bioLAB
PROGRAM GUIDE

SCIENCE & MATHEMATICS
EDUCATION WITH AN EDGE

www.biolab.vic.edu.au
BioLAB’s aim is to engage and inspire the next generation into Science and Mathematics careers using innovative technologies and techniques.

Our programs are themed using Sport and Human Performance and are linked to The Victorian Curriculum F-10 and VCE outcomes. We build our unique experiences around a number of Science, Technology, Engineering and Mathematics career pathways.

We cater for primary through to VCE students accommodating different stages of learning and ability with a special focus on disadvantaged and rural schools.

BioLAB programs are intentionally cross curricular and are designed to cater for more than just Science and Mathematics classes!

Our programs can also be successfully integrated into learning areas such as Physical Education, Health, Design & Technology and English.

We are able to emphasise various learning areas in each of our programs to meet individual class requirements.

There are two modes of delivery for BioLAB’s programs, onsite visits to our state of the art facility and outreach visits to your school – including physical visits and online programs.

All programs at BioLAB deliver cutting edge, engaging educational content and integrate the use of the latest ICT and AV technologies.

We offer full and half day program experiences which can encompass one or more of the programs you see in this information package.

Get your lab coat and goggles on because this activity introduces students to basic lab skills and cutting edge research laboratory equipment.

We take students on an adventure into the human body looking at a number of important components such as the skeletal, muscular and nervous systems, cells and DNA.

Students work in small groups with mentors to perform chemistry experiments, problem solve and utilise scientific technology, such as microscopes, micropipettes, 3D models and iPads.

**KEY THEMES:** Body systems, biology, chemistry, working scientifically, science inquiry skills, science as a human endeavour, data collection and analysis, units of measurement.

**SUITABLE FOR:** Years 5–8

**PROGRAM DURATION:** 2 hrs

**MAX CLASS SIZE:** 28

**SKIN DEEP**

Skin Deep introduces the body’s largest organ and the role it plays in controlling body temperature. Students gain a deeper understanding of the structure and function of skin, including variations in thickness, skin mass and body temperature. They also investigate the effect that exercise has on body temperature using our physiological sensors and data loggers.

Students use science inquiry skills; observation, questioning, predicting and inferring, to create an experiment which helps demonstrate how advances in technology can benefit athletes in controlling body temperature. They discover how these materials can improve human performance by directing blood flow to where it is needed the most.

**KEY THEMES:** Body systems, working scientifically, science inquiry skills, science as a human endeavour, data collection and analysis.

**SUITABLE FOR:** Years 5–8

**PROGRAM DURATION:** 2 hrs

**MAX CLASS SIZE:** 28

“OUR TALENTED & EXPERIENCED STAFF ARE LOOKING FORWARD TO MEETING YOU!”
The human body is capable of many things and we are constantly pushing its limits. This activity looks at the concepts of sporting performance and the way in which an athlete can improve.

Students are introduced to the basic chemistry and biology of the human body challenging them to investigate some mystery athletes.

Students and teachers work in small groups with mentors and independently report their results to our scientific delegation.

This program is also a great introduction to drug and alcohol education and discusses a number of relevant issues in sport and society.

**KEY THEMES:** Biology, chemistry, scientific method, sport and society, scientific communication.

**SUITABLE FOR:** Year 5-6

**PROGRAM DURATION:** 2 hrs

**MAX CLASS SIZE:** 28

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The Brain is the most amazing computer and it's inside us!

Brain Matters explores the anatomy and function of the human brain using technology to experiment and learn more about brain function.

Students apply their knowledge to functionally test each part of the brain. They explore and answer questions, manipulate materials, and test ideas.

Students use technology to conduct a number of experiments to explore reaction time, balance, psychology and physical activities effect on brain function. Technology used includes; batik reaction timing system, timing gates, iPads and iClickers.

**KEY THEMES:** Body systems, Data collection and analysis, Central nervous system, Health and Wellness.

**SUITABLE FOR:** Year 5-6

**PROGRAM DURATION:** 2 hrs

**MAX CLASS SIZE:** 28

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A fantastic introduction to the wonders of science! This program is a science immersion experience that is designed specifically for students with special needs.

The program is designed around sensory development experiences and compliments Victorian Curriculum Foundation through to Level 2 science outcomes. We use chemistry to look at concepts such as colour change, and chemical reactions the effects of exercise on the human body.

