STEM SPARKS TEACHERS RESOURCE

UNIVERSITY OF NEWCASTLE

COLLEGE OF ENGINEERING, SCIENCE AND ENVIRONMENT

GETTING STARTED STEM SPARKS

STEM SPARKS
IGNITING GIRLS' FUTURES IN THE BUILT ENVIRONMENT

Ever wondered who decides what gets built where? How does someone know how much concrete to order for a new footpath?

Welcome to STEM Sparks – an educational hands on, curiosity-fuelled program that explores real jobs in construction and the built environment.

Watch the 'a day in the life of' videos and be inspired by women who work as design managers, project managers, quantity surveyors, building surveyors, and engineers. Learn about how they plan big projects, small projects, solve tricky problems, and keep everything running smoothly – from skyscrapers to solar farms.

Experience what the different STEM Career roles involve through in our activity workshops – design, plan, estimate, inspect, and solve just like real construction professionals!

Take the Mythbusters Challenge: Can you guess which STEM career myths are true and which are not? (Hint: Yes, there are women in construction!)

Enjoy the free book!

How to Use This Resource

STEM Sparks is a flexible, hands-on teaching resource designed to introduce students to real STEM careers in the built environment. It can be used as a stand-alone session, across multiple lessons, or adapted to suit your class needs.

What's included

This resource includes:

- Short "Day in the Life" videos featuring women working in built environment STEM careers
- Hands-on classroom activities linked to each role
- Printable worksheets and checklists
- Facilitator guidelines with suggested timing, prompts, and answers
- Mythbusters activities to challenge common stereotypes about STEM careers

Each activity is designed to be engaging, practical, and discussion-based, with no prior knowledge required.

Getting started

1. Choose a role or activity

Select one (or more) STEM roles to explore, depending on your time and learning focus.

2. Watch the video

Scan the QR code to watch a short Day in the Life video. These videos introduce students to real people and real jobs in construction, engineering, and the built environment.

3. Run the activity

Follow the facilitator guidelines provided for each activity. Activities can be completed:

- Individually
- In pairs
- In small groups

4. Discuss and reflect

Use the reflection prompts to encourage students to think about:

- How problems were solved
- How teamwork and communication were used
- How STEM skills apply to real-world projects

How long does it take?

- Most activities run for 30–45 minutes
- Videos are short and can be paused for discussion
- Activities can be shortened or extended to suit your lesson plan

Curriculum flexibility

STEM Sparks supports learning across:

- Science
- Technology
- Engineering
- Mathematics
- Design and problem-solving
- Careers education

Activities encourage creativity, critical thinking, collaboration, and curiosity.

No special equipment needed

All activities use low-cost, classroom-friendly materials. A materials checklist is included for each activity.

Feedback

Your feedback helps us improve STEM Sparks and reach more students.

At the end of the resource, please scan the QR code to complete a short feedback form.

