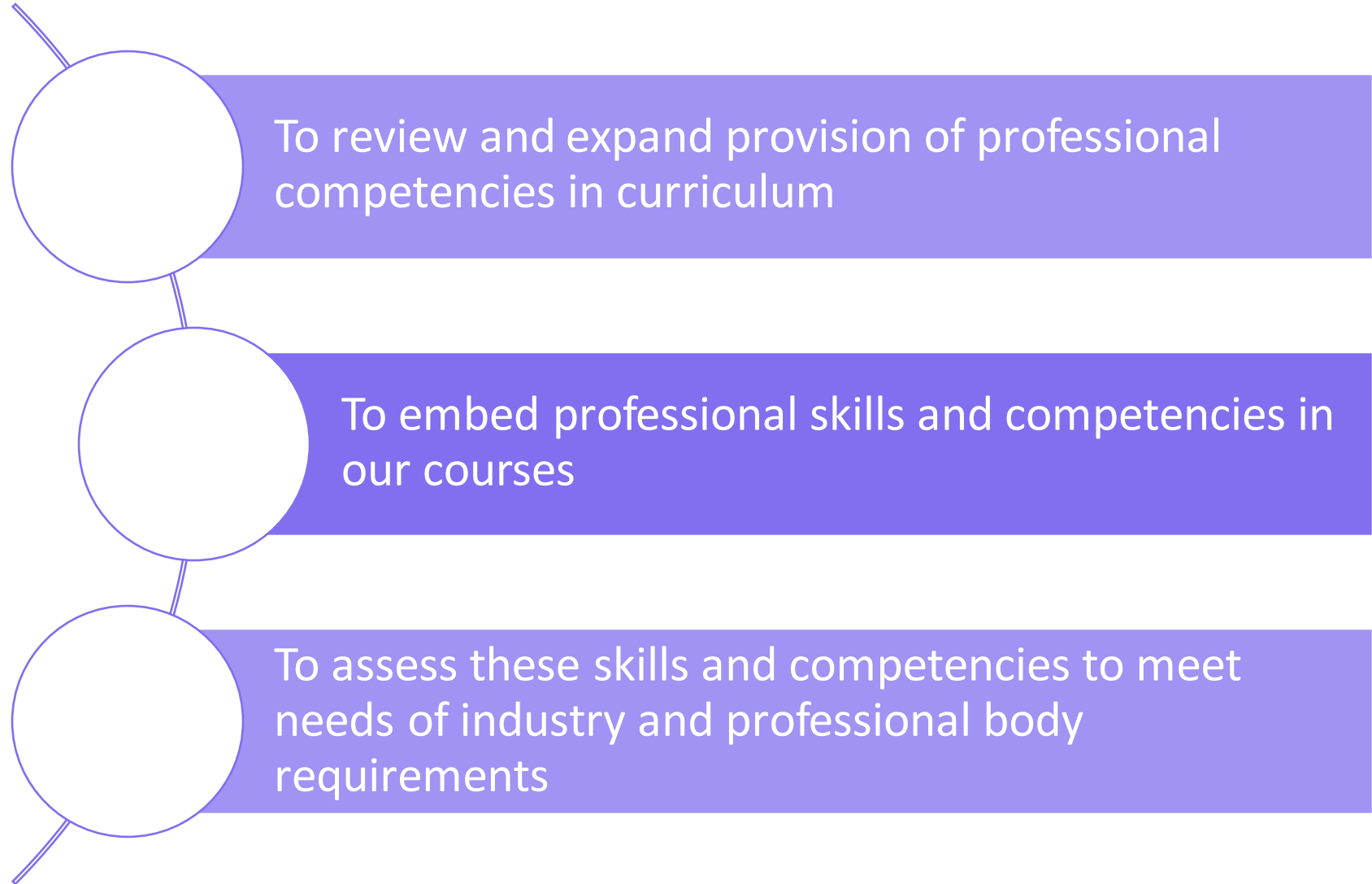| Area of learning | Bachelors (Honours) (continued) | Masters degrees (continued) | Integrated Masters (continued) |
|---|---|---|---|
| Sustainability | **C7.** Evaluate the environmental and societal impact of solutions to complex problems and minimise adverse impacts. (ISCED L6/EQF L6) | **M7.** Evaluate the environmental and societal impact of solutions to complex problems (to include the entire life-cycle of a product or process) and minimise adverse impacts. (ISCED L7/EQF L7) | **M7.** Evaluate the environmental and societal impact of solutions to complex problems (to include the entire life-cycle of a product or process) and minimise adverse impacts. (ISCED L7/EQF L7) |
| Ethics | **C8.** Identify and analyse ethical concerns and make reasoned ethical choices informed by professional codes of conduct. (ISCED L6/EQF L6) | Learning outcome achieved at previous level of study (N.A.) | **M8.** Identify and analyse ethical concerns and make reasoned ethical choices informed by professional codes of conduct. (ISCED L6/EQF L6) |
| Risk | **C9.** Use a risk management process to identify, evaluate and mitigate risks (the effects of uncertainty) associated with a particular project or activity. (ISCED L6/EQF L6) | Learning outcome achieved at previous level of study (N.A.) | **M9.** Use a risk management process to identify, evaluate and mitigate risks (the effects of uncertainty) associated with a particular project or activity. (ISCED L6/EQF L6) |
| Security | **C10.** Adopt a holistic and proportionate approach to the mitigation of security risks. (ISCED L3/ EQF L4) | Learning outcome achieved at previous level of study (N.A.) | **M10.** Adopt a holistic and proportionate approach to the mitigation of security risks. (ISCED L3/ EQF L4) |

