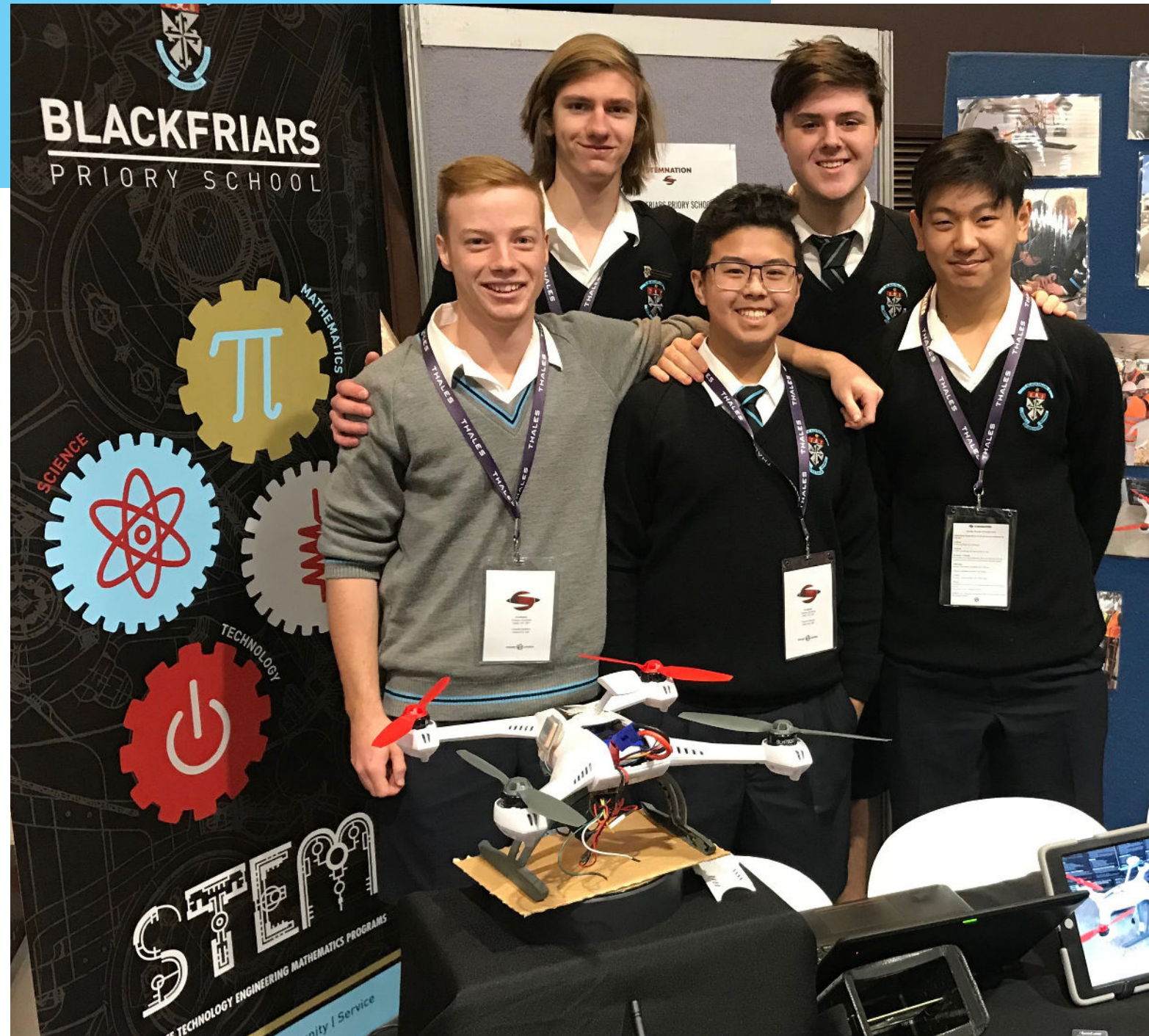# Academic
Extension Academy

A^X is...

an exciting learning enrichment program designed for boys in Years 7 to 10 looking to extend their academic program at Blackfriars.

The A^X Academy program enhances the standard secondary school curriculum and includes a broad range of problem-solving and project-based activities in the STEM disciplines - Science, Technology, Engineering and Mathematics.

A^X encourages highly motivated students to collaborate with like-minded peers, extend themselves academically and to excel.

A^X is offered as an elective subject and is accompanied by a number of co-curricular opportunities.

The A^X Academy has four major components:

- Accelerated learning
- Project-based in-school and after-school STEM extension activities
- Mentoring by industry experts
- Opportunities to participate in STEM experiences and competitions

To join the A^X Academy, students apply via their subject selection form and require the endorsement of their STEM-based subject teachers.