STEM SPARKS
A DAY IN THE LIFE . . .
ARCHITECTURE

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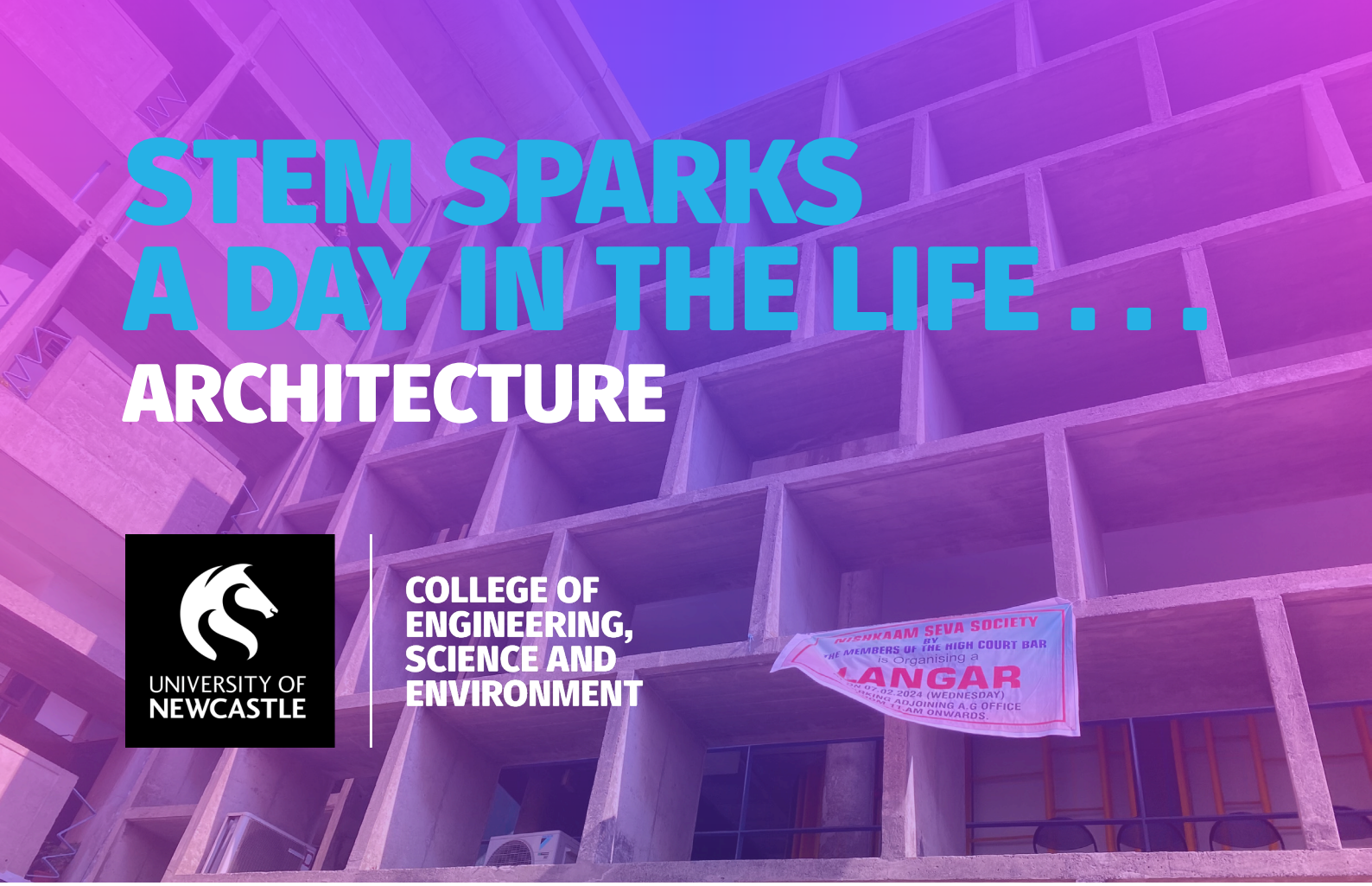

Explore a day in the life of Architect and Director, Sandra

An architect is the creative mind behind the spaces where we live, work, learn, and play. They design everything from homes and schools to parks and skyscrapers, considering how buildings will look, function, and be built.

Architects balance climate, safety, cost, and sustainability to create spaces that meet both individual and community needs. They work closely with clients and collaborate with engineers, builders, and surveyors to turn ideas into real places. Through their designs, architects shape the way we experience the world, creating environments that inspire, connect, and support us — both now and for generations to come.

My STEM Story

Hi I'm Sandra, I've been passionate about architecture since heading straight to university in Newcastle after school. My career has taken me from a small Sydney studio to becoming a Registered Architect in Perth, and later working in Brisbane and Townsville.

Fourteen years ago, I returned to Newcastle and joined Webber Architects, where I'm now a Director. I love the people I work with - clients, stakeholders, councils, consultants, and contractors - and the fresh conversations each project brings. Architecture takes persistence, patience, and a love of learning, but it's a deeply rewarding career that shapes meaningful spaces for people and communities.

