**TEDI-London**

**Transforming engineering education: transforming lives**

**Overview**

TEDI London is an innovative new higher education engineering institution in London, co-founded by Kings College London, Arizona State University and UNSW Sydney. With a global shortage of engineers, attracting more people to the profession is paramount to ensure engineered solutions to global challenges. TEDI London will do this.

Our mission is to attract and empower individuals and partners from a diverse range of backgrounds and perspectives to develop the skills and confidence to create practical real-world solutions that advance how we live. We will inspire, disrupt and transform.

The goal is to attract and empower a diverse cohort of capable students (school-leavers and mature-age applicants), give them the skills to solve complex contemporary challenges, and provide employers with job-ready graduates through a flexible, student-led and rigorous learning program. TEDI-London will be highly responsive to industry needs and will engage industry from the outset to help design the curriculum, provide mentorship and work alongside the students on real-life industry projects.

In order to assist with the global shortage of engineers and to provide a diverse engineering workforce to truly transform the discipline, it is equally important for TEDI-London to attract capable students from non-traditional backgrounds, particularly women and people from a variety of socioeconomic and cultural backgrounds. These students have not been attracted to engineering for a variety of reasons including the cultural context in which gender and professional identities have been shaped, and because narratives about the exciting realities of modern engineering have not been compelling. About 11% of engineering undergraduates in the UK are women, and the UK has the lowest percentage of female engineering professionals in Europe.

Career-ready graduates are required because, in the UK alone, it is estimated that an additional 20,000 engineers a year are needed to respond to a digitally driven and data-enabled economy, and that the UK needs to double, at least, the number of students studying engineering. It is envisaged that this institute will achieve further market differentiation by offering:

- A unique and global student experience jointly designed and supported by the three founding universities and employers.
- New professionally focused degrees that reflects community demand and industry needs — a Bachelor of Global Design Engineering and a Master of Global Design Engineering.
- Flexible learning over a 44-week academic year, which will allow students to complete undergraduate degrees over two years, saving them money and helping them enter the workforce quicker.
- New admission criteria in which students are selected by their intellectual capability, passion and attitude to succeed. This approach will provide access for a new, non-traditional type of professional engineer in training.
- An academically rigorous and continuously evolving curriculum that is interdisciplinary and career oriented, designed to deliver a broader set of skills for engineers of the future. The goal is to produce graduates with technical, contextual, design and business skills.
- A student-led and immersive pedagogy that features 55% project- and scenario-based learning, both individually and in groups, complemented by an interactive learning tree that allows our professionals in training to take modules as they need them.
• A culture in which students are trusted and empowered, and in which educators are coaches.

Research with employers and advocacy groups suggests that a highly interdisciplinary learning environment will be required to respond to demand for engineers with a broader set of entrepreneurial, design and technology skills.

The curriculum for the undergraduate TEDI-London programme develops skills in communication, entrepreneurialism and project management through our unique pedagogy, alongside core engineering subjects. By making things in project teams throughout their program, our graduates will be more able to tackle hands-on, complex, multi-disciplinary challenges than current engineering graduates.

Industry partners will be invited to help co-design projects and be involved with coaching and mentoring to ensure the professionals in training have real-world experience. Additionally, industry partners will further the professional development of their staff who are involved in the coaching and mentoring. The following charts provide indicative outlines of the education goals.
Curriculum

The curriculum will be unique in the UK, with total flexibility according to student needs. Students will be “professionals-in-training” and will be treated as professionals from Day 1, expected to be present on campus for a full ‘working day’. The programme will be split between project work, in which the students will make things (55%) and self-directed on-line learning through our Learning Tree (45%).

(a) Projects

Professionals-in-training will be involved in project work, both in teams and individually from the beginning. Learning outcomes from projects will include:-

1. Teamwork
2. Design skills
3. Problem solving
4. Global focus
5. Environmental Sustainability
6. Project management
7. Social and Aesthetic awareness
8. Leadership
9. Critical thinking
10. Technical competence

Projects will be structured to deliver several of these outcomes with emphasis on different aspects at different stages of the programme. At least two projects will be undertaken each semester, with different teams. Some students, who may wish to accelerate the programme and complete their Bachelor’s degree in two years, may take more than two projects in some semesters. At least one project will be of larger scale over multiple semesters. Students may come in and out of these projects, taking different roles within the project group at different stages of their programme.
Subject to further academic considerations and industry input, typical project sequencing may be as follows:

**Semester 1:**
- Introductory Group Project – Rube Goldberg machine
- Group Project 1 – Introduction to Social Needs eg Engineers without Borders
- Major Project 1 – Introduction to a major project delivered by all students, e.g. building a £100 house

**Semester 2:**
- Group Project 2 – Energy/Sustainability project – uses of energy and sustainable resources
- Group Project 3 – Industry scenario project – maybe a blue sky idea but should involve disruption – led by Engineers-in-residence

**Semester 3**
- Group Project 4 – IOT project – e.g. smart cities, health care, big data
- Group Project 5 – Manufacturing Project – e.g. additive manufacturing, intelligent materials

**Semester 4**
- Individual Project 1 – Student-lead Individual project - an idea developed by student, or tutor
- Major Project 2 – slip back into the longitudinal continuing project

**Semester 5**
- Group Project 6 – Food Security Project
- Major Project 3 - major project continued

**Semester 6**
- Group Project 7 - Infrastructure Project
- Major Project 4 - major project continued

**Semester 7**
- Group Project 8 - Product Development Project
- Group Project 9 – Innovation project

**Semester 8**
- Major Project 5 – major project continued
- Individual Project 2 – Research project – could be literature review or market research

**Semester 9**
- Major Project 6 – major project continued
- Individual Project 34 – continued research or product development.