Students are mentored by staff and Belmont High School students as part of a mentorship program.

**KEY THEMES:** Colour change, chemical reactions, number recognition, human body, communication

**SUITABLE FOR:** Special Development Schools

**PROGRAM DURATION:** 2 hrs

**MAX CLASS SIZE:** 16
THE FAST AND THE CURIOUS

Metabolic madness

SPORTS CHEMISTRY (Primary)

This program provides a hands on experience in chemical sciences and its application to everyday life.

Students put themselves in the shoes of Quality Control Testing Officers and join the BioLAB staff to solve sporting products mysteries.

Students apply their problem solving skills as they identify the main ingredients of BioLAB’s new range of sports nutrition products. They learn to critically evaluate information they see in their everyday life as consumers.

Scientific knowledge collected during the investigations is then applied to real world applications to evaluate claims and suggest improvements.

KEY THEMES: Chemical and physical change, classification of properties, fair testing, application of knowledge to real world aspects.

SUITABLE FOR: Year 5-6
PROGRAM DURATION: 2 hrs
MAX CLASS SIZE: 28

OUTREACH

PAPER PLANE SCIENCE

Did you know that Paper Plane throwing is a sport? Even the Australian Institute of Sport (AIS) has played a part in helping Australian athletes perform at the Paper Plane World Championships!

The simple art of turning a piece of paper into a paper plane is loaded with links to science, technology, engineering and maths. Students will be introduced to the principles of flight and conduct an investigation into the principles of engineering and design. They will utilise their skills in mathematics and science to test their paper plane performance.

This program is complemented by a comprehensive teacher resource which can form a STEM unit within your classroom.

KEY THEMES: Principles of flight, forces, engineering, units of measurement, averages and decimals.

SUITABLE FOR: Yr 5-6
PROGRAM DURATION: 1.5 hours
MAX CLASS SIZE: 28

OUTREACH

@ SIMONDS STADIUM

BIOCATS

Welcome to the inner sanctum of the Geelong Cats and the cutting edge science and mathematics of footy! The Geelong Cats employ a team of scientists and mathematicians to help ensure that their athletes are able to analyse and refine their performance and technique to gain the winning edge.

BioCATS is run from the Deakin Cats Community Centre at Simonds Stadium as a full day program. Students and teachers participate in dynamic scientific experiments, using problem solving, statistical analysis and observation skills to learn about the science and mathematics of football and career pathways in sport. The program also reinforces the concepts of health and wellness and the benefits that come from sports participation.

KEY THEMES: Graphing, data analysis, problem solving, nutrition, training principles, recovery methods, materials technology.

SUITABLE FOR: Year 5-6
PROGRAM DURATION: Full Day (MONDAY ONLY)
MAX CLASS SIZE: 56 (2 classes of max. 28 students)

OUTREACH

WEARABLE SPORT TECHNOLOGY

Wearable technology has made monitoring our health and well being a part of daily life. But what does all this data mean? We have class sets of wearable technology devices which allow you to complete a number of mathematical, scientific and health investigations with students.

A box of devices will be dropped off to your school and students wear them for a full day of activity. BioLAB specialists then visit your classroom to provide reports and resources to help you analyse the heart rate, energy expenditure and distance data.

This program is a wonderful way to introduce your students to data analysis using personal and class data sets, research methodologies, findings and conclusions as a scientific poster.

KEY THEMES: Physiology, energy expenditure and wearable technologies, data analysis and scientific poster development.

SUITABLE FOR: Year 6
PROGRAM DURATION: 1 day data collection, follow up BioLAB visit
MAX CLASS SIZE: 28
Are we coded for success? This program investigates the link between genetics and sporting success.

Students will use cutting edge technologies to screen athletes and maximise individual sporting success by matching genetic profiles to sports performance. The link between gene products and specialised cells will be examined as students explore the functionality of various cell types and the impact of these on sporting success.

Students will use gel electrophoresis and microscopic techniques to unlock the secrets of mystery athletes and gain a better understanding to the role our DNA plays in sporting success and injury.

**KEY THEMES:** Genetics, biotechnology, microscopy, physiology and cellular biology.

**SUITABLE FOR:** Year 7-10

**PROGRAM DURATION:** 2 hrs

**MAX CLASS SIZE:** 28

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This program utilises leading edge technologies such as ergometers, physiological sensors, iPads and our Deakin Human Performance Laboratory to explore the acute responses to exercise and the science of human performance.

