



SUSTAINABLE
FUTURES
ISSF 2023
QA_{SM}T
BRISBANE

Participant Event Guide

International Students Science Fair 2023

4 - 8 December
Brisbane, Australia

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SMT

Queensland Academy
for Science Mathematics
and Technology



THE UNIVERSITY
OF QUEENSLAND
AUSTRALIA

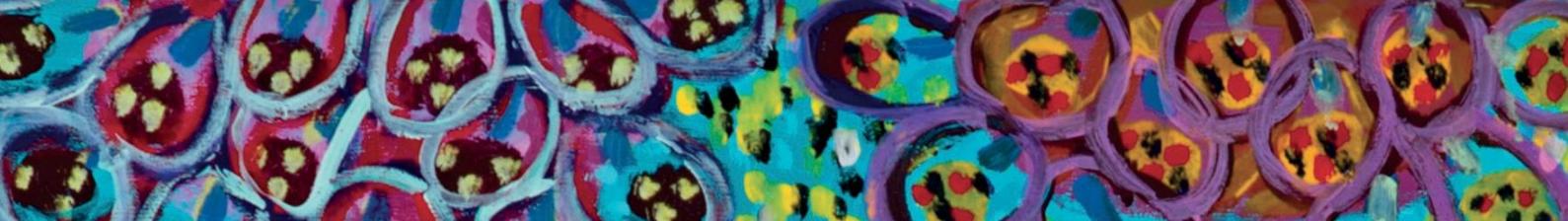
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FOR SCHOOLS



Queensland
Government

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Acknowledgement of Country

QASMT acknowledges the traditional Owners of the land where we gather for ISSF 2023 and pay our respects to Elders past, present and emerging. We recognise their custodianship and role in caring for and maintaining Country over thousands of years; and their continuing connection to lands, waters and communities. We value the contributions and sophistication of First Nations knowledges to the field of Science.



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Artist biography



Josiah Omeenyo is from Lockhart River Queensland Australia and is a member of the Lockhart River Artists group. Josiah is well known for his coral reef themed paintings using spectacular colour combinations. He is not the only artist in his family, his mother and aunty are also involved with the Lockhart River artists. He uses paint on canvas and linen to share his stories with the world.

Notice of Custodial Interest of the Lockhart River Community: *"This image embodies traditional ritual knowledge of the Lockhart River community in Queensland as painted by the artist. Dealing with any part of the images for any purpose that has not been authorised by the artist Josiah Omeenyo, a traditional landowner himself, is a serious breach of the customary laws of the Lockhart River community."*

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Coral Beds Down Under by Josiah Omeenyo



Principal Kath Kayrooz

Message from the Principal, Queensland Academy for Science Mathematics and Technology

It is my great pleasure to welcome you all to the 19th International Student Science Fair (ISSF) hosted at the Queensland Academy for Science Mathematics and Technology. This event is a celebration of the achievements and hard work of students from around the world who have dedicated themselves to scientific inquiry and discovery.

The ISSF is a prestigious event that brings together young aspiring scientists to showcase their innovative research projects and compete for recognition and awards. It serves as a platform for talented students to exchange ideas, collaborate, and demonstrate their scientific prowess on an international stage.

At QASMT, we offer a rigorous academic program designed to challenge and engage students with a strong interest and aptitude in STEM (Science, Technology, Engineering, and Mathematics) subjects. We foster a passion for scientific inquiry, critical thinking, problem-solving, and innovation among our students.

QASMT provides a range of advanced courses and enrichment programs, including subjects such as physics, chemistry, biology, mathematics, computer science, and engineering. The curriculum is designed to meet the needs of high-achieving students and prepare them for tertiary studies in STEM fields.

In addition to the academic curriculum, QASMT places great emphasis on research and inquiry-based learning. Students have opportunities to engage in independent research projects, participate in scientific competitions, and collaborate with industry and university partners. The school also encourages students to develop their leadership skills and engage in community service.

The ISSF 2023 seeks to focus our collective attention on six (6) of the 17 United Nations (UN) 'Sustainable Development Goals' (SDGs), specifically, goals 7, 11, 12, 13 14 and 15. These goals aim to address various global challenges and promote sustainable development.

Over the course of the next few days, we will have the opportunity to witness the results of countless hours of research, experimentation, and analysis, as students present their projects aligned with one or more of these goals, under our overarching theme of Sustainable Futures. From biology to physics, from engineering to computer science, we will be amazed by the breadth and depth of knowledge and innovation on display.

We are honoured to host this event, and we are grateful to all the participants, teachers, and judges for their contributions. We believe that this fair represents a unique opportunity for students to showcase their talents, learn from one another, and engage in meaningful dialogue with experts in their fields.

We wish you all a productive and inspiring experience at the International Student Science Fair 2023, and we look forward to witnessing the future of science and technology unfold before our eyes.

Thank you,
Kath Kayrooz



Professor Doune Macdonald

Message from the Pro-Vice-Chancellor (Teaching and Learning), The University of Queensland

It is with immense pleasure that I extend my warmest welcome to all participants, educators and esteemed guests of the International Student Science Fair (ISSF) 2023. The University of Queensland is proud to collaborate with the Queensland Academy for Science Mathematics and Technology to host this extraordinary event.

As we gather on the picturesque campus of UQ St Lucia, we acknowledge the Traditional Owners of this Land, where teaching and learning have occurred for tens of thousands of years. We all have a part to play in reconciliation, in caring for our environment and our colleagues, and I hope you develop a sense of connection to the places you visit and people you meet during your stay.

The ISSF 2023 epitomises inquiry, exploration, and intellectual camaraderie, which together define the realm of scientific endeavour. During this year's Fair, participants will have the opportunity to engage in workshops with UQ's Faculty of Science and Faculty of Engineering, Architecture and Information Technology. These transformative experiences promise to equip you with skills and insights that stretch your horizons.

To the teachers and principals accompanying our young scholars, your guidance and mentorship are invaluable components of this shared journey. We thank you for guiding the next generation of scientific leaders and enriching the future of science.

As we celebrate ISSF2023, let us embrace the collaborative energy that propels scientific progress. May this event ignite an enduring passion for knowledge within each participant, and may the friendships forged and ideas exchanged become the cornerstones of future collaborations.

Welcome to The University of Queensland, welcome to ISSF2023, and welcome to a world where you can Own the Unknown.

Warm regards,
Professor Doune Macdonald

ISSN Message from Bob Adamson (Canada)



In 2005 a small group of forward-thinking Science and Mathematics school leaders imagined an organization that would formally bring together like-minded educators and learners from around the globe. The vision for this network of STEM schools and leaders would involve the planning and hosting of an annual International Student Science Fair (ISSF). The ISSF would provide a platform for students and teachers from around the world to engage in a shared, innovative learning journey. The hope was that this non-competitive event would not only impact the learning of their students and teachers but would be a showcase for global collaboration for high school students that mirrored the scientific community.

The global leaders, instrumental in laying the foundation for the International Science School Network, (ISSN) were led by Mahidol Wittayanusorn School Thailand, Australian Math and Science School Australia, Ritsumeikan Junior and Senior School Japan, and the Korea Science Academy of KAIST

The initial challenge was to find schools from all regions of the world to share in a learning journey that would establish a diverse network to provide a global perspective on current issues and scientific challenges. Network schools would also be expected to assume a leadership role in the promotion of STEM in their home countries and regions. As a result, the network grew and the contributions of new partner schools from Indonesia, Malaysia, Iran, India, the Philippines, Singapore, China, Canada, USA, England, Russia and Kenya expanded the vision. With the successes of the ISSF over the first nine years, the next step was in the formation of an International Science Schools Network (ISSN). This bold step in forming the International Science Schools Network was formalized in our tenth ISSF hosted by the then Moscow Chemical Lyceum.

The network would expand the goal of hosting an annual ISSF to one that would work throughout the year to:

- Promote and host regional STEM learning for non-network schools
- Engage ISSN schools in collaborative student research between schools
- Provide for student and teacher exchanges
- Offer in-person and on-line learning for students and educators

Further expansion of the network has seen schools from Mongolia and the Netherlands formally join the network as well as additional new schools from member countries. We now have a network of over 28 schools that comprise the ISSN as well as many schools that have joined various events hosted by schools in their regions. Some of these schools have begun the process of membership application while others work within their community to keep the vision alive. The Queensland Academy for Science Mathematics and Technology ISSF 2023 and the significant list of participating countries is a testament to the success and global reach of the bold vision of four schools from four countries in 2005.

My personal journey with the ISSF began in 2006 while attending an event hosted by the Australian Science and Mathematics School. It was there that I was introduced to Mr. Hiroshi Tanaka from Ritsumeikan High School and with that a great friendship and learning journey began. This learning journey has significantly impacted me both when I was a STEM Director at Fort Richmond Collegiate and Pembina Trails School Division as well as in my current role as the Chair of a National Education Foundation that focuses on Food and Water Security. That initial opportunity to engage in reflective conversations with colleagues from Australia and Japan supported many of my professional beliefs but also motivated me to grow my understanding of best practices that would further support student and teacher learning.