DESIGN LIKE AN ARCHITECT

Facilitator guidelines

This activity is designed to introduce students to architectural thinking in a simplified, engaging way. Students explore how ideas are developed, tested, and refined through sketching and model-making. They consider how design responds to climate, context, and function, and experiment with strategies to create stable, resilient structures.

Age suitability: approx. 9–14.

No prior knowledge required. Encourage students to discuss how their design works, what challenges they encountered, and how their structure could be improved or strengthened.

Activity Timing

Outline Design Brief and Discuss (10 mins)

- Prompt students to think about construction materials, sustainability and climate

Draw a Design (5 mins)

- Encourage communication between group members
- Remind them of the benefits of collaboration

Construct your Design (15 mins)

- Provide tips to students; what shapes are strong? triangles
- What material has strength? – paddle pop
- What materials are flexible? – card

Test the Constructions (10 mins)

- Let's see how your design performs
- Test each group separately and build excitement
- Is there enough shade for your LEGO people? (Use the lamp/sun)
- Can it withstand strong wind? (Try the fan on different speeds/wind)
- Can it hold weight? (Add weights gradually)
- Reflect on what you learnt
- Encourage discussion about what they learnt
- Reflect on what how this relates to the real world

Scan the QR code for a link to the day in the life of an architect by Sandra

Design like an architect worksheet checklist

- Printouts
- Pencils
- Paddle pop sticks
- 30mm Length of masking tape per student
- A4 Card stock
- Lego people or small figurines
- Lamp or torch
- Fan or hairdryer
- Small rocks or weights

Note* Activity can be organised in groups or individual, depending on class size

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STEM SPARKS
A DAY IN THE LIFE . . .
QUANTITY SURVEYING

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Explore a day in the life of Quantity Surveyor, Lucy

A quantity surveyor is like a project's money and planning expert. They help builders, architects, and clients make sure a building can be built for the right price, on time, and using the best materials. They measure and count what's needed, prepare budgets, and keep track of costs while the project is built.

Think of them as the detective of numbers — solving problems, making smart choices, and helping everyone work together. Quantity surveyors work on all kinds of projects, from schools to stadiums, and their skills can take them anywhere in the world. It's a career for smart, creative thinkers.

My STEM Story

My name is Lucy and I recently graduated at University of Newcastle with a Bachelor of Construction Management (Building)(Honours) in 2024. I started working at Rider Levett Bucknall (RLB) in the last year of my degree as an Assistant Quantity Surveyor and currently in a Quantity Surveyor (QS) role at RLB.

In the first few years of my studies, I gained valuable experience as an assistant construction certifier/surveyor, and later as a cadet at a Tier 1 head contractor, which led to my current role as a QS. I felt that this position aligned most closely with my strengths in attention to detail, numerical and analytical skills!

Fun fact about my work is that we have more females than males in our office! It's great seeing the increase of women in construction and working closely with female leaders in the industry that inspire.

SURVEY LIKE A QUANTITY SURVEYOR

Facilitator guidelines

This activity is designed to simulate quantity surveying in a simplified, engaging way. Students estimate materials based on the plan description, calculate the cost using the price list, and complete a basic budget worksheet.
Age suitability: approx. 9–14.
No prior knowledge required. Encourage discussion about budgeting, cost-saving strategies, and real-world construction decisions.

Answers

Material Cost Worksheet
The total of the materials should be as follows:-
Floor Panel (1 x $100) + Front Wall (1 x $75) + Rear wall panel (1 x $50)
+ Side wall panels (2 x $40 = $80) + Roof panels (2 x $75 = $150)
+ Screws (1 x $15) = $470

Bonus Challenge
Student swill need to save $70 to bring the price under the nominated $400. This could be removing the floor panel (maybe they have some Pavers they could put it on), removing the front wall (maybe their dog is larger and they don't want a small door).