# The challenge
## Accreditation Requirements

Five areas of interest:
- Science and mathematics
- Engineering analysis
- Design and innovation
- The Engineer and society
- Engineering practice

| Area of learning | Bachelors (Honours) (continued) | Masters degrees (continued) | Integrated Masters (continued) |
|---|---|---|---|
| On successful c | | | |
| Engineering and project management | C15. Apply knowledge of engineering management principles, commercial context, project and change management, and relevant legal matters including intellectual property rights. (ISCED L6/EQF L6) | Learning outcome achieved at previous level of study (N.A.) | M15. Apply knowledge of engineering management principles, commercial context, project and change management, and relevant legal matters including intellectual property rights. (ISCED L6/EQF L6) |
| Teamwork | C16. Function effectively as an individual, and as a member or leader of a team. (ISCED L5/EQF L5) | M16. Function effectively as an individual, and as a member or leader of a team. Evaluate effectiveness of own and team performance. (ISCED L7/EQF L7) | M16. Function effectively as an individual, and as a member or leader of a team. Evaluate effectiveness of own and team performance. (ISCED L7/EQF L7) |
| Communication | C17. Communicate effectively on complex engineering matters with technical and non-technical audiences. (ISCED L6/EQF L6) | M17. Communicate effectively on complex engineering matters with technical and non-technical audiences, evaluating the effectiveness of the methods used. (ISCED L7/EQF L7) | M17. Communicate effectively on complex engineering matters with technical and non-technical audiences, evaluating the effectiveness of the methods used. (ISCED L7/EQF L7) |

# The opportunity
## Curriculum Review

To review and expand provision of professional competencies in curriculum

To embed professional skills and competencies in our courses

To assess these skills and competencies to meet needs of industry and professional body requirements
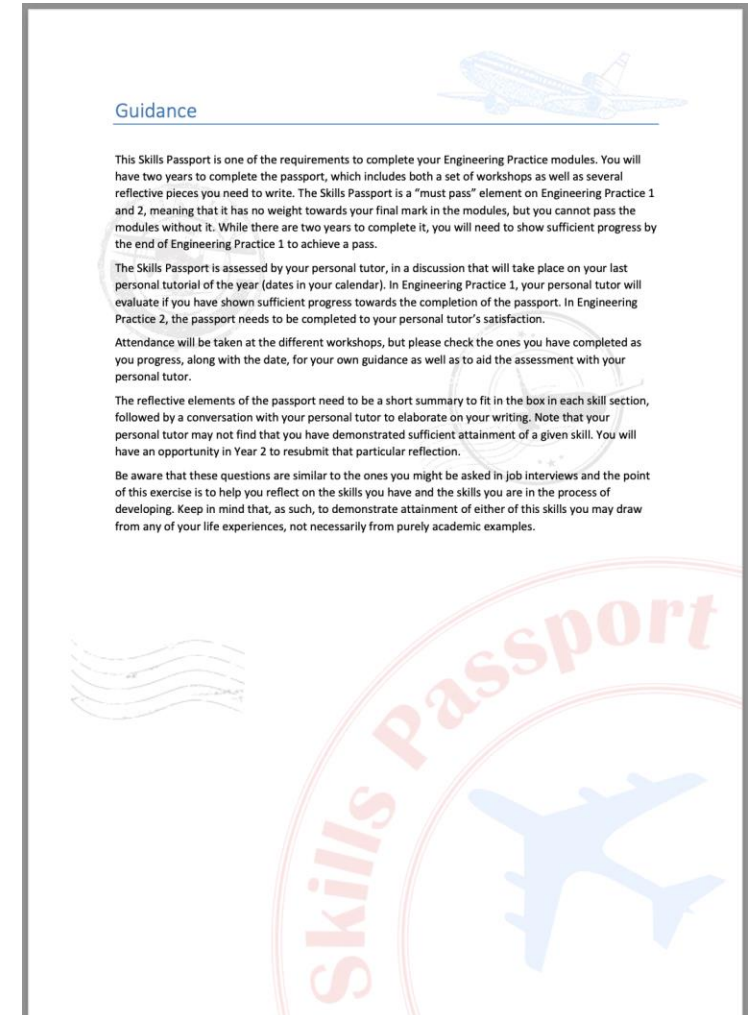
# Aeronautics