I want to highlight the profound impact the ISSN has had on Fort Richmond Collegiate. I have had the privilege to work with the students and staff and see how the science department has created and continues to grow the opportunities that students need to be scientifically literate and responsible in the 21st Century. Fort Richmond Collegiate strives to be an exemplary learning community that has attended all the ISSF events, hosts a regional summit for local schools, supports student and teacher exchanges while engaging students in authentic and meaningful research.

However, the journey is not complete. Both Fort Richmond Collegiate and all schools in the ISSN are on an important pathway that needs to continue and evolve as a model for all educational learning communities around the world. Regards and I am wishing for a successful ISSF 2023 for all participants. The experiences one will engage in over the five days will have a profound impact on your future endeavours.

Bob Adamson (Canada)

INTERNATIONAL SCIENCE SCHOOLS NETWORK (ISSN)



ISSN

The ISSN was created by the schools that have been involved in organising, leading and promoting the renowned International Student Science Fair (ISSF) since 2005. The ISSN was proposed and agreed by schools at the ISSF in Moscow in 2014.

The purpose of the ISSN is to establish an identity as a collaborative and influential body of schools that speaks clearly to a wide range of audiences about the nature, purpose and significance of the network and its capacity to be a forum in promoting leading edge science education on a global scale. We define 'science' as including science, mathematics and technologies.

MISSION

The goals of the International Science Schools Network are to:

- engage students with an understanding of the significant global issues in science
- empower students to meet significant social challenges from the perspective of global scientific collaboration
- enable students to explore science as human endeavour; Inspire students to take action to address the important global issues of our time
- build a global community of young scientists empowered to use their scientific knowledge and understanding in a purposeful and ethical manner
- prepare young people to be the future science leaders of our world
- connect young scientists with leading science researchers and practitioners around the world
- model the way real scientists work in the global community
- promote inclusive STEM education by supporting schools to participate in the work of the International Science Schools Network, in partnership with appropriate organisations.

VALUES

The values of the International Science Schools Network are:

- **Respect:** for the cultural diversity, values, traditions, beliefs and expertise brought to the ISSN by each member school
- **Collaboration:** in good faith, with all partner schools, we share our expertise, ideas and, where appropriate, resources, for the benefit of all our students and the promotion of excellence in science awareness and education more globally
- **Support:** for each member school, to allow opportunities which might otherwise be inaccessible
- **Sense of community:** built to allow us to have a reasoned and credible voice for the purpose of the continued advancement of science and science education across the world.



ABOUT ISSF 2023

This year the International Schools Science Fair 2023 (ISSF 2023) is being conducted in Brisbane, Australia.

Fair Theme: Sustainable Futures

The ISSF 2023 theme, Sustainable Futures, seeks to draw focus to the World's most pressing issues, as highlighted by the United Nations. The 2023 Global Sustainability Development Report highlights the urgent need for accelerated action to occur in actioning the **Sustainable Development Goals (SDGs)** as we head towards the 2030 target. The report recognises the powerful role science plays in supporting the development of practical solutions. United Nations, Department of Economic and Social Affairs (Sustainable Development, 2023)

ISSF 2023 seeks to focus our collective attention on the key sustainability issues highlighted by the SDG, with a particular focus on **Goals 7, 11, 12, 13 14 and 15**. To this end, schools have aligned their student research presentations to one or more of these goals, under our overarching theme of **Sustainable Futures**.



The fair has six sub-themes:

- Robotics and technology
- Biology and molecular biosciences
- Earth and environmental science
- Physics and engineering
- Computing and mathematics
- Chemistry and nanoscience

Student oral and poster research projects have been categorised and organised under these six sub-themes for presentation.

Poster presentations: On Day 1, presenters will have the opportunity to discuss their research posters with other participants and invited guests, including the judging panel.

Oral presentations: On Day 2, presenters will have 10-minutes to share their research, followed by 5-minutes of 'question and answer' with University of Queensland researchers and other experienced educators. Student research-project abstracts can be found at the end of this document.

THIS IS A NET ZERO EVENT



ISSF 2023 is a Net Zero event!

QASMT students are working on the calculation and analysis of the carbon emissions across the areas of local transportation, venue usage, excursions, catering and accommodation. As a result, our students have gained a deeper understanding of the environmental impact of their activities and the importance of adopting sustainable practices. These actions are being undertaken with the assistance of the **Zero Positive for Schools** initiative.

The focus on Net Zero aligns with the ISSF 203 goal of promoting sustainability and creating a generation of environmentally conscious global citizens. This approach not only educates our students about carbon emissions, but also fosters a sense of responsibility and encourages them to become advocates for change; both during the science fair and in their daily lives. By raising awareness and instilling a mindful approach to the Net Zero journey, the International Students Science Fair 2023 aims to create a positive and lasting impact on students and the wider scientific community.

FIVE AREAS OF FOCUS



ACCOMODATION

Conduct a comprehensive analysis of carbon emissions associated with St. Leo's accommodation needs, as well as any additional accommodation requirements.



EXCURSIONS

Undertake an emissions assessment for excursions beyond designated fair venues and encourage sustainable planning (e.g., minimizing distances, low-emission transportation).



TRANSPORT

Calculate local transportation emissions from participants' arrival at Brisbane Airport to their departure including transportation, venues and excursions.



VENUE

Evaluate the carbon footprint of the QASMT and UQ venues, taking into account factors such as energy usage, waste management practices, and overall sustainability



measures.

CATERIN G

Evaluate catering's carbon emissions in food production, transportation, and waste.

Prioritize sustainable sourcing, minimize food waste, and use only eco-friendly packaging.

ISSF 2023 PARTICIPANTS



Australian Science and Mathematics School, Australia



Ms Kylie Eggers
Dr Matt Verdon
Ms Maryann Doolette
Vicky Lee
Sofia Obradovic



Darwin High School, Australia

Mr Nick Ergos
Ms Sophie McConnell
Rangchak Tripura
Vincent Mondol
Niyaz Hasan



John Monash Science School, Australia



Mr Peter Corkill
Mr Shane McLean
Ms Fiona Bui
Mishanya Romadinov
Raghav Zutshi
Aidan Rhys Fernandes



Queensland Academy for Science Mathematics and Technology, Australia

Ms Kath Kayrooz
Ms Tanya Haggarty
Dr Kirsten Hogg
Daniel D'Souza
Lucas Lim
Rachel Rabuya



Preah Sisowath High School, New Generation School, Cambodia



Mr Sam Kamsann
Mr Huot Seanghay
Chan Daravatey
Thong Pagnatepy
Heng Chan Mongkul



Fort Richmond Collegiate, Canada

Mr Jon Manness
Mr Bob Adamson
Ms Jennifer Piasecki
Leonardo Zhao
Tony Wang





**Experimental School of
Beihang University, China**

Mr Wei Du
Wang Borui
Liu Zhixuan
Yang Yilin



**Budi Mulia Dua International
High School, Indonesia**

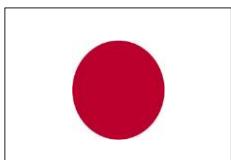


Mr Tri Widaryanto
Ms Lia Yuniarji
Queena Calya Rabbanee Wibowo
Selaksa Alun Samudra
Sabila Ramadhan Putriku Calita

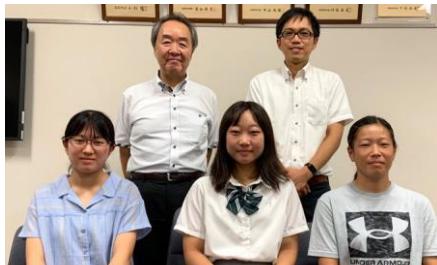


**Ritsumeikan High School,
Japan**

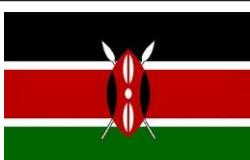
Mr Yashiro Higashitani
Mr Hiroshi Tanaka
Ms Natsuki Kasamaki
Ryo Imaizumi
Haruho Yamaguchi
Yuto Inoue



**Tokyo Tech High School of
Science and Technology, Japan**



Dr Shigeki Nakagawa
Mr Shunsuke Shibanuma
Ayaka Takema
Yui Takeyasu
Sachina Watanuki



Ms Gurkiran Chana
Charlotte Achieng Okome
Justin Martin Mengich Koross
Eric Ochola Ouma



Brookhouse School, Kenya



**New Beginning International
School of Mongolia, Mongolia**



Ms Oyungerel Natsagdorj
Mr Munkh-Ochir Urtsaikhan
Tanan Mungunchuluun
Bolormaa Luvsandorj
Anar Nergui



St-Odulphuslyceum,
Netherlands



Mr Jeroen Zeeuwen
Mr Niels Hesselberth
Romy Burger
Sophie Verhagen
Jente Nefkens



Mr Alejandro Jose Tuazon
Alex Andal
Salvador Recio
Martin Lopez



Philippine Science High School
Main Campus, Philippines



Dr Jongbae Choi
Mr Zae Young Ghim
Seongmin Hong
Jiwoo Hong

Korea Science Academy of
KAIST, Korea



Ms Elena Germanovich
Timur Akhmedov
Viktoria Dragun



Moscow South-Eastern School
named after V.I. Chuikov,
Russia



Mrs Lucy Toh
Mr Arthur Goh
Kaixin Qiang
Isabelle Ang
Wan Ying Lim

National Junior College,
Singapore



Ms Phebee Ng
Ananya Nallapuraju
Prannaya Gupta
Lim Teck Kong



NUS High School of
Mathematics and Science,
Singapore



School of Science and Technology, Singapore



Mr Nick Chan
Mr Hoe Teck Tan
Chan Yi Qian
Colin Lee Zheng Ting
Aathithya Jegatheesan