Students learn experientially, immersing themselves in a range of physiological tests to look into the human body's acute response to exercise. It looks at three distinct areas of physiological measurement; cardiovascular, muscular and respiratory. Students gather their primary data and create a scientific presentation to communicate findings back to the class.

Students also take the data generated at BioLAB back into their classroom for further analysis and experimental write up.

**KEY THEMES:** Physiological responses to exercise, sport science and wearable technologies.

**SUITABLE FOR:** Year 9 - VCE Physical Education

**PROGRAM DURATION:** 2 hrs

**MAX CLASS SIZE:** 28

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The Inner Sanctum delves into the amazing world of human psychology and the relationship between mind and body.

This program introduces various methods and techniques used by sports psychologists to train elite athletes. Students utilise physiological and psychological methods to identify personality traits, monitor the stress response and collect their own performance data using our Batak reaction time and Smart Speed timing gate systems.

Students also observe professional sports psychologists and test athletes in our industry standard facilities. This program draws on research with the Victorian Institute of Sport and showcases a number of research projects, career pathways and exciting developments right here in Geelong!

**KEY THEMES:** Sport Psychology, relationship between arousal and sporting performance, Yerkes-Dodson law, personality tests, research methods and analysis of data.

**SUITABLE FOR:** Year 8 - 10

**PROGRAM DURATION:** 2 hrs

**MAX CLASS SIZE:** 28

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Athletes are always searching for the edge in their performance. We are seeing a large number of engineers, mathematicians and scientists now working exclusively in developing equipment and clothing that can assist athletes in going faster, higher, stronger.

This program looks at local surf equipment legends RipCurl and their search for the perfect wetsuit. Students get the chance to perform a number of industry tests which give them an insight into human physiology, thermal imaging, textile and fibre testing and development of cutting edge sport equipment from concept to the consumer.

This program is supported by Ripcurl and Deakin University’s Sports Design Technology team and showcases a number research projects, career pathways and exciting developments right here in Geelong!

**KEY THEMES:** Materials Technology, Engineering, Design and Research Development.

**SUITABLE FOR:** Science/STEM (Yr 9 - 10); Design & Technology; VCE Outdoor and Environmental Studies

**PROGRAM DURATION:** 4hrs Full Day/ 2 hr option

**MAX CLASS SIZE:** 28
BioLAB Sports Testing Laboratory has a number of athletes to screen and we require students to take on the role of Testing Officers! Using experimentation, analysis and communication skills we require your assistance to report back to Head Office.

This program converts our Molecular Biology Lab into a dynamic Athlete Testing Facility taking students through the process of screening athletes for performance enhancing substances.

It will introduce students to basic molecular biology, protein structure and the use of research grade equipment (Spectrophotometry) and chemistry processes.

The program also introduces a number of performance enhancing substances and their effects on the human body.

**KEY THEMES:** Biotechnology, Chemistry, Physiology, role of proteins, and graphing data

**SUITE FOR:** Year 9-10

**PROGRAM DURATION:** 2 hrs

**MAX CLASS SIZE:** 28

This program is designed to give students an insight to the applications of sport and exercise science in sporting environments. Students are hands on with state of the art equipment and technology and conduct three investigations;

- **GPS Data Analysis** - Investigating and manipulating their own GPS information including: distance, speed, heart rate and map data.
- **Elite Testing** - Analysing what VO₂ Max testing is and how it can be used to determine an athlete’s cardio-respiratory endurance.
- **Physiology Lab** - Using physiological sensors and real time data logging to investigate acute response to exercise. This investigation focuses on heart rate training zones and recovery times.

**KEY THEMES:** Physiological responses to exercise, sport science and sports testing.

**SUITE FOR:** Year 9 - 10

**PROGRAM DURATION:** Full Day (4 hours)

**MAX CLASS SIZE:** 28
Nutrients are paramount to the success of athletes and this program will highlight the depth of science that goes into numerous science nutrition products that are on the market today. After an exploration of analytical chemistry techniques, students will analyse product to verify nutrient content and then apply this information to make recommendations to athletes.