## Skills Passport

# Skills Passport
## What is it?

- An element of our Engineering Practice 1 and 2 modules

- Must pass component: can be completed over the first two years, but sufficient progress must be done in Year 1

- A way to compile all the professional and personal development skills and EDI provision in the course and for the students to track their completion

- A reflection element: students must reflect on 5 competencies and give examples from their own experience:
  - Leadership
  - Networking
  - Motivation, resilience and adaptability
  - Prioritising and organising
  - Teamwork

# Skills Passport
## How do we assess it?

Training and workshops

- Currently, by attendance, which is compulsory
- From next year, MCQs will be used to assess engagement

Reflections

- Students discuss the reflections with their personal tutor on a one-to-one meeting at the end of the Spring term

- Personal tutors may discuss whether Learning Outcome has been met or require to resubmit with feedback to improve

# Skills Passport
## How do we improve it?

For the department:

- Attendance tracking not always reliable

- We need a solution that can be deployed when students cannot attend so they can meet the learning outcome.

- Attendance does not ensure engagement, it cannot be the only measure that the learning outcome has been attained.

For the students:

- Students could benefit from a dashboard with all their training materials for reference when needed

- Students could track what they have completed and see the progress of their own personal development

# EEE

# Professional Competencies Log

# Professional Competencies Log
## What is it?

- Running for the first time this academic year

- Encompasses Years 1 through to 4

- Delivered through talks, workshops and taught modules

- Students are introduced to the relevant skills for their level of study

- Can be customised to changing requirements

# Professional Competencies Log
## What is it?

- **Years 1 and 2** included as part of Group Design Project

- **Year 3** part of Industrial Placement and Group Project

- **Year 4** has two taught modules:
  Professional portfolio
  Ethics and sustainability

| 1st Year Design Project (group) |
| --- |
| Teamwork |
| Project Management |
| Ethics in engineering |
| Intellectual Property |
| Technical communication |
| Weekly reflection on skills used and contribution to project |

| 2nd Year Design Project (group) |
| --- |
| Project Management in practice |
| Technical writing |
| LinkedIn profile and cv |
| Weekly reflection on skills used and contribution to project |

| 3rd Year Design Project (group) or Individual Industrial Placement |
| --- |
| Skills audit, reflection and future career plans |

| 4th Year Professional Competencies portfolio |
| --- |
| Complete 3 of the AHEP4 LOs and provide evidence (part of CEng application) |
| Ethics and sustainability taught module |

# Professional Competencies Log
## How do we assess it?

- As in Aero, attendance is compulsory and monitored

- At present, competencies are assessed as part of the modules in which they are embedded

- For the workshops, evidence of understanding and application is demonstrated in the project report

- For the talks, assessment is by attendance

- In Year 4, it is monitored using the Career Tool of the IET and the Ethics and Sustainability module

# Professional Competencies Log
## How do we improve it?

- Attendance data not always reliable, particularly for whole cohort events

- Time and effort intensive for the staff involved

- Improvement through automation

- Provide a permanent record for the student to use at interviews or as a skills development tool

- Supports the department in demonstrating that all AHEP4 LOs have been achieved

# Looking ahead

## Plans for the future

# Future plans
## New needs

- New accreditation learning outcomes must be met and evidenced

- A solution is needed for students who missed the original training/workshop

- Simpler and more accurate attendance monitoring

- **Better ways of assessing the learning outcomes**

| | Bachelors (Honours) (continued) | Masters degrees (continued) | Integrated Masters (continued) |
|---|---|---|---|
| Security | C10. Adopt a holistic and proportionate approach to the mitigation of security risks. (ISCED L3/ EQF L4) | Learning outcome achieved at previous level of study (N.A.) | M10. Adopt a holistic and proportionate approach to the mitigation of security risks. (ISCED L3/ EQF L4) |
| Equality, diversity and inclusion | C11. Adopt an inclusive approach to engineering practice and recognise the responsibilities, benefits and importance of supporting equality, diversity and inclusion. (ISCED L6/EQF L6) | Learning outcome achieved at previous level of study (N.A.) | M11. Adopt an inclusive approach to engineering practice and recognise the responsibilities, benefits and importance of supporting equality, diversity and inclusion. (ISCED L6/EQF L6) |

# Future plans
## The idea

- A platform where departments can customise the skills their students should have acquired and applied by the time they graduate

- Dashboards for both students and staff

- Some of the sessions could be converted to videos (allowing students to complete in their own time)

- A set of questions must be answered before the skill is recorded as completed

- Permanent record

https://dribbble.com/shots/15398474-Dashboard-Dark-theme

# Future plans
## Current discussions

- Gathering Expressions of Interest (please let us know if you would like to know more)

- In discussions with other departments withing the Faculty of Engineering, as well as Business with similar interest

- First phase to include UG courses, but subsequent phases could include PGT and PGR.
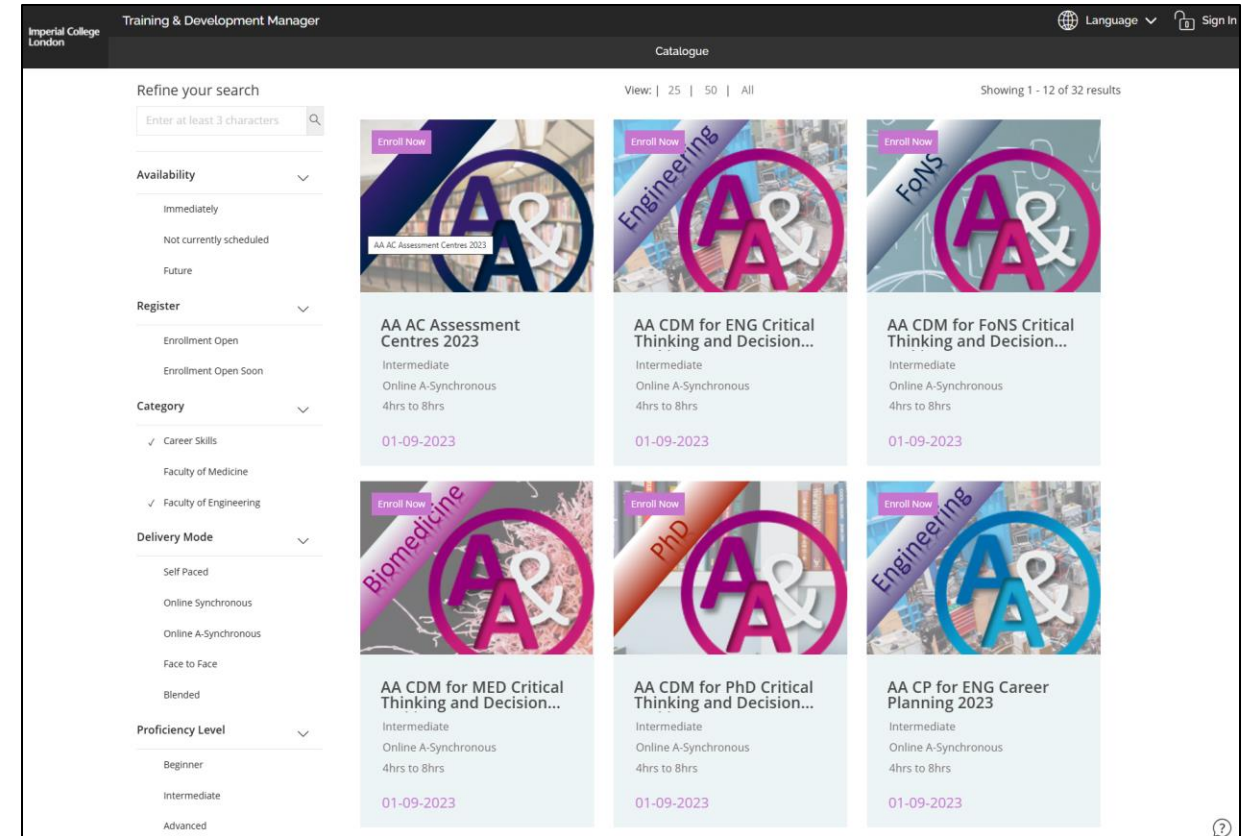
# Future plans
## Proposed solution

Attributes & Aspirations platform:

- Developed for Careers development (Careers Service, Education Office) with online training through videos and presentations

- Many courses covering professional development common with skills passport/professional competencies log

- Provides a dashboard of courses that can be customised by streams and years

- Currently ready to deploy to all undergraduates

# Future plans
## The plan

- Putting together an expression of interest for the Digital Innovation / Pedagogic Transformation Fund

- Collaboration to extend Attributes & Aspirations to be the platform to host a customisable stream for our departments' professional development needs

- Develop more digital content to address desired learning outcomes

# IMPERIAL

Thank you