Mrs Pornprom Chaichatpornsuk
Mr Komed Nachaeng
Yasintorn Poonyawanich
Weerawin Vaitoonkiat
Tanyapat Triwitayakorn



Chulalongkorn University Demonstration Secondary School, Thailand



Prof Boonchoat Paosawatyanyong
Dr Janjira Maneesan
Chananrat Tiranumpongvanich
Virakarn Boonfahpratan

Kamnoetvidya Science Academy (KVIS), Thailand



Dr Worawarong Rakreungdet
Dr Kiattipoom Rodpun
Nicharee Chaisamritpol
Nutch Chaisamritpol
Ananya Chaiyanopakul



Mahidol Wittayanusorn School, Thailand



Dr Ramazan Bayar
Ms Racheal Ainembabazi
Shawna Amihere
Arianne Diku
Selihom Yohannees

Galaxy International School Uganda, Uganda



Mrs Emma Haase
Mr Wayne Riley
Daniel Bruton
Jamie Gore



Camborne Science & International Academy, United Kingdom





**Illinois Mathematics and
Science Academy, United
States of America**



Mr Brian Trainor
Divya Brahmbhatt
Joshua Lee



**Lewiston-Porter, United States
of America**

Mr Christopher D'Anna
Mr James Wanamaker
Dom Tracy
Hope Parkhill-Wylie
Matthew Long



**West Aurora High School,
United States of America**



Mr David Allen
Ms Sandy Scott
Caroline Escobedo
Yaretzi Guerrero
Zubeir Noorani



QASMT BUDDY ALLOCATIONS

PARTICIPATING SCHOOL	QASMT BUDDY
Australian Science and Mathematics School, Australia	Xiaoya Xu
Darwin High School, Australia	Jenny Pham
John Monash Science School, Australia	Anika Gupta
Queensland Academy for Science Mathematics and Technology, Australia	Claire Kong
Preah Sisowath High School, New Generation School, Cambodia	Saanvi Putchakayala
Fort Richmond Collegiate, Canada	Nerissa Do
Experimental School of Beihang University, China	Jasmine Peng
Budi Mulia Dua International High School, Indonesia	Mido He
Ritsumeikan High School, Japan	Emma Liang-Godber
Tokyo Tech High School of Science and Technology, Japan	Jyothika Cheerath
Brookhouse School, Kenya	Raelyn Liang
New Beginning International School of Mongolia, Mongolia	Heidie Palade
St-Odulphuslyceum, Netherlands	Iris Landy
Philippine Science High School Main Campus, Phillipines	Jade Zhou
Korea Science Academy of KAIST, South Korea	Yuri Son
Moscow South-Eastern School named after V.I. Chuikov, Russia	Lawrence Yu
National Junior College, Singapore	Sejal Gupta
NUS High School of Mathematics and Science, Singapore	Liam Place
School of Science and Technology, Singapore	Kelvin Chan
Chulalongkorn University Demonstration Secondary School, Thailand	Arash Hashhmi
Kamnoetvidya Science Academy, Thailand	Mary Do
Mahidol Wittayanusorn School, Thailand	Jiwoo Seo
Galaxy International School, Uganda	Arjun Prasanth
Camborne Science & International Academy, UK	Sera Chatha
Illinois Mathematics and Science Academy, USA	Stanley Wang
Lewiston-Porter, USA	Aaron Wei
West Aurora High School, USA	Sana Shah

ISSF 2023 Guidelines for students

General Expectations:

- Please wear enclosed footwear at all times (except when visiting the beach)
- Be sun-safe! Hats, sunscreen, covered shoulders and appropriate clothing to be worn at all times
- Please ensure you place all rubbish in the bins provided
- Please ensure you follow the instructions provided to you by your teachers and do not leave the venue or accommodation at any time, except under the accompaniment of a supervising adult

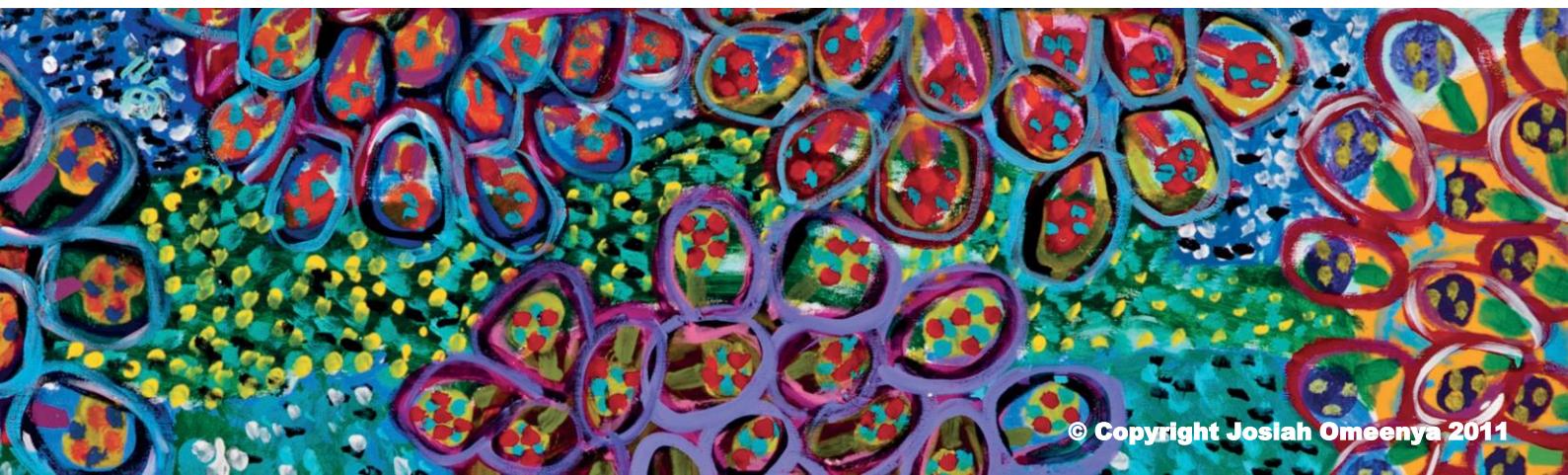
Accommodation Expectations:

- Keep accommodation tidy and clear of obstacles in walkways. Care of accommodation is every student's responsibility
- Do not move the beds or remove mattress or mattress protector from beds
- Please do not jump on beds
- Report to your teacher or supervisor immediately, anything that you find that isn't working correctly or is broken
- Keep showering time to a minimum to save water and allow others time to shower
- Keep all fire exits clear
- Please do not eat or drink in the accommodation
- Be sure to check in each night with your block supervisor before bed and remain in your accommodation block until breakfast in the morning

Student Code of Conduct

Students are expected to abide by the following expectations of behaviour and conduct during ISSF 2023. If a student does not abide by the Code of Conduct, disciplinary action will be taken in association with the visiting school.

- Safe, responsible behaviour is to be shown at all times
- Students are to be punctual for all activities and willing to participate
- No student is allowed to go into an accommodation room that is not their own
- Students are not to leave the accommodation or venue at any time
- Obscene or offensive language is not to be used
- Other people's property should not be touched or interfered with in any way
- Students are to show respect for members of the public at all times
- Treat all persons with courtesy and respect, and value their contributions
- Chewing gum is not permitted
- Drugs, cigarettes, vapes or alcohol are NOT permitted at all times
- Dangerous weapons are NOT permitted



KEY TO UNDERSTANDING YOUR WORKSHOP, EXCURSION, PRESENTATION, BUS AND ACCOMODATION ALLOCATIONS

PARTICIPATING SCHOOLS



Australian Science and Mathematics School
Adelaide, South Australia, Australia



Attending principal: Ms Kylie Eggers (Principal) / Dr Matt Verdon (Deputy Principal)

	STEM Workshop	Poster Presentation	UQ Group Tour	Cultural Performance	Oral Presentation	Excursion	Travel Bus
Teacher							
Ms Maryann Doolittle			One			2 GREEN	BUS 3
Students							
Vicky Lee	W5	PE02	One		PE02	1 RED	BUS 3
Sofia Obradovic	W5	PE02	One		PE02	2 GREEN	BUS 3
Buddy							
Xiaoya Xu	Absent		One			1 RED	BUS 3



Darwin High School
Darwin, Northern Territory, Australia



Attending principal: Mr Nick Ergos (Assistant Principal)

	STEM Workshop	Poster Presentation	UQ Group Tour	Cultural Performance	Oral Presentation	Excursion	Travel Bus
Teacher							
Ms Sophie McConnell			One			2 GREEN	BUS 3
Students							
Rangchak Tripura	W2	EES08	One		EES08	2 GREEN	BUS 3
Vincent Mondol	W2	EES08	One		EES08	2 GREEN	BUS 3
Niyaz Hasan	W2	EES08	One		EES08	2 GREEN	BUS 3
Buddy							
Jenny Pham	W2		One			2 GREEN	BUS 3