Labour Cost
The total labour costs should be as follows:-
Floor Panel (30min) + Front Wall (20min) + Rear wall panel (20min)
+ Side wall panels (2 x 15min = 30min) + Roof panels (2 x 10min = 20min)
= 120min or 2 hrs
Total Labour cost = 2hrs x $50/hr = $100
Total Project Cost = Materials ($470) + Labour ($100) = $570

Bonus Challenge
The above is based on a single person completing the activity. If there were two people completing the activity, then in theory it would be twice as fast.

Having two people completing the work will cost twice as much if they are both paid the $50/hr each, however they should do it in half the time, therefore ending up with the same overall labour cost.

Scan the QR code for a link to the Day in the life of a QS Manager video by Syidah

Scan the QR code for a link to the Day in the life of a Quantity Surveyor video by Lucy

Survey like a quantity surveyor worksheet checklist

- Printouts (Individual or duo)
- Pencils
- Additional paper for working out maths

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STEM SPARKS
A DAY IN THE LIFE . . .
PROJECT MANAGEMENT

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Explore a day in the life of a Project Manager, Jen

A construction project manager is responsible for making sure building projects—like homes, schools, or bridges—are completed safely, on time, and within budget. They plan the work, coordinate with architects, engineers, and builders, tradies, and make sure everyone knows what to do.

Each day, they visit construction sites, check progress, solve problems, and ensure safety rules are followed. They also manage schedules, order materials, and talk with clients to keep them updated. Being organised, a good communicator, and a strong leader are important skills. Construction project managers help turn blueprints into real buildings by guiding teams and making sure everything runs smoothly

My STEM Story

Hi I'm Jen, a Senior Project Manager at The APP Group, where I guide clients and contractors through complex projects from concept to completion.

I began my career as a Graduate Site Engineer with Lendlease after completing a Bachelor of Environmental Engineering at the University of Newcastle. Transitioning to client-side project management has allowed me to apply my skills across diverse projects—no two days are ever the same!

For anyone interested in this field, be passionate, stay driven, and never stop asking questions. Curiosity fuels growth, and even now, I'm learning something new every day.

PLAN LIKE A PROJECT MANAGER

Facilitator guidelines

This activity is designed to stimulate project / construction manager day-to-day job in a simplified and engaging way. Students will put task in order and allocate number of workers according to each task.

Age suitability: approx. 9–14.

No prior knowledge required. Encourage discussion about budgeting, cost-saving strategies, and real-world construction decisions.

Solution

- 1. Design the house (1 day)
- 2. Order materials (must come after design; takes 2 days)
- 3. Build base (2 days, can't be done in rain)
- 4. Build walls (2 days)
- 5. Add roof (1 day, can't be done before walls)
- 6. Paint and decorate (2 days, must be done last)

Students will learn basic technical task which is foundation of construction projects and constrains such as tasks in order, some tasks cannot be started if the precedent task is not completed. Sometime, external environment such as rain or strong wind will have impact on some tasks.

Scan the QR code for a link to the day in the life of a project manager video by Jen

Plan like a project planner worksheet checklist

- Instruction printout (Can be shared)
- Timetable (Individual or group)
- Small counters to place on the timetable (Alternatively you can print and cut out the included emojis) (14 per timetable)

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STEM SPARKS
A DAY IN THE LIFE . . .
BUILDING SURVEYING

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Explore a day in the life of Building Surveyor, Zoe

A building surveyor is like a safety and rules expert for buildings. They check that designs and construction follow all the laws and safety standards so people can live, work, and play in them safely.

They inspect plans before building starts, visit sites while work is happening, and give the final “OK” when everything is finished. Think of them as the guardian of safe spaces — making sure walls, roofs, and everything in between are strong and built the right way. Building surveyors help create homes, schools, and shops that are safe, legal, and built to last for years to come.

My STEM Story

I’m Zoe Brown, a registered Building Surveyor working at Credwell as the Technical Quality and Business Improvement Manager. I work on a small number of projects, but mainly focus on driving efficiency and technical quality across the business.