**KEY THEMES:** Spectrophotometry, Standard Curves, Sports Nutrition and Biomolecules

**SUITABLE FOR:** VCE Chemistry

**PROGRAM DURATION:** 2 hrs

**MAX CLASS SIZE:** 24

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Sprinters Gene: Profiling is a unique introduction to the concepts of genetic diversity and analysis. Students use cutting edge biotechnology tools to analyse protein and DNA samples to investigate the genotype of the ACTN3 allele (Sprinters Gene) in athletes.

**PLEASE NOTE:** This program is not run under SAC conditions and is suggested to be used as a practical laboratory experience that addresses the following content:

- Use of gel electrophoresis in sorting DNA fragments, including interpretation of gel runs.
- Techniques that apply DNA knowledge (specifically gene cloning, genetic screening and DNA profiling) including social and ethical implications and issues.

**KEY THEMES:** Biotechnology manipulation techniques, genetic diversity

**SUITABLE FOR:** VCE Biology

**PROGRAM DURATION:** 2 hrs/ can be combined with DNA Manipulation to create full day experience

**MAX CLASS SIZE:** 24

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Sprinters Gene: Gene Manipulation is an introduction to the developing issue of gene doping in athletes. Students investigate the issue by exploring the techniques and concepts used to transfer genetic material. Students use cutting edge biotechnology tools to use recombinant plasmids to transform a bacterial colony.

**PLEASE NOTE:** This program is not run under SAC conditions and is suggested to be used as a practical laboratory experience that addresses the following content:

- Genetic modification of organisms.
- Amplification of DNA using the polymerase chain reaction.
- The use of recombinant plasmids as vectors to transform bacterial cells.

**KEY THEMES:** SUITABLE FOR: VCE Biology

**PROGRAM DURATION:** 2 hours/can be combined with DNA Profiling to create full day experience

**MAX CLASS SIZE:** 24
THE FAST AND THE CURIOUS

The Fast and the Curious explores how forces affect sporting performance.

This physics-based program utilises force platforms, dynamometers, radar speed guns and timing gates to measure forces that act on students during a range of activities.

Students use their mathematical skills and a range of experiments to generate their own data for analysis back in the classroom.

Students determine the many physical elements that determine sporting performance and use their understanding of mathematical relationships (trends, ranges, means, correlations) to analyse results.

**KEY THEMES:** Forces, Energy and Mathematical analysis.

**SUITABLE FOR:** Year 7-8

**REQUIREMENTS:** Indoor Gymnasium

**PROGRAM DURATION:** 2 hrs

**MAX CLASS SIZE:** 28

WINNING EDGE

This program is designed to give students a hands-on introduction to university and research-level anatomy, physiology, and biomechanics. It's a great introduction to exercise, health, and medical science career pathways.

The Winning Edge is run from the brand new state-of-the-art School of Exercise and Nutrition Sciences at Deakin University's Waurn Ponds Campus.

Students will experience cutting-edge technologies allowing them to measure force, gait analysis, predictive VO\(_2\) max and power. They use anatomical terms and models to further investigate the human body.

**KEY THEMES:** Anatomy, Physiology, Biomechanics, Career Pathways.

**DATES:** This program runs on specific weeks in Terms 1, 2, 3.

**SUITABLE FOR:** Year 10-12 (VCE PE Units 1-4)

**PROGRAM DURATION:** 3.5 hours

**MAX CLASS SIZE:** 28

OUTREACH

MOBILE METABOLIC MADNESS

This is the outreach version of one of our most popular programs and utilises the latest in outdoor performance diagnostics equipment to perform a VO\(_2\) max field test.

Your class will compare an indirect fitness assessment (multi-stage beep test) to a direct fitness assessment VO\(_2\) max, measuring one student's aerobic capacity using the latest equipment, the Cortex Metamax 3B. This allows for the comparison of a precise measurement against a predicted result. Your class will see a live data feed of results (Oxygen consumption, CO\(_2\) production, ventilation, heart rate, RER).

Vital sign collection for all students: blood pressure, heart rate, vital capacity, and core body temperature.

**KEY THEMES:** Energy Systems, Gas Exchange, Respiratory Rate, Heart Rate, Blood Pressure, Oxygen deficit and debt, Cellular respiration and Homeostasis.

**SUITABLE FOR:** Yr 9-10 / VCE Physical Education

**PROGRAM DURATION:** 2 hrs

**REQUIREMENTS:** Indoor Gymnasium

**MAX CLASS SIZE:** 28

OUTREACH

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**KEY THEMES:** Forces, Energy and Mathematical analysis.