**Queensland Academy of Science
Mathematics and Technology**
Brisbane, Queensland, Australia



Attending principal: Ms Kath Kayrooz (Principal) / Ms Tanya Haggarty (Associate Principal)

	STEM Workshop	Poster Presentation	UQ Group Tour	Cultural Performance	Oral Presentation	Excursion	Travel Bus
Teacher							
Dr Kirsten Hogg			One			3 BLUE	BUS 2
Students							
Lucas Lim	W7	BMB01	One	ACT 1	BMB01	3 BLUE	BUS 2
Rachel Rabuya	W7	BMB01	One	ACT 1	BMB01	3 BLUE	BUS 2
Daniel D'Souza	W7	BMB01	One	ACT 1	BMB01	3 BLUE	BUS 2
Buddy							
Claire Kong	W7		One			3 BLUE	BUS 2
QASMT Support Students							
	STEM Workshop	Poster Presentation	UQ Group Tour	Cultural Performance	Oral Presentation	Excursion	Travel Bus
Students							
Eesha Shaarma	W3		Two			1 RED	BUS 1
Patipoon Foongkajornkiat	W4		Two			1 RED	BUS 1
Akash Ra-chaa	W5		Two			2 GREEN	BUS 3
Minah Kim	W1		Two			2 GREEN	BUS 3
Sophia Clark	Absent		Three			2 GREEN	BUS 3
Mialana Plekhanova	W2		Three			4 PURPLE	BUS 3
Gabriel Pavilion	N/A		Three			5 PINK	BUS 3
Joy Chen	N/A		Two			5 PINK	BUS 3
Abby Hatchell	N/A		Two			5 PINK	BUS 3
Japneet Kaur	W6		Two			4 PURPLE	BUS 1
Shivani Singh	W1		Three			5 PINK	BUS 1



Attending principal: Mr Peter Corkill (Principal) / Mr Shane McLean

	STEM Workshop	Poster Presentation	UQ Group Tour	Cultural Performance	Oral Presentation	Excursion	Travel Bus
Teacher							
Ms Fiona Bui			One			2 GREEN	BUS 3
Students							
Aidan Rhys Fernandes	W6	EES06	One		PE02	2 GREEN	BUS 3
Raghav Zutshi	W6	CM02	One		CM02	2 GREEN	BUS 3
Mishanya Romadinov	W7	CM02	One		CM02	3 BLUE	BUS 3
Buddy							
Anika Gupta	W1		One			2 GREEN	BUS 3



**Preah Sisowath High School,
New Generation School**
Phnom Penn, Cambodia



Attending principal: Sam Kamsann (Vice Principal)

	STEM Workshop	Poster Presentation	UQ Group Tour	Cultural Performance	Oral Presentation	Excursion	Travel Bus
Teacher							
Mr Huot Seanghay			Two			5 PINK	BUS 1
Students							
Chan Daravatey	W5	RT01	Two	ACT 9	RT01	5 PINK	BUS 1
Heng Chanmongkul	W5	RT01	Two	ACT 9	RT01	5 PINK	BUS 1
Thong Pagnatepy	W6	RT01	Two	ACT 9	RT01	1 RED	BUS 1
Buddy							
Saanvi Putchakayala	W5		Two			1 RED	BUS 1



Fort Richmond Collegiate
Winnipeg, Manitoba, Canada



Attending principal: Mr Jon Mannes (Vice Principal), Bob Adamson (ISSN)

	STEM Workshop	Poster Presentation	UQ Group Tour	Cultural Performance	Oral Presentation	Excursion	Travel Bus
Teacher							
Ms Jennifer Piasecki			Two			3 BLUE	BUS 2
Students							
Leonardo Zhao	W7	EES07	Two	ACT 4	EES07	3 BLUE	BUS 2
Tony Wang	W7	EES07	Two	ACT 4	EES07	3 BLUE	BUS 2
Buddy							
Nerissa Do	W1		Two			3 BLUE	BUS 2



Experimental School of Beihang University

Xicheng District, Beijing, China



Attending principal: Not attending

	STEM Workshop	Poster Presentation	UQ Group Tour	Cultural Performance	Oral Presentation	Excursion	Travel Bus
Teacher							
Mr Wei Du			Two			5 PINK	BUS 1
Students							
Wang Borui	W1	CN05	Two	ACT 12	CN05	5 PINK	BUS 1
Liu Zhixuan	W1	CM03	Two	ACT 12	CM03	5 PINK	BUS 1
Yang Yilin	W1	BMB04	Two	ACT 12	BMB04	5 PINK	BUS 1
Buddy							
Jasmine Peng	W3		Two			5 PINK	BUS 1



Budi Mulia Dua International High School
Sleman Regency, Special Region of Yogyakarta, Indonesia



Attending principal: Mr Tri Widaryanto (Principal)

	STEM Workshop	Poster Presentation	UQ Group Tour	Cultural Performance	Oral Presentation	Excursion	Travel Bus
Teacher							
Ms Lia Yuniarti			Two			5 PINK	BUS 1
Students							
Queena Calya Rabbanee Wibowo	W2	CN07	Two	ACT14	CN07	1 RED	BUS 1
Selaksa Alun Samudra	W2	CN07	Two	ACT14	CN07	5 PINK	BUS 1
Sabila Ramadhan Putriku Calita	W2	CN07	Two	ACT14	CN07	3 BLUE	BUS 1
Buddy							
Mido He	W2		Two			5 PINK	BUS 1



Ritsumeikan High School
Choshi Nagaokakyō City, Kyoto, Japan



Attending principal: Mr Yasuhiro Higashitani (Principal); Mr Hiroshi Tanaka (Former Principal)

	STEM Workshop	Poster Presentation	UQ Group Tour	Cultural Performance	Oral Presentation	Excursion	Travel Bus
Teacher							
Ms Natsuki Kasamaki			Three			4 PURPLE	BUS 2
Students							
Ryo Imaizumi	W5	CM04	Three	ACT 7	CM04	4 PURPLE	BUS 2
Haruho Yamaguchi	W2		Three	ACT 7		3 BLUE	BUS 2
Yuto Inoue	W5	BMB06	Three	ACT 7	BMB06	3 BLUE	BUS 2
Buddy							
Emma Liang-Godber	W5		Three			3 BLUE	BUS 2



**Tokyo Tech High School of
Science and Technology**
Minato City, Tokyo, Japan



Attending principal: Dr Shigeki Nakagawa (Principal)

	STEM Workshop	Poster Presentation	UQ Group Tour	Cultural Performance	Oral Presentation	Excursion	Travel Bus
Teacher							
Mr Shunsuke Shibanuma			Three			3 BLUE	BUS 2
Students							
Ayaka Takema	W3	CN01	Three	ACT 7	CN01	3 BLUE	BUS 2
Yui Takeyasu	W3	CN01	Three	ACT 7	CN01	3 BLUE	BUS 2
Sachina Watanuki	W3	CN01	Three	ACT 7	CN01	1 RED	BUS 2
Buddy							
Jyothika Cheerath	W3		Three			1 RED	BUS 2



Brookhouse School
Nairobi, Kenya



Attending principal: Not attending

	STEM Workshop	Poster Presentation	UQ Group Tour	Cultural Performance	Oral Presentation	Excursion	Travel Bus
Teacher							
Ms Gurkiran Chana			Three			1 RED	BUS 1
Students							
Charlotte Achieng Okome	Absent	Absent	Three	ACT 15	BMB05	1 RED	BUS 1
Justin Martin Mengich Koross	Absent	Absent	Three	ACT 15	BMB05	1 RED	BUS 1
Eric Ochola Ouma	Absent	Absent	Three	ACT 15	BMB05	5 PINK	BUS 1
Buddy							
Raelyn Liang	W2		Three			1 RED	BUS 1



New Beginning International School of Mongolia

Ulan Bator, Mongolia



Attending principal: Ms Oyungerel Natsagdorj (Principal)

	STEM Workshop	Poster Presentation	UQ Group Tour	Cultural Performance	Oral Presentation	Excursion	Travel Bus
Teacher							
Mr Munkh-Ochir Urtsaikhan			Four			3 BLUE	BUS 3
Students							
Tanan Mungunchuluun	W7	EES05	Four	ACT 13	EES05	3 BLUE	BUS 3
Bolormaa Luvsandorj	W6	EES05	Four	ACT 13	EES05	3 BLUE	BUS 3
Anar Nergui	W7	EES05	Four	ACT 13		3 BLUE	BUS 3
Buddy							
Heidie Palade	W5		Four			3 BLUE	BUS 3



St-Odulphuslyceum

Tilburg, Netherlands



Attending principal: Mr Jeroen Zeeuwen (Principal)

	STEM Workshop	Poster Presentation	UQ Group Tour	Cultural Performance	Oral Presentation	Excursion	Travel Bus
Teacher							
Mr Niels Hesselberth			Four			3 BLUE	BUS 3
Students							
Romy Burger	W6	PE03	Four	ACT 2	PE03	3 BLUE	BUS 3
Sophie Verhagen	W6	PE03	Four	ACT 2	PE03	3 BLUE	BUS 3
Jente Nefkens	W6	PE03	Four	ACT 2	PE03	3 BLUE	BUS 3
Buddy							
Iris Landy	W6		Four			3 BLUE	BUS 3