To be eligible, students must:

- Display a genuine curiosity for STEM-based subjects
- Exhibit an inquiry-based approach to STEM disciplines
- Have demonstrated a willingness to explore innovative ways to solve complex real-world problems
- Be able to work collaboratively with their peers

BLACKFRIARS

DEUS DOMINUS

SCIENTIARUM

A^X

ACADEMIC
EXTENSION
ACADEMY

Accelerated learning
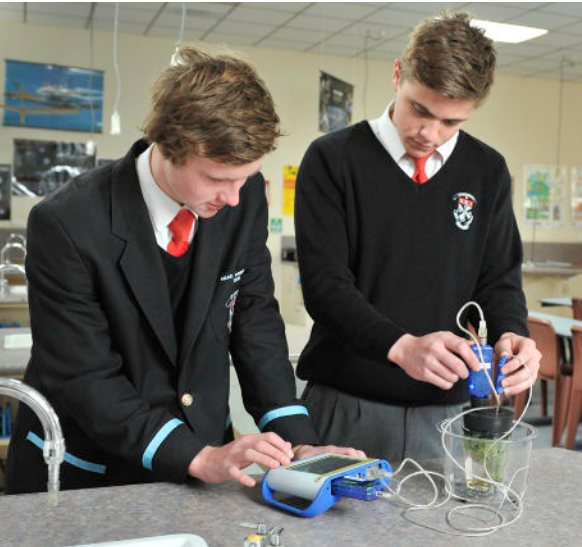
Science

Aˣ Science (Year 10)

Aˣ students are accelerated through the Australian Science Curriculum, including a taste of what is required in the SACE science subjects. Additional time becomes available, accordingly, for students to complete collaborative STEM projects which prepare students for tertiary education and beyond.

Accelerated Physics, Biology and Chemistry (SACE Stage 2)

Aˣ students have the opportunity to complete SACE Stage 2 Physics, Biology or Chemistry as Year 11 students.

Technology

Advanced Programming

Aˣ students learn advanced programming techniques such as coding to an introductory university level, as well as using arrays and creating data structures.

Web Based Applications

Programming languages, involving the development of interactive websites are taught in unison. Aˣ students learn HTML, CSS, JavaScript, MySQL, PHP and utilise their creativity to develop a unique web application.

The integration of this suite of skills provides students with practical experience in web development.

Real Life Hardware Scenarios

Aˣ students engage in real-life scenarios that cover both personal and business computer use. They must select and justify all parts to construct a computer to meet a specific set of requirements while adhering to a budget.

Students simulate working as an ICT business by generating a quote for installing a network in a workplace environment, as well as selecting appropriate hardware to meet the demands of the job and substantiating the decisions made.
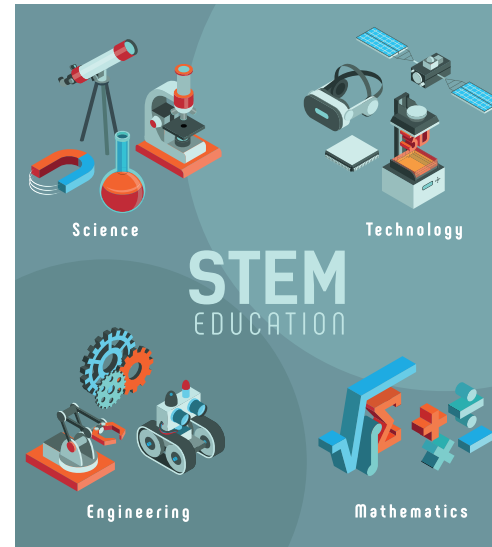
Engineering

Aˣ Elective (Years 7-9)

This elective involves project-based work requiring the use of skills essential in the STEM disciplines: problem solving, collaboration and communication. Students design, build, test and redesign to make sure they meet required specifications.

Example projects include:

- Designing an automated greenhouse.
- 3-D fabricating and assembly of drones
- F1 in Schools program
- Arduino electronics and coding

Mathematics

Mathematics Enrichment

In addition to regular Mathematics classes, Aˣ students can be selected for the Mathematics Enrichment Program in the Middle Years (7-9).

Under the direction of a senior Specialist Mathematics teacher, boys can extend their knowledge and explore their passion for Mathematics through problems which focus on thinking critically and using a variety of problem-solving skills.

Real World Projects

Throughout the Middle Years, teachers focus on STEM-based learning in their classrooms. Students work both individually and in teams to apply their mathematical and numerical knowledge in authentic real-world projects such as wind turbine development, carbon dioxide dragster construction and robotics.

Aˣ Mathematics

Aˣ students have the opportunity for mathematics curriculum enrichment. The Aˣ Mathematics stream is designed to inspire, challenge and extend students to a more in-depth understanding of Mathematics.

Aˣ students who have completed Stage 2 Mathematics in Year 11 can apply for the University of Adelaide *Headstart* Scholarship for Year 12. If accepted, they will be assigned a mentor teacher.

STEM**Extension**

AˣAcademy extension activities aim to develop students' problem-solving and research skills, application of knowledge in context, communication and teamwork and focus on social relevance and real-life problem solving.

STEM Aˣ Co-curricular

This component of the Aˣ program offers students the chance to undertake broad, open-ended Engineering projects utilising *Programming WeDo* and *Mindstorms Lego* robots.

Students will also be involved in:

- Designing and building wind turbines to optimise power generation

- Designing and building model bridges for the highest structural efficiency

- Investigating the energy efficiency in 3D printed model *Scalextric* cars

- Constructing solar powered cars to travel a set distance in the fastest time

- Designing energy efficient housing.

Industry Focused Assignments

Aˣ assignments and projects throughout the Middle and Senior school have a strong STEM and industry focus. Students are given tasks which utilise group-work, interdisciplinary models and design-thinking pedagogy.

Projects involve complex mathematical designs of real-world products and the application of mathematical concepts to real-life data analysis.

Examples of Aˣ project work across the Middle and Senior school are:

- Designing chocolate bars (ranging from the shape to the packaging)

- Designing school gardens, building bridges (to assess loads)

- Designing roller-coasters using calculus

- Analysing census data to find correlations

- Creating enciphering algorithms to construct and break codes.

Industry
Mentoring

A^X Industry Mentoring Program

Engaging with industry mentors helps to challenge, motivate, inspire and empower the next generation of STEM professionals.

The Industry Mentoring Program connects Blackfriars A^X Academy boys with STEM professionals, many of whom are Blackfriars Old Scholars, working in local STEM-rich industries.

The mentor's primary role is to provide insight into the world of work and to engage the students in an ongoing dialogue about the skills needed for success in the 21st century workplace. Mentors can discuss practical questions and issues related to careers in their specific industry and help develop key workplace competencies such as leadership, teamwork, problem-solving skills, communication and ethical understanding.

Mentors also play an advisory role in project-based learning components of the A^X program that focus on an industry issue or question.

STEM Experiences& Competitions

Mathematics

Students are involved in nationwide and international Mathematics competitions such as the *Australian Mathematics Competition*, the *Computational Algorithmic Thinking Competition* and the *Hamann School Mathematics Competition for the Society of Petroleum Engineers*.

These competitions focus on non-standard problems and seek to identify students with computer programming potential or expert problem-solving skills.

FIRST Tech Challenge

FIRST Tech Challenge students learn to think like engineers. Teams design, build, and code robots to compete in an alliance format against other teams. Robots are built from a reusable platform, powered by Android technology, and can be coded using a variety of levels of Java-based programming.

Tinkercad + Fusion 360

Year 7 A^x students complete 3D modelling and printing projects using Autocad products. *Tinkercad* is a collection of software tools that help people think, create and make. It is the ideal introduction to Autodesk, the leader in 3D design, engineering and entertainment software. *Fusion 360* is software for 3D CAD, modelling, manufacturing, industrial design, electronics and mechanical engineering.

F1 in Schools

F1 in Schools is the world's most competitive STEM competition involving over 17,000 schools in 44 countries. Students design, build and race miniature Formula 1 cars capable of reaching speeds of up to 80kmh in under a second! In Australia, F1 in Schools is conducted by the Re-Engineering Australia Foundation.

Robo Cup - Lego Robotics

In this Year 8 A^x co-curricular program, students design and program *Lego EV4* robots to compete in the Robo Cup. Students can enter various categories including the popular Rescue Challenge and Soccer competition.

Subs in Schools

The Re-Engineering Australia Foundation *Subs in Schools* program, developed in association with Saab Australia, allows A^x students to explore the complex challenges of maritime engineering and hydrodynamics. Students use coding and electronics as they design and build operational submarines and remotely operated underwater vehicles (ROVs). This program includes opportunities for industry collaboration with ASC and Naval Group.

Pedal Prix

This is South Australia's most popular school-based STEM activity. The *Australian HPV (Human Powered Vehicle) Super Series* (Pedal Prix) is an annual velomobile series of events designed to develop competitors' teamwork, technological and engineering skills, initiative, enterprise, fitness and health.

The series captures core 21st century education values: the development of sustainable communities, healthy lifestyles, communication, teamwork, research and innovation.

Science Competitions
> www.asi.edu.au/programs/big-science-competition/
> asta.edu.au/awards/asi_competitions

ICT Competitions
> www.digitaltechnologieshub.edu.au/students/
> Young ICT Explorers

BLACKFRIARS

ibsc member

StudyADELAIDE
SOUTH AUSTRALIA

catholic education
south australia

Prayer | Study | Community | Service