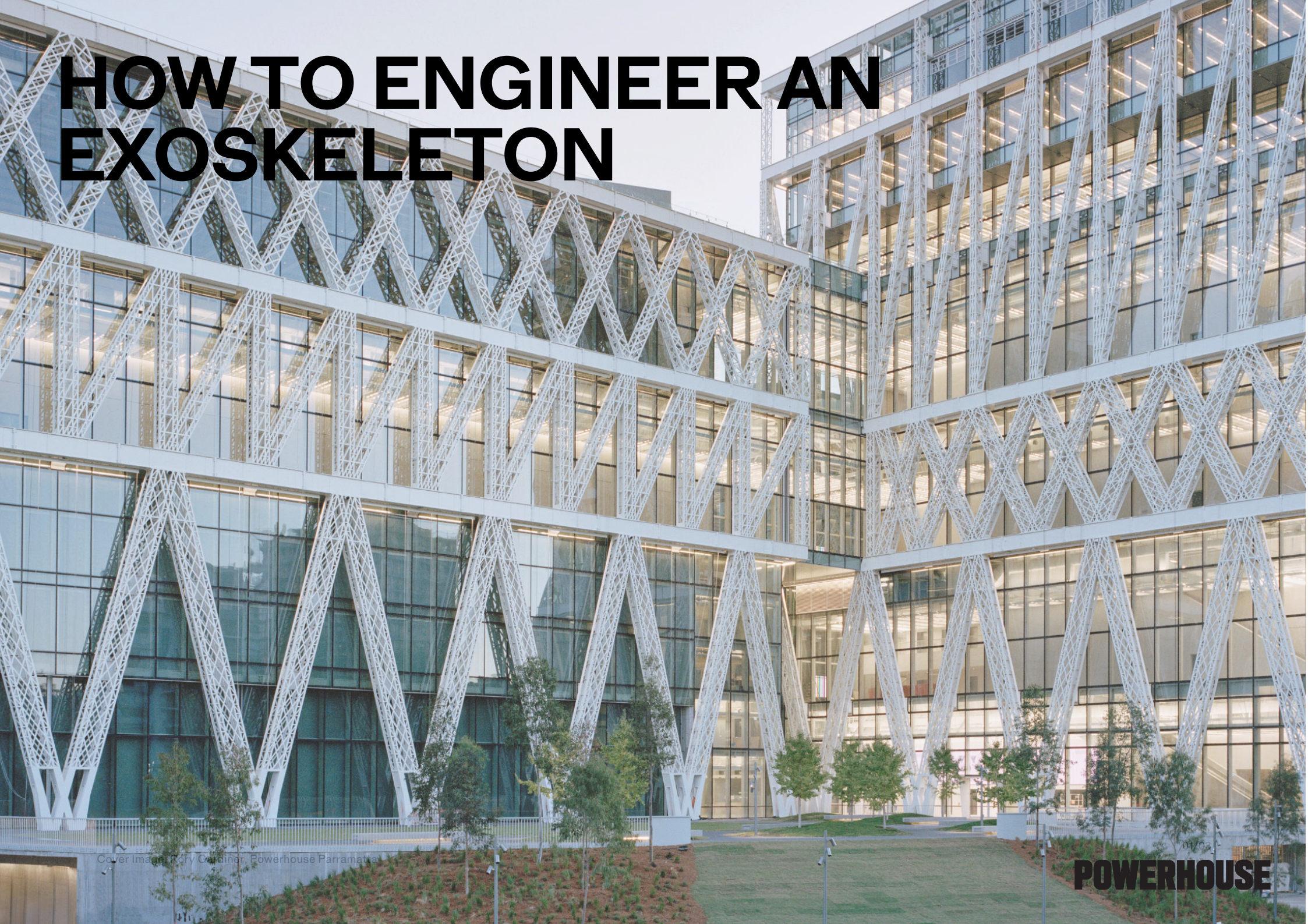
HOW TO ENGINEER AN EXOSKELETON



Cover Image: Rory Gardiner, Powerhouse Parramatta

POWERHOUSE

PROGRAM OVERVIEW

‘The exoskeleton is representative of what you might find in nature, in response to natural forces. We sought to refine the exoskeleton down to its minimum componentry to achieve maximum structural integrity.’ Hiroko Kusunoki, co-director Moreau Kusunoki.

Inspired by the ways natural structures often influence engineered solutions, students will explore engineering principles and structural design, using Powerhouse Parramatta and its iconic steel exoskeleton as a real-world case study. Over 9 weeks, students will work with industry professionals through a structured design and engineering process. They will investigate a design brief, generate and communicate ideas, experiment with structural forms and materials, prototype solutions, test and analyse their designs, and refine their response using evidence from their investigations. Students will apply this learning to develop an exoskeleton that either:

1. Supports and protects an object they propose for the Powerhouse Collection, or
2. Responds to an identified need in their community.

The program will culminate in a celebration at Powerhouse Parramatta, where students will present and showcase their designs, prototypes and design process.

Students will have the opportunity to:

- Explore engineering through Powerhouse Parramatta and its structural design.
- Learn directly from engineers, designers and industry professionals.
- Investigate biomimicry, forces, loads, structures and materials through practical experiments.
- Develop skills in design, prototyping, testing, analysis and documentation.
- Respond to a real-world engineering design brief.
- Present and showcase their final engineered solution.

As part of this program, we will provide:

- A structured 9-week teaching and learning program.
- Direct engagement with engineering and industry professionals.
- Hands-on engineering investigations and prototyping activities.
- Teaching resources, design briefs and supporting materials.
- Opportunities to engage with Powerhouse Parramatta as a case study.
- A culminating showcase of student designs.

This program is designed to align with:

- Engineering Technologies (7–10): Structures
- Design and Technology (7–10): Design Innovation Technologies
- Technology (7–8): Engineering technologies and systems, Materials and production processes
- iSTEM: Fundamentals or Project-based learning

Cover Image: Rory Gardiner, Powerhouse Parramatta

PROGRAM STRUCTURE

TERM 4, 2026	TERM 1, 2027	ENGINEERING SUMMIT 9–10 April 2027
From 10 November: School visits to Powerhouse Parramatta. Bookings required. Book here.	**Week 2:** What is engineering?	**Friday 9 April:** Secondary School Day
Friday 11 December: Teacher professional learning (full day at Powerhouse Parramatta)	**Week 3:** Case Study: Powerhouse Parramatta (site visit)	
	Week 4: Structural investigations	**Saturday 10 April:** Family Day (invitation to attend with parent/guardian)
	Week 5: Responding to the Design Brief	
	Week 6: Material investigations	
	Week 7: Prototyping and analysis	
	Week 8: Prototyping and analysis	
	Week 9: Finalising design and presentation	
	Week 10: Program celebration at Powerhouse Parramatta	

This program has been designed with direct input from:

Genton ARUP WESTERN SYDNEY UNIVERSITY UNSW SYDNEY ENGINEERS AUSTRALIA EngineeringAid Australia *Building futures* AMRF Advanced Manufacturing Readiness Facility NSW GOVERNMENT Education OLMC PARRAMATTA