**Philippine Science High School
Main Campus**
Quezon City, Metro Manila, Philippines



Attending principal: Dr Lawrence Madriaga (Campus Director)

	STEM Workshop	Poster Presentation	UQ Group Tour	Cultural Performance	Oral Presentation	Excursion	Travel Bus
Teacher							
Mr Alejandro Jose Tuazon			Four			2 GREEN	BUS 3
Students							
Alex Andal	W7	PE01	Four		PE01	2 GREEN	BUS 3
Salvador Recio	W7	PE01	Four		PE01	2 GREEN	BUS 3
Martin Lopez	W7	PE01	Four		PE01	2 GREEN	BUS 3
Buddy							
Jade Zhou	W1		Four			2 GREEN	BUS 3



Korea Science Academy of KAIST
Busan, South Korea



Attending principal: Dr Jongbae Choi (Principal)

	STEM Workshop	Poster Presentation	UQ Group Tour	Cultural Performance	Oral Presentation	Excursion	Travel Bus
Teacher							
Mr Zae Young Ghim			Four			2 GREEN	BUS 3
Students							
Seongmin Hong	W6	PE05	Four	ACT 10	PE05	2 GREEN	BUS 3
Jiwoo Hong	W7	PE05	Four	ACT 10	PE05	2 GREEN	BUS 3
Buddy							
Yuri Son	W6		Four			2 GREEN	BUS 3



**Moscow South-Eastern School
named after V.I. Chuikov**
Moscow, Russia



Attending principal: Not attending

	STEM Workshop	Poster Presentation	UQ Group Tour	Cultural Performance	Oral Presentation	Excursion	Travel Bus
Teacher							
Ms Elena Germanovich			Five			1 RED	BUS 1
Students							
Timur Akhmedov	W4	CN03	Five	ACT 6	CN03	1 RED	BUS 1
Viktoria Dragun	W5	CN04	Five	ACT 6	CN04	3 BLUE	BUS 1
Buddy							
Lawrence Yu	W4		Five			1 RED	BUS 1



National Junior College
Bukit Timah, Singapore



Attending principal: Mrs Lucy Toh (Principal)

	STEM Workshop	Poster Presentation	UQ Group Tour	Cultural Performance	Oral Presentation	Excursion	Travel Bus
Teacher							
Mr Arthur Goh			Five			4 PURPLE	BUS 2
Students							
Kaixin Qiang	W1	EES09	Five	ACT 8	EES09	4 PURPLE	BUS 2
Isabelle Ang	W3	EES09	Five	ACT 8	EES09	4 PURPLE	BUS 2
Wan Ying Lim	W1	EES09	Five	ACT 8	EES09	4 PURPLE	BUS 2
Buddy							
Sejal Gupta	W3		Five			4 PURPLE	BUS 2


Attending principal: Not attending

	STEM Workshop	Poster Presentation	UQ Group Tour	Cultural Performance	Oral Presentation	Excursion	Travel Bus
Teacher							
Ms Phebee Ng			Five			4 PURPLE	BUS 2
Students							
Prannaya Gupta	W7	CM01	Five	ACT 8	CM01	4 PURPLE	BUS 2
Ananya Nallapuraju	W3	CM01	Five	ACT 8	CM01	4 PURPLE	BUS 2
Lim Teck Kong	W4	CN02	Five	ACT 8	CN02	4 PURPLE	BUS 2
Buddy							
Liam Place	W4		Five			4 PURPLE	BUS 2


Attending principal: Mr Nick Chan (Principal)

	STEM Workshop	Poster Presentation	UQ Group Tour	Cultural Performance	Oral Presentation	Excursion	Travel Bus
Teacher							
Mr Hoe Teck Tan			Five			5 PINK	BUS 1
Students							
Chan Yi Qian	W1	EES02	Five		EES02	5 PINK	BUS 1
Colin Lee Zheng Ting	W5	EES03	Five		EES03	5 PINK	BUS 1
Aathithya Jegatheesan	W7	RT02	Five		RT02	5 PINK	BUS 1
Buddy							
Kelvin Chan	W6		Five			5 PINK	BUS 1



Attending principal: Mrs Pornprom Chaichatpornsuk (Director)

	STEM Workshop	Poster Presentation	UQ Group Tour	Cultural Performance	Oral Presentation	Excursion	Travel Bus
Teacher							
Mr Komed Nachaeng			Five			1 RED	BUS 2
Students							
Yasintorn Poonyawanich	W4	RT04	Five	ACT 16	RT04	1 RED	BUS 2
Weerawin Vaitoonkiat	W4	RT04	Five	ACT16	RT04	1 RED	BUS 2
Tanyapat Triwitayakorn	W4	BMB07	Five	ACT16	BMB07	1 RED	BUS 2
Buddy							
Aarash Hashmi	W4		Five			2 GREEN	BUS 2



Attending principal: Professor Boonchoat Paosawatyanyong (Principal)

	STEM Workshop	Poster Presentation	UQ Group Tour	Cultural Performance	Oral Presentation	Excursion	Travel Bus
Teacher							
Dr Janjira Maneesan			Two			3 BLUE	BUS 2
Students							
Chananrat Tirumumpongvanish	W3	BMB02	Two	ACT 3	BMB02	4 PURPLE	BUS 2
Virakarn Boon-fahpratan	W3	BMB02	Two	ACT 3	BMB02	3 BLUE	BUS 2
Buddy							
Mary Do	W1		Two			4 PURPLE	BUS 2



Mahidol Wittayanusorn School
Phutthamonthon District, Nakhon Pathom, Thailand



Attending principal: Dr Worawarong Rakreungdet (Principal)

	STEM Workshop	Poster Presentation	UQ Group Tour	Cultural Performance	Oral Presentation	Excursion	Travel Bus
Teacher							
Dr Kiattipoom Rodpun			One			2 GREEN	BUS 1
Students							
Nicharee Chaisamritpol	W3	BMB03	One	ACT 5	BMB03	2 GREEN	BUS 1
Nutchaya Chaisamritpol	W3	BMB03	One	ACT 5	BMB03	2 GREEN	BUS 1
Ananya Chaiyanopakul	W3	BMB03	One	ACT 5	BMB03	2 GREEN	BUS 1
Buddy							
Jiwoo Seo	W6		One			2 GREEN	BUS 1



Galaxy International School Uganda

Kampala, Uganda



Attending principal: Dr Ramazan Bayar (Principal)

	STEM Workshop	Poster Presentation	UQ Group Tour	Cultural Performance	Oral Presentation	Excursion	Travel Bus
Teacher							
Ms Racheal Ainembabazi			Three			4 PURPLE	BUS 3
Students							
Shawna Abena Amihere	W2	PE04	Three	ACT 11	PE04	4 PURPLE	BUS 3
Arianne Hildegard Diku	W2		Three	ACT 11		4 PURPLE	BUS 3
Selihom Eskndr Yohannees	W4	PE04	Three	ACT 11	PE04	4 PURPLE	BUS 3
Buddy							
Arjun Prasanth	W6		Three			4 PURPLE	BUS 3



Camborne Science and International Academy

Cornwall, England, UK



Attending principal: Mrs Emma Haase (Principal)

	STEM Workshop	Poster Presentation	UQ Group Tour	Cultural Performance	Oral Presentation	Excursion	Travel Bus
Teacher							
Mr Wayne Riley			Four			4 PURPLE	BUS 3
Students							
Daniel Bruton	W5	RT03	Four		RT03	4 PURPLE	BUS 3
Jamie Gore	W5	RT03	Four		RT03	4 PURPLE	BUS 3
Buddy							
Sera Chatha	W6		Four			4 PURPLE	BUS 3



**Illinois Mathematics and
Science Academy**

Aurora, Illinois, USA



Attending principal: Not attending

	STEM Workshop	Poster Presentation	UQ Group Tour	Cultural Performance	Oral Presentation	Excursion	Travel Bus
Teacher							
Mr. Brian Trainor			Four			5 PINK	BUS 2
Students							
Divya Brahmbhatt	W4	CN08	Four		CN08	5 PINK	BUS 2
Joshua Lee	W4	EES10	Four		EES10	5 PINK	BUS 2
Buddy							
Stanley Wang	W7		Four			4 PURPLE	BUS 2



Attending principal: Mr Christopher D'Anna (Principal)

	STEM Workshop	Poster Presentation	UQ Group Tour	Cultural Performance	Oral Presentation	Excursion	Travel Bus
Teacher							
Mr James Wanamaker			Five			1 RED	BUS 2
Students							
Dom Tracy	W1	EES01	Five		EES01	1 RED	BUS 2
Hope Parkhill -Wylie	W4	EES01	Five		EES01	1 RED	BUS 2
Matt Long	W4	EES01	Five		EES01	1 RED	BUS 2
Buddy							
Aaron Wei	W4		Five			1 RED	BUS 2



Attending principal: Mr David Allen (District Science Curriculum Coordinator)

	STEM Workshop	Poster Presentation	UQ Group Tour	Cultural Performance	Oral Presentation	Excursion	Travel Bus
Teacher							
Ms Sandy Scott			One			1 RED	BUS 1
Students							
Caroline Escobedo	W1	EES04	One		EES04	1 RED	BUS 1
Yaretzi Guerrero	W1	EES04	One		EES04	1 RED	BUS 1
Zubeir Noorani	W1	EES04	One		EES054	1 RED	BUS 1
Buddy							
Sana Shah	W7		One			2 GREEN	BUS 1