I originally pursued a career in architecture but found myself more drawn to building compliance than design, which led me to transition into building surveying. I must have always had an interest in compliance as I remember wanting to be a police officer when I was a kid, and now I joke that I am the “Building Police”.

I love applying my analytical skills to complex building code interpretations, and being a part of the team that solves compliance problems. My favourite part is getting out the drill to take cladding samples from buildings to be tested, but I also enjoy how diverse the role is, and collaborating with the greater industry by attending events, and being a part of various committees.

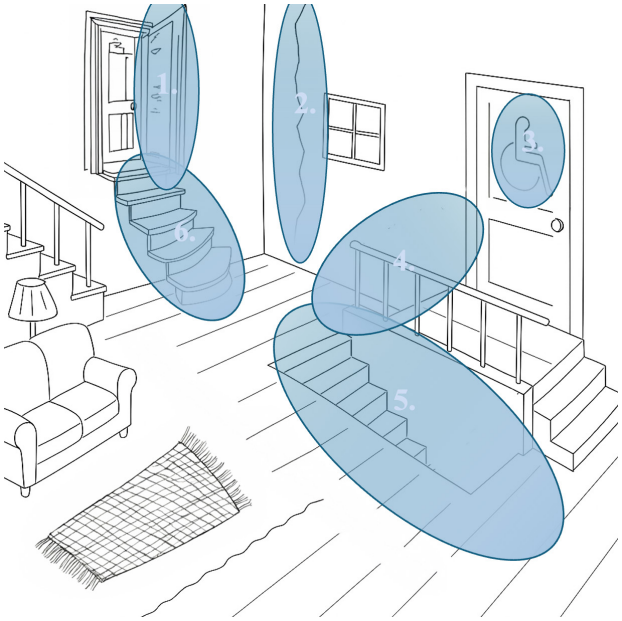
SURVEY LIKE A BUILDING SURVEYOR

Facilitator guidelines

This activity is designed to simulate building surveying in a simplified, engaging way. Students identify potential errors or damage and propose methods to rectify them.

Age suitability: approx. 9–14.

No prior knowledge required. Encourage discussion about what could be wrong and how it could be fixed.



Answers

- 1. The Door opens out over the stairs – Reverse the door so that it opens inwards (Note: It should still have a landing in front to allow space)
- 2. There is a crack in the wall.This can be repaired, but could be a sign of structural damage.
- 3. The accessible door is at the top of stairs – A ramp could be added, however the door would still not be able to be opened by someone in a wheelchair. Another exist would be more suitable.
- 4. A handrail is missing – Add a handrail or a ramp to make this safe
- 5 & 6. A handrail is missing – Add a handrail to make safe

Scan the QR code for a link to the day in the life of a building surveyor video by Zoe

Survey like a building surveyor worksheet checklist

- Printouts (Individual or group)
- Pencils
- Highlighters

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STEM SPARKS
A DAY IN THE LIFE . . .
ENGINEERING

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Explore a day in the life of Mechanical Engineer, Imogen

Engineers in the built environment design, plan, and deliver the systems and structures that keep our cities and communities running. Their work spans a wide range of specialisms - from mechanical and electrical engineering to civil, structural, and environmental engineering - each playing a vital role in shaping the spaces where we live, work, and connect.

They combine technical expertise with creative problem-solving to develop innovative solutions, improve sustainability, and enhance quality of life. Whether it's designing efficient transport systems, renewable energy networks, or resilient buildings, engineers help turn complex challenges into practical, lasting results.

My STEM Story

Hi! My name is Imogen Wouters, and I'm currently a Mechanical Engineer at UGL Transport, focused on ensuring the reliability of locomotive fleets (chugga chugga choo choo). I studied a Bachelor of Mechanical Engineering and Medical Engineering at The University of Newcastle from 2018-2022. My career began as a Graduate Structural Engineer at UGL, working on wagon and locomotive design.

I later transitioned to a Graduate Site Engineering role and, in 2024, was honored with CIMIC's Graduate of the Year for Engineering Excellence. A highlight of my work has been tackling diverse challenges and the unique experience of working with locomotives and stakeholders. If you're interested in engineering - Stay curious, ask questions, and embrace problem-solving!

MYTHBUSTERS - STEM EDITION 1

Facilitator guidelines

Answers for sheet 1

1. Myth: “You have to be good at drawing to be an architect.”
D. Fact: Architects use sketches to share ideas, but also rely on software, teamwork, and problem-solving — not just drawing skills!

2. Myth: “Construction jobs are dirty and dangerous.”
C. Fact: Construction includes a wide range of high-tech, creative, and safety-focused roles — including design, planning, and project management.

3. Myth: “There are no women in building surveying.”
B. Fact: Women are leading the way in building inspections, compliance, and innovation — and the numbers are growing every year!

4. Myth: “Engineers only build bridges and roads.”
H. Fact: Engineers design everything from buildings and water systems to solar farms and virtual cities — and many specialise in sustainability!

5. Myth: “You need to be super strong to work in construction.”
G. Fact: Most construction roles are about skills, thinking, and teamwork, not physical strength — and machines do the heavy lifting!

6. Myth: “Maths is the most important subject for a STEM job.”
E, Fact: STEM uses many skills — curiosity, creativity, communication, and critical thinking are just as important as maths.

7. Myth: “All architects work in big cities.”
F. Fact: Architects work everywhere — designing homes, schools, and public spaces in regional towns, remote areas, and urban centres alike.

8. Myth: “STEM is all about computers.”
A. Fact: While tech is important, STEM careers can also involve hands-on building, creativity, collaboration, and community impact.

9. Myth: “STEM jobs are boring and only for people who like school.”
I. Fact: STEM careers are creative, active, and often hands-on — from designing spaces to solving real-world problems.

10. Myth: “All STEM work happens in labs or offices.”
J. Fact: STEM careers can take you outdoors, on construction sites, in workshops, or even underwater and underground!

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STEM SPARKS
A DAY IN THE LIFE . . .
QUANTITY SURVEYING

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Explore a day in the life of Digital Leader in Quantity Surveyor, Syidah

A Quantity Surveyor is like a project's money and planning expert. They help builders, architects, and clients make sure a building can be built for the right price, on time, and using the best materials.

They measure and count what's needed, prepare budgets, and keep track of costs while the project is built. Think of them as the detective of numbers — solving problems, making smart choices, and helping everyone work together. Quantity Surveyors work on all kinds of projects, from schools to stadiums, and their skills can take them anywhere in the world. It's a career for smart, creative thinkers.

My STEM Story

Hi I'm Syidah Arnold, a Director at Rider Levett Bucknall, working at the intersection of construction, property and technology. With a background in architecture and quantity surveying, I lead digital transformation initiatives, focusing on data, AI and innovation in the built environment.

Over my 19-year career, I have found purpose in solving problems and making work more efficient through smart digital tools.

I'm a proud University of Newcastle graduate and believe there's never been a more exciting time to join the industry, especially for those curious about how buildings, technology and people come together.

MYTHBUSTERS - STEM EDITION 2

Facilitator guidelines

Answers for sheet 2

1. Myth: “If you don’t like coding, you can’t work in STEM.”
F. Fact: Many STEM careers don’t require coding — there’s space for project managers, sustainability experts, architects, and surveyors too.

2. Myth: “Sustainability and the environment aren’t part of STEM.”
A. Fact: Many STEM careers focus on solving environmental challenges — from designing energy-efficient buildings to managing natural resources.

3. Myth: “You must have top grades to get into STEM.”
G. Fact: STEM is about curiosity and determination — there are many entry points and pathways, and success doesn’t require perfect grades.

4. Myth: “Architecture is only about designing fancy houses.”
B. Fact: Architects design schools, hospitals, parks, emergency shelters, and sustainable cities — not just houses!

5. Myth: “Construction is just about building things.”
I. Fact: Construction also involves planning, budgeting, risk management, safety, leadership, and environmental design.

6. Myth: “You have to be a maths genius to be a quantity surveyor.”
D. Fact: You need to be comfortable with numbers, but problem-solving, communication, and negotiation are just as important.

7. Myth: “Building surveyors are the same as real estate inspectors.”
E. Fact: Building surveyors focus on building codes, fire safety, structural issues, and design regulations — not property sales.

8. Myth: “Project engineers just sit at a desk all day.”
C. Fact: Many project engineers split their time between site visits, meetings, and hands-on project planning.

9. Myth: “Contract administrators are just paperwork people.”
H. Fact: Contract admins are key decision-makers — managing timelines, budgets, legal documents, and communication between all project teams.

10. Myth: “Facilities managers only fix broken things in buildings.”
J. Fact: Facilities managers keep entire buildings safe, efficient, and sustainable — managing energy, space, maintenance, and technology.

Scan the QR code for a link to the Day in the life of a QS Manager video by Syidah

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STEM SPARKS
A DAY IN THE LIFE . . .
CONSTRUCTION MANAGEMENT

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Explore a day in the life of a Construction Manager, Larissa

A construction manager turns plans on paper into bricks, steel, and glass in the real world. Overseeing roles like project engineer, site engineer, and contract administrator, they coordinate people, materials, and timelines to keep projects running smoothly.

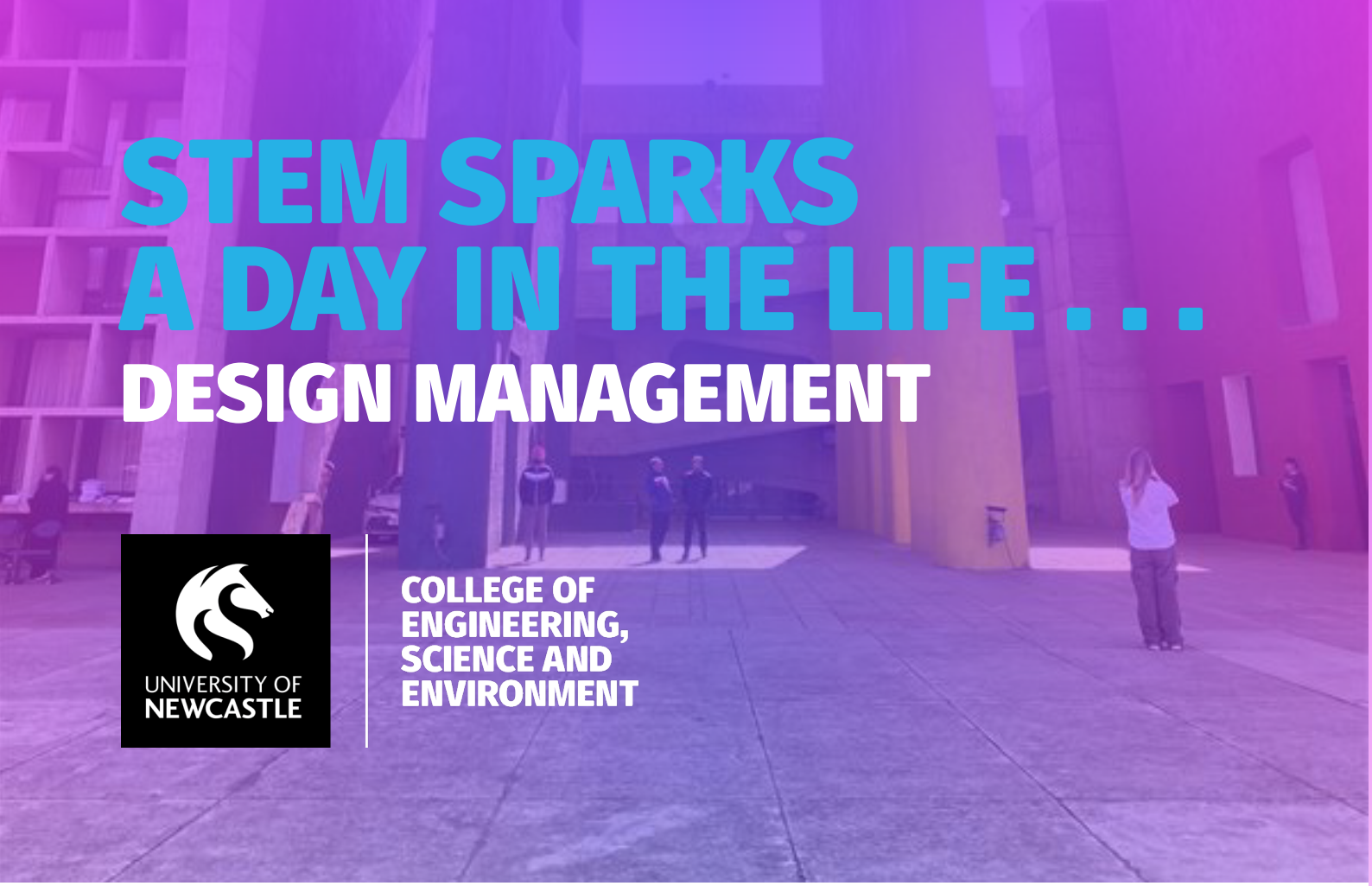
They're problem-solvers on site, tackling challenges from weather delays to budget changes, all while keeping safety and quality front of mind. Whether building skyscrapers, schools, or infrastructure, Construction managers blend leadership, technical know-how, and teamwork to deliver projects on time and on budget. It's a career for those who thrive under pressure and love seeing their work take shape in the skyline.

My STEM Story

Hi I'm Larissa, a construction manager with Richard Crookes Construction, working on projects that shape and support regional communities, like the Central Coast Medical School. My journey started with a Bachelor of Construction Management (Honours) at the University of Newcastle, where I balanced study with a cadetship to gain hands-on experience.

What I love most is seeing a project grow from plans on paper to a place that people will use and value for years to come. Construction is fast-paced, creative, and full of opportunities - if you're up for a challenge and want to make a tangible difference, this is the place to be.

STEM SPARKS
A DAY IN THE LIFE . . .
DESIGN MANAGEMENT



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Explore a day in the life of Design Manager, Ash

A design manager is the conductor of a project's creative orchestra, bringing together architects, engineers, and contractors to turn bold ideas into buildable realities. They keep the design process on track - balancing creativity with cost, deadlines, and technical requirements - while solving problems and keeping everyone in sync.

From reviewing plans to securing approvals, they make sure every detail aligns with the project vision. Whether it's shaping a hospital, a stadium, or a cutting-edge office, Design managers combine big-picture thinking with practical know-how to deliver spaces that are functional, inspiring, and ready to stand the test of time.

My STEM Story

Hi I'm Ashley, the Head of Design at Icon, bringing extensive expertise in design management across diverse sectors including health, education, and complex commercial projects. I ensure design excellence is integrated into every stage of delivery, balancing innovation with compliance, safety, and client objectives. My leadership fosters collaboration between consultants, stakeholders, and construction teams, driving efficiency, quality, and strong project outcomes.

Alongside my professional role, I serve as Chair of the NAWIC NSW Regional Committee, leading initiatives to support, advocate for, and retain women in construction, further strengthening the industry through mentorship, education, and strategic partnerships.

STEM SPARKS FEEDBACK

Thanks for participating in STEM Sparks! Your feedback that you provide helps us better design the activities to reach a wider audience and help inspire and educate the next generation of STEM students. If you can take the time to follow the QR code below, you will be taken to short form where you can provide feedback.

All answers are collected anonymously and any information included is confidential.

If you have any queries or issues, please contact the team via:

ArchBE@newcastle.edu.au

Scan the QR code for a link to our feedback form!