The sequence of projects will give our graduates professional engineering skills in a variety of applications and situations, helping them to jump into the workforce, ready to make significant contributions.

**(b) Learning Tree**

In order to participate in, contribute and benefit from the project-based learning, professionals-in-training will also need to acquire the technical skills normally associated with engineering qualifications. This will be achieved through individual, self-paced online study through the Learning Tree. The Learning Tree has core modules (trunk), courses (branches) and smaller modules (leaves). Each module can be taken in or out of sequence and students will be assessed after each module. As the on-line component is truly self-paced, modules may be taken out of sequence, but if they are, the students will take longer to complete each module.

Below is an example Learning Tree – which shows the general concept, but not the specific school curriculum. Students will have a mixture of compulsory and optional modules, so there are many more modules than are required to complete the degree.
The degree offered is Engineering, so the tree will contain branches related to all the traditional engineering disciplines without covering the detail of a specialised degree. Additional branches will relate to design thinking, leadership, financial management and economics as well as social sciences and philosophy which will be available but not all required for every student. Ethics and its study will be interwoven in the courses and in the projects.

**Industry partnerships**

Partnerships with industry will empower the institute to be at the leading edge of technology and industrial change, and to attract bright, creative students from diverse backgrounds who share a passion for engineering. The partnerships will directly improve lives – and inspire students and faculty to deliver the desired outcomes.

These value-adding partnerships will support the delivery of three core services:

- **Teaching and learning** – industry partnerships will facilitate a symbiotic relationship, whereby industry has a key role in the design, quality and delivery of the institution’s education programs, and in return, the institution responds to industry to maximise the relevance of the education offerings and hence the graduate outcomes.

- **Graduate employment** – industry partners will get first access to the graduates, and over time, to a growing global network of individuals with these unique skills and qualifications.

- **Research and development** – the institution’s Global Design Centre will provide research, consulting, prototyping and testing services to industry. It will also be a vehicle for engagement between industry partners and researchers at the partner universities.
Work-relevant learning and career-ready graduates are designed to be key points of difference with respect to other higher-education providers in the UK. At the same time, TEDI-London understands that it will need to meet or exceed the expectations of industry relative to other higher-education institutions. TEDI-London will take the approach that relationships with industry are two-way, and the starting point in discussions with potential partners will be how the institute can add value to industry.

The institution will aim to be:

1. **Relevant**, in terms of program offerings, research and training, by being responsive to the relationships between public policy and the economic environments in which industry operates.
2. **Customer-focused**, where education programs are customised and responses are timely and well-coordinated.
3. **Outcome-focused**, to help industry innovate, increase profits and improve productivity.

TEDI-London will be inviting industry partners to define the types of value they will need from its staff, students, and programme. Primarily, industry will have immediate access to talented graduates who are problem solvers, team players, effective communicators, technically adept, practical designers, socially conscious, globally experienced and industry ready.

Other potential benefits include:-

- Influencing the way engineers learn.
- Upskilling employees.
- Solving short- and long-term business challenges.
- Providing professional development for executives via professional teaching and mentoring appointments.

**Other partnerships**

**Greater London Authority**

The institution can be an important part of the GLA’s strategies to create education and innovation hubs and to further advance London’s reputation as the leading destination for international students.

**UK Government**

For the national Government, the opportunity is to support an initiative aimed at responding directly to skills shortages in the UK in a critically important sector, while improving diversity and inclusion and directly aligning with the UK’s Industrial Strategy.

The key benefits include:

- More engineers to help ease the national skills shortage.
- More diversity in engineering education and practice.
- A transformative model for flexible learning and improved student affordability in a high-demand STEM discipline.

For other national governments, particularly those in emerging markets, the opportunity is to accelerate skills development by providing scholarships and fast-tracking support to eligible students.

**Education**

Within the broader education sector, the goal is to develop a new engineering training eco-system that features stable pipeline partnerships with private and public secondary schools, further education institutions and institutes of technology – in the UK and offshore.
The desired result is that TEDI-London will benefit from a flow of students with the skills and passion to progress to a new type of degree at an institution that is more inclusive through its student intake model. At the same time, TEDI-London will assist schools and colleges that specialise in project-based learning via outreach programs.

Other
Collaborations with peak industry and engineering bodies, advocacy groups, women in STEM organisations, and similar groups in design, technology and science will be actively nurtured.

UK Examples include:
- The Science, Engineering and Manufacturing Technologies Alliance (SEMTA).
- The Engineering Employers' Federation (EEF).
- Women's Engineering Society (WES)
- The Royal Academy of Engineering.
- Engineering UK.
- The Institution of Engineering and Technology.
- Women in Science, Technology and Engineering (WISE).

Collaborations with international organisations will also be pursued.