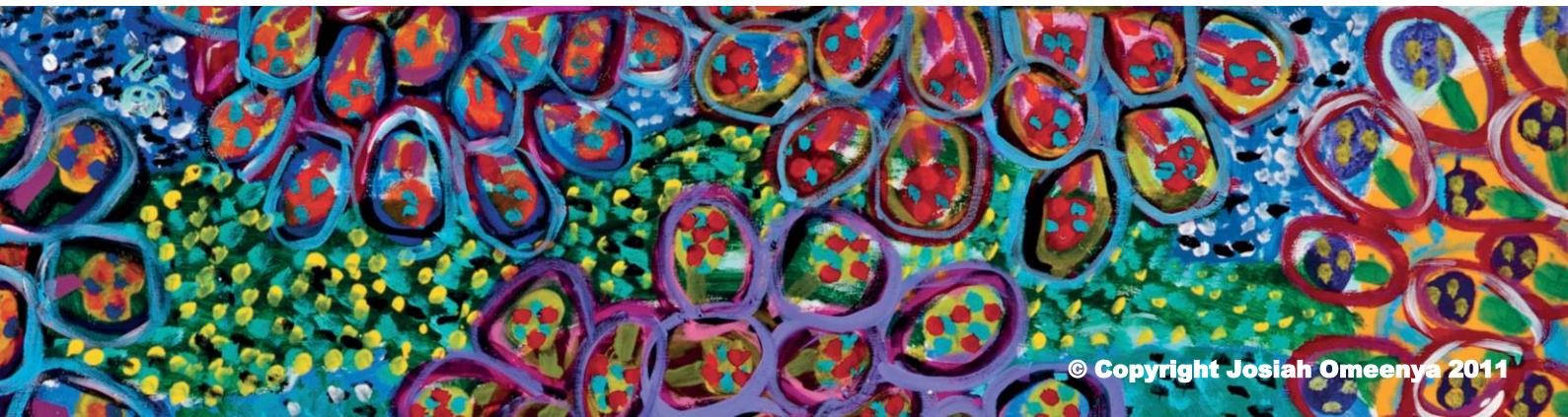
SCHEDULE

Sunday 3 December – Friday 8 December 2023

Sunday 3 December 2023

Program Day 0 - Arrival Day

Time	Program	Location	Notes
All day	<p>Collection of participants and transportation to The University of Queensland - St Leo's accommodation</p> <p>Arrival, registration, check-in at UQ, buddy 'meet and greet', location familiarisation, room allocation.</p>	St Leo's, UQ	<ul style="list-style-type: none"> Dress casual Buddies: students will be met by their buddies on arrival at St Leo's College Registration occurs in St Leo's lounge area on arrival You will receive your conference bag, name tag and room key on arrival Lunch is not provided, however, is available for purchase
Afternoon activities	<ul style="list-style-type: none"> Tour of local facilities, room allocation, The University of Queensland. Ceramic tile painting – school name, and flora and fauna associated with country (Memorable piece to be held at QASMT) Australian animal origami Indoor and outdoor games 	Courtyard	<ul style="list-style-type: none"> Visit to Southbank via CityCat (Optional: has cost attached and time limitations) Outdoor and indoor equipment - including indoor games, cards, balls, cricket sets - are available to borrow from lounge area. Please return to the lounge once finished
6.00 – 8.00 pm	Dinner and briefing	St Leo's, UQ	<ul style="list-style-type: none"> Please wait in the dining room until after briefing is completed
8.00 - 9.30 pm	Free time	Student accommodation blocks and lounge area	<ul style="list-style-type: none"> Indoor equipment - including indoor games and cards – are available to borrow from the lounge area. Please return to the lounge once finished
9.30 pm	Room check and roll call by chaperones	Student accommodation blocks	<ul style="list-style-type: none"> Bedtime check-in with block supervisor at 9.30 pm Students are to remain in their room blocks until morning



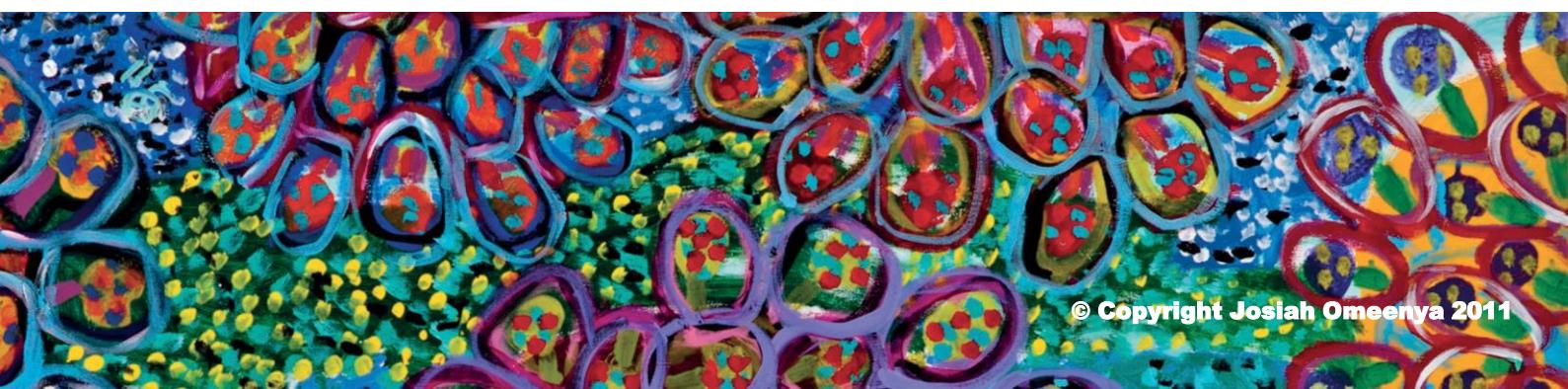
Monday 4 December 2023

Program Day 1

Time	Program	Location	Notes
7.00 – 7.50 am	Breakfast	St Leo's, UQ	<ul style="list-style-type: none"> • Dress school uniform/business attire for day program • 8.00 am bus departure – please meet in foyer area • Please bring with you: your poster presentation materials, refillable drink bottle, hat, room key and day program) • Daily bus travel schedule for 3 buses <ul style="list-style-type: none"> - Bus 1 – Red flag - Bus 2 - Yellow flag - Bus 3 - Blue flag
8.30 – 9.30 am	Poster display set-up	QASMT auditorium	<ul style="list-style-type: none"> • Please ensure you know the board number that has been allocated for you to use (See your allocation list) • Pins and fasteners will be available for you to use. • If you require a table, please ask on the day.
9.30 – 11.30 am	Opening ceremony <ul style="list-style-type: none"> • Keynote speaker: Dr Catherine Ball • Official Opening • World launch of ISSF orchestral soundtrack 	QASMT auditorium	<ul style="list-style-type: none"> • Please be seated by 9.20 am in the auditorium. • Students and teachers are requested to sit together
11.30 am – 3.20 pm	Student Science workshops x 7 Lunch break: 1.00 – 2.00 pm	STEM Precinct, L Block	<ul style="list-style-type: none"> • Teacher and principal morning tea to follow the Opening Ceremony in the auditorium • Educator sharing session and school tour • Students to be excused from sessions by 3.20 pm. At this time students are required to move to the auditorium for the Poster Presentation judging.
11.30 am – 12.30 pm	Morning tea with invited guests.	QASMT auditorium	<ul style="list-style-type: none"> • Principal and teacher only event
12.30 pm – 2.30 pm	Educator Session (led by Dr Esme Hatchell) Lunch will be served during the afternoon.	QASMT Lecture theatre	<ul style="list-style-type: none"> • Presenters are asked to move to the lecture theatre at 12.10 pm for final instructions prior to the commencement of the session. • Please bring a copy of your presentation on a USB in case of technology issues

Monday 4 December 2023

3.30 – 5.30 pm	Research poster presentation and judging session • Poster judging: 3.30 – 4.30pm • Open viewing: 4.30 – 5.30pm	QASMT auditorium	<ul style="list-style-type: none"> • During this time, students to stand by their poster and wait for judges to address them • Students to take turns to view the posters of others, during viewing time • Return to accommodation by bus at 5.30 pm • Daily bus travel schedule for 3 buses <ul style="list-style-type: none"> - Bus 1 – Red flag - Bus 2 - Yellow flag - Bus 3 - Blue flag
6.00 – 7.00 pm 7.00 - 8.30 pm	Mexican themed dinner Icebreaker' activities	St Leo's, UQ	<ul style="list-style-type: none"> • Dress casual for evening program including enclosed shoes • Please wait in the dining room until after briefing is completed
8.30 – 9.30 pm	Cultural performance preparations and free time	St Leo's, UQ	<ul style="list-style-type: none"> • Indoor equipment - including indoor games and cards - are available to borrow from the lounge area • Please return to the lounge once finished
9.30 pm	Room check and roll call by chaperones	Student accommodation blocks	<ul style="list-style-type: none"> • Bedtime check-in with block supervisor at 9.30 pm • Students are to remain in their room blocks until morning



KEYNOTE SPEAKER

Dr Catherine Ball (Scientific Futurist)



Associate Professor, Dr Catherine Ball is an Academic at ANU's School of Cybernetics, bestselling author, futurist and 'visioneer.'