**SUITABLE FOR:** Year 7-8

**REQUIREMENTS:** Indoor Gymnasium

**PROGRAM DURATION:** 2 hrs

**MAX CLASS SIZE:** 28

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**PROGRAM DURATION:** 3.5 hours

**MAX CLASS SIZE:** 28

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**KEY THEMES:** Anatomy, Physiology, Biomechanics, Career Pathways.

**DATES:** This program runs on specific weeks in Terms 1, 2, 3.

**SUITABLE FOR:** Year 10-12 (VCE PE Units 1-4)

**PROGRAM DURATION:** 3.5 hours

**MAX CLASS SIZE:** 28

OUTREACH

Eye in the Sky

Eye in the Sky will expose students to cutting-edge GPS athlete tracking equipment including a real-time feedback system measuring distance, speed, and heart rate. Students will also utilise iPads for skills mapping and biomechanical analysis.

Students will analyse and generate their very own primary data sets in areas such as: work to rest ratios, movement and locomotor patterns, and skill frequencies.

This is a wonderful way to look at performance and game analysis in sport and has many applications across Physical Education, Maths, and Science.

**KEY THEMES:** Skills analysis, movement patterns, work-rest ratios, sports technology, graphing, and scientific communication.

**SUITABLE FOR:** Years 7-10; VCE Physical Education

**PROGRAM DURATION:** 2 hrs

**MAX CLASS SIZE:** 28
Helping to build teacher capacity and confidence in science and mathematics.

BioLAB aims to provide a range of events, programs and resources to teachers. We want to make it as easy as possible for teachers to build upon the experiences that they have with their students during a visit to the centre. Here are a range of teacher-focused activities that we would like you to know about!

**Teacher Resource Kits** are developed for many of our programs. The kits are provided to each of the teachers on completion of the program. We prepare these comprehensive resources to assist teachers to build upon the content of the BioLAB programs. They provide AUSVELs curriculum links, rich learning tasks, thinkers skills, and lab activities for the classroom.

**BioLAB Events and Seminars** are held throughout the year in a number of key theme areas, teachers who book into our programs will have exclusive access to our events calendar which includes relevant industry nights, conferences and information evenings.

**Teacher Professional Development** is run throughout the year at BioLAB. We have two key programs throughout the year:

- **BioBLAST** - A professional development program which aims to build teacher capacity and confidence in the teaching of science within 5 regional disadvantaged schools. If you are interested in applying for this program please contact us.

- **STEM Teachers Networks** - we host two regional teachers networks that meet twice a term. The Primary network is focused on STEM in upper primary and the Secondary network is focused on yrs 7-10 STEM. Each meeting includes professional sharing, professional development opportunities and mentoring. If you are interested in attending network meetings please contact us for further details.

**Join Madi Robinson** - Australian netballing sensation for a Meet the Athlete experience with your students!

This program provides students with real life science application and experiences in elite sport settings. Gain a first hand insight and work with Madi on athlete training, hydration, nutrition, recovery and rehabilitation. Madi brings a wonderful dynamic to this program with her teaching background and her personal experience using science as an elite athlete.

The program covers the following areas: nutritional requirements, hydration analysis, glucose testing, electrolyte balance, exercise, recovery and rehabilitation methods.

**KEY THEMES:** Science of nutrition, hydration and recovery.

**SUITEABLE FOR:** Years 7-10, VCE Physical Education

**PROGRAM DURATON:** 2 hours

**MAX CLASS SIZE:** 28

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Wearable technology has made monitoring our health and well being a part of daily life. But what does all this data mean?

We have class sets of wearable technology devices which allow you to complete a number of mathematical, scientific and health investigations with students. A box of devices will be dropped off to your school and students wear them for a full day of activity. BioLAB specialists then visit your classroom to provide reports and resources to help you analyse the heart rate, energy expenditure and distance data.

This program is a wonderful way to introduce your students to data analysis using personal and class data sets, research methodologies, findings and conclusions as a scientific poster.

**KEY THEMES:** Physiology, Energy expenditure and Wearable technologies, Data analysis and Scientific poster development.

**SUITEABLE FOR:** Year 7 - 10

**PROGRAM DURATION:** 1 day data collection, follow up BioLAB visit

**MAX CLASS SIZE:** 28

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Wearable sport technology

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**WEARABLE SPORT TECHNOLOGY**

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