Catherine likes to create businesses and champion movements, collaborate with peers, and advise game-changers. Having been called a 'social architect', Catherine likes to connect people from different backgrounds across common themes.

A champion of diversity and inclusion, she believes we need points of difference to truly innovate and curate the changes we want to see in the world. Working to protect the natural environment and empowering all members of society through mutual education are core aspects of the projects Catherine chooses to spend her time and energy on.

Catherine continues to support Australia as being the world leader in the advancement of ethically driven technological applications. She is the only Australian on the International Advisory Board of the Schmidt Ocean Institute, which follows her work as a judge on the Ocean Discovery XPrize.

Catherine's business ventures include the internationally renowned World of Drones and Robotics Congress, established in Brisbane in 2017 and the free community resource of World of Drones Education, established in 2018.

We extend a welcome to Queensland Chief Scientist, Professor Kerrie Wilson



Her distinguished career encompasses roles at QUT, including Pro Vice Chancellor (Sustainability and Research Integrity), and her tenure as the Executive Director of the QUT Institute for Future Environments.

Professor Wilson is one of Australia's leading researchers into the science, strategy and policy of conservation. With a track record in key leadership roles and driving collaboration with national and international stakeholders, she will ensure Queensland remains at the forefront of science.

Before joining QUT in 2019, Professor Wilson was the Director of the Australian Research Council (ARC) Centre of Excellence for Environmental Decisions and an ARC Future Fellow at The University of Queensland. She is also an Affiliated Professor in Conservation Science at The University of Copenhagen, a member of the Australian Heritage Council, and previously a member of the Reef 2050 Plan Independent Expert Panel. Professor Wilson has held leadership positions including Director of Conservation for The Nature Conservancy Australia and the Australian Natural Sciences Commissioner for UNESCO.

Opening Ceremony: The Sustainability Suite

By QASMT Composition Students (World Premier)



QASMT mentor from Queensland Symphony Orchestra, Craig Allister-Young

The “Sustainability Suite” by QASMT Composition Students, is a musical exploration of the interconnectedness of humanity with the natural world, inspired by the United Nations’ sustainability themes. This composition delves into the delicate balance between water, earth, and the human-built environment, reflecting the imperative need for harmony and sustainable coexistence. Motifs from each movement illustrate the cyclical relationship between water, earth and human endeavours. The harmonic language blends traditional tonalities with modern dissonances, reflecting the juxtaposition of ancient natural forces and contemporary challenges. The orchestra is treated as a microcosm of the planet, with different sections representing distinct elements of the environment. Woodwinds, strings, brass and percussion collaborate to depict the diverse textures of the earth.

This composition, with its world premiere at the QASMT Auditorium during the International Students Science Fair 2023 was composed through a unique collaboration between a small group of students from Years 7 to 11, their teacher, Mr Greg Thompson, and their mentor from Queensland Symphony Orchestra, Mr Craig Allister-Young. The 19th International Student Science Fair (ISSF 2023), is a celebration of the achievements and hard work of students from around the world who have dedicated themselves to scientific inquiry and discovery. ISSF 2023 is a prestigious event that brings together young aspiring scientists to showcase their innovative research projects and compete for recognition and awards. With 27 schools from around the world attending, it serves as a platform for talented students to exchange ideas, collaborate, and demonstrate their scientific prowess on an international stage.

The “Sustainability Suite” aims to inspire contemplation on the delicate equilibrium between human activities and the environment. Through its rich musical tapestry, the composition encourages a collective responsibility to ensure a harmonious coexistence between water, earth, and the built environment for generations to come.

We will gift all attending schools a copy of the instrumental score to play on return to their own international schools, making it a truly international composition.

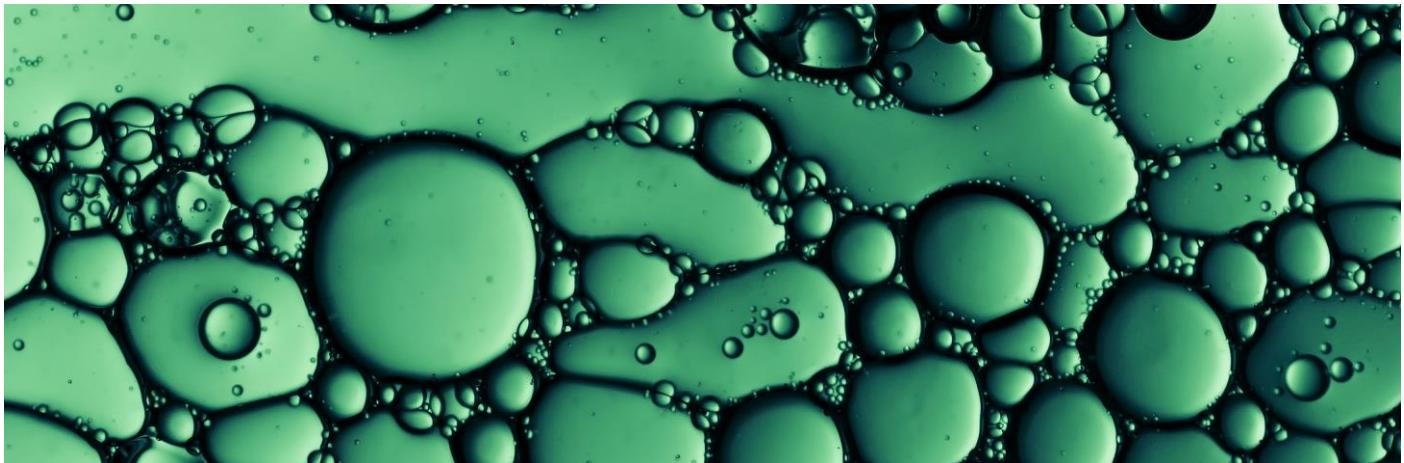
**ISSF 2023 Chamber Orchestra
QASMT Composition Student World Premier**

Instrument	Musician/s
Flute	Daisy Huo Amy Deng
Clarinet	Joy Chen, Khang Dao, Rina Li
Bassoon	Jemma Smith
French Horn	Soersin Greer
Trumpet	Sebastian Bernede – Beresforde Joshua Boon
Trombine	Leisel Alick
Percussion	Eason Wong Ronald Dulay Lucas Li Liam Place
Violin	Claire Kong Leonardo Verbica Wendi Li Dennis Yang
Viola	Eugene Cho Gabriel Pavilion
Cello	Dami Lu Ian Cho
Double Bass	Ben Humphries
Conductor	Mr Gregory Thompson



STEM Workshops

Workshop 1: Microfiltration membranes for minimising waterborne disease



Location: L01

Approximately 2 billion people around the world still lack access to safe and clean drinking water. Illnesses including dysentery, typhoid fever and cholera can rapidly spread through communities due to contamination of drinking water with bacteria, viruses, and parasites. Several water treatment technologies exist for the removal of such contaminants including microfiltration membranes that are portable, low cost, durable, and environmentally sustainable.

In this workshop, you will explore the applications of polymer chemistry in water filtration by producing a cellulose acetate membrane. You will investigate its pore size and surface morphology using scanning electron microscopy to determine whether the membrane could successfully remove such pathogenic contamination. Finally, you will conduct functional testing of the membrane.

Workshop 2: Water planning for our future



Location: L16 - L17

Approximately 2 billion people around the world still lack access to safe and clean drinking water. Illnesses including dysentery, typhoid fever and cholera can rapidly spread through communities due to contamination of drinking water with bacteria, viruses, and parasites. Several water treatment technologies exist for the removal of such contaminants including microfiltration membranes that are portable, low cost, durable, and environmentally sustainable.

In this workshop, you will explore the applications of polymer chemistry in water filtration by producing a cellulose acetate membrane. You will investigate its pore size and surface morphology using scanning electron microscopy to determine whether the membrane could successfully remove such pathogenic contamination. Finally, you will conduct functional testing of the membrane.

Workshop 3: The BAT-tle against Hendra Virus



Location: L10 and L11

Hendra virus is a bat-borne pathogen first discovered in 1994 not far from where QASMT is based in the Brisbane suburb of Hendra. This zoonotic virus is harmless for bats but has a fatality rate of 60% in humans and 75% in horses. Hendra virus is widespread throughout Australia's bat population and the resulting outbreak of Hendra virus is considered a biosecurity risk. Outbreaks led to increased research in viral transmission and development of strategies to minimise spread.

In this workshop, students will explore a real-world application of ELISA and perform their own ELISA test to detect viral antigen levels in bat urine samples. ELISA (enzyme-linked immunosorbent assay) is a common bioanalytical assay used to detect and quantify antigens and antibodies in biological samples.

Workshop 4: The Grätzel Cell powered by juice



Location: L09

Energy production accounts for approximately three quarters of global greenhouse gas emissions. In order to avoid catastrophic climate change, the United Nations estimates we need to reduce greenhouse emissions by 45%. Photovoltaic cells convert radiant solar energy to electricity with no CO₂ emissions. The Grätzel cell uses photo-electrochemistry, they are cheap and flexible compared to solid-state silicon based solar cells (Grätzel, 2001), they have the potential to bridge the gap between our current carbon-based energy economy and a carbon neutral future.

In this workshop you will make a Grätzel cell using iodine, fruit juice, and titanium dioxide. You will have an opportunity to refine and improve your design to maximise the power output. Finally, you will compete against other teams using your cell to power LEDs.

Workshop 5: Fruity Tones



Location: L06 and L07

Research clearly shows the many benefits of music; blood flows more easily, our mood elevates whilst stress levels reduce. It can benefit our physical and mental health in numerous ways. Music can be made with almost anything, including modern technology tools.

In this workshop you will discover fun and creative way to combine your passions for electronics, music, and pop culture with the Bananiano, an Arduino project inspired by the beloved Minions™ movies. You'll learn how to transform everyday bananas into a musical instrument. Using an Arduino, breadboard, 1MΩ resistors, a small speaker, jumper wires, and alligator test leads, and we will be ready to make music with fruit in no time. We won't just limit ourselves to just bananas as we will experiment with other conductive fruits and veggies too. Unleash your creativity and join us for this delightfully fruity workshop!

Workshop 6: Dreaming of gold at the Olympics



Location: L03 and L04

Athletes at the Olympics rely on good sleep to recover their wearied bodies. Over 18 000 beds are required to be produced, assembled, and disposed for the duration of the Olympics. A further 8 000 beds require an alternative design for Paralympians. The Tokyo Olympics were the first Olympics where all beds and bedding were made from almost entirely renewable materials.

Students will play the role of an engineer to design, build, test, and evaluate bed frames that withstand the weight of athletes, are comfortable, quick to assemble and disassemble, and sustainable through the life cycle of the product.

Workshop 7: Rubbish robots



Location: L18 and L19

In the era of AI technology, imagine a robot that can analyse, sort and categorise rubbish as it moves along a conveyor belt. A robot that has the capacity to sort materials quickly and accurately, whilst ensuring that recyclable materials can be sorted for reused in a sustainable manner.

In this workshop, we will explore the concept of automated rubbish sorting using a robotic arm. We will investigate techniques to sense, categorise and sort rubbish. All are welcome from beginners to experienced programmers as challenges will be provided depending on your Arduino programming ability and experience with automated systems.

Tuesday 5 December 2023

Program Day 2

Time	Program	Location	Notes
7.00 – 7.50 am	Breakfast	St Leo's, UQ	<ul style="list-style-type: none"> • Dress school uniform/ business attire for day program • Please bring with you: materials required for oral presentations, refillable drink bottle, a hat, room key and day program • You will not be returning to the accommodation until late afternoon
8.00 – 8.50 am	UQ tour with ambassadors	UQ – various locations	<ul style="list-style-type: none"> • 8.00 am departure • Please meet in foyer area by 7.50 am • Students will be walking to the venue
8.50 – 10.30 am	UQ STEM workshops Session 1: Pick your strategy: Offense or defence? (Dr Gurion Ang)	UQ ModWest Building, Rooms 110 and 111	<ul style="list-style-type: none"> • 10.30 – 10.45 am: Workshop participants will walk to Workshop 2 location • Official rocket launch has been scheduled for Friday morning
10.45 – 12.15 pm	Session 2: Rockets: Aerospace engineering (Mr James Orman)	Liveris Building 46 – Rooms 442 and 443	
12.30 – 1.15 pm	Pizza lunch	Great Court (Forgan Smith West area)	<ul style="list-style-type: none"> • It is essential that you drink lots of water during the day and stay sun safe – regular application of sunscreen, keep your hats on and sit in shaded areas
1.15 - 2.00 pm	'Studying at UQ' presentation	Forgan Smith building, room E107	<ul style="list-style-type: none"> • Picnic rugs will be available to sit on in shaded areas

Tuesday 5 December 2023

2.00 – 5.00 pm	Student Oral Presentations	ModWest, UQ	Presentation locations <ul style="list-style-type: none"> Biology and molecular biosciences: Modwest 110 Robotics and technology: Forgan Smith E107 Earth and environmental science: Modwest 111 Physics and engineering: Modwest 121 Computing and mathematics: Modwest 131 Chemistry and nanoscience: Modwest 130
6.00 – 7.00 pm	Aussie barbecue	St Leo's, UQ	<ul style="list-style-type: none"> Dress in cultural dress for cultural performances or in casual wear for evening program
7.30 – 8.00 pm	First Nations cultural performance: Turrbal Peoples	Outdoor dining area, St Leo's, UQ	<ul style="list-style-type: none"> Please be seated by 7.20 pm
8.00 – 9.15 pm	Cultural performances	Outdoor dining area, St Leo's, UQ	<ul style="list-style-type: none"> See Appendix 1: Program of events
9.30 pm	Room check and roll call by chaperones	Student accommodation blocks	<ul style="list-style-type: none"> Bedtime check-in with block supervisor at 9.30 pm Students are to remain in their room blocks until morning

First Nations Cultural Performance: Turrbal Peoples



Tonight, local Turrbal Peoples will be performing a **Welcome to Country**, a traditional smoking ceremony and dance performance.

A **Welcome to Country** is a traditional ceremony performed at gatherings by a local clansperson to welcome visitors to the land. In the absence of a clansperson, the ceremony is performed by a tribesperson (a clan is a subgroup of a tribe).

Turrbal Dippil is committed to ensuring the survival and continuous sharing of Turrbal culture, and to developing self-sustaining communities. We hope that both Indigenous and non-Indigenous people will be able to celebrate the rich culture and history of the Turrbal Tribe.

THE UNIVERSITY OF QUEENSLAND WORKSHOPS

Session 1: Pick your strategy: Offense or defence? (8.50 – 10.30 am)



Location: ModWest Building, Rooms 110 and 111

- Session conducted by Dr Gurion Ang (Director, Bachelor of Science, School of Biological Sciences, Faculty of Science)

Balance the energy, physical structures, chemical profiles, and behavioural responses of plants and their attackers! How will you design a super-plant that can defend against a league of voracious herbivores? How will your attackers go on the offensive and evolve strategies to overcome these plant defences? This workshop will engage all your senses as you see, feel, smell, taste, and learn more about the war between plants and their enemies.

About the presenter: Dr Gurion Ang is a teaching-focussed academic specialising in ecology and zoology. He completed his PhD in 2017 on insect-plant interactions and still dabbles in behavioural ecology research: understanding the intricate relationships between plants and their insect partners enable us to learn more about the ecosystem services they provide.

He is an outstanding practitioner who seeks to characterise and develop best practice in teaching in secondary and university biology classrooms.



Session 2: Rockets: Aerospace engineering (10:45am - 12:15pm)



Location: Liveris Building 46 – Rooms 442 and 443

- Session conducted by Mr James Orman (Liveris Scholar, Faculty of Engineering, Architecture & Information Technology)

Aerospace engineers are tasked with, among other things, the design of rockets to deliver a payload and return it safely to the ground.

Students will work together in groups to design and construct a solid fuel model rocket. The workshop teaches concepts such as analysing and balancing forces, aerodynamics, differential equations and decision-making.

About the presenter: Mr James Orman is one of the inaugural scholars of the Liveris Academy and is in his fifth year of a dual degree, studying Mechanical and Aerospace Engineering and Physics.

James is heavily involved in UQ Space, the student rocketry team at UQ, attending competitions and events around the world with the team. Most recently, UQ Space attended the Spaceport America Cup in New Mexico, placing seventh in their category. He is also a senior executive with the Australian Youth Aerospace Association, a national organisation working to develop the Australian aerospace industry from the ground up.



Wednesday 6 December 2023

Program Day 3

Time	Program	Location	Notes
7.00 – 8.00 am	Breakfast	St Leo's, UQ	<ul style="list-style-type: none"> • Dress casual • You will need: refillable water bottle, hat, sunscreen, room key and day program • You will not be returning to the accommodation until 9.00 pm • Assemble in the foyer for bus boarding by 8.00 am • Bus Groups <ul style="list-style-type: none"> - Group 1 – Red flag - Group 2 – Green flag - Group 3 – Blue flag - Group 4 – Purple flag - Group 5 – Pink flag
9.00 – 12.00 noon	Lone Pine Koala Sanctuary/ Local excursions	Various locations	<ul style="list-style-type: none"> • It is essential that you drink lots of water during the day and stay sun safe – regular application of sunscreen, keep your hats on and sit in shaded areas • Access to large containers of water is available on each bus • See Appendix 3 and 4 for excursion lists
12.00 noon - 1.00 pm	Picnic lunch at Lone Pine Koala Sanctuary	Lone Pine	<ul style="list-style-type: none"> • Lunch will be available in picnic areas located outside the main entrance of the Lone Pine Koala Sanctuary • Water will also be available for water bottle top-ups
1.00 - 3.45 pm	Lone Pine Koala Sanctuary/ Local excursions	Various locations	<ul style="list-style-type: none"> • See Appendix 3 and 4 for excursion lists • Bus boarding at 3.45 pm for a 4.00 pm departure from all venues

Wednesday 6 December 2023

4.30 – 5.30 pm	ISSF 2023 tree planting	QASMT school oval	<ul style="list-style-type: none"> All teachers and students to meet on the school oval on arrival at QASMT
5.30 – 6.30 pm	Dinner: Fork hot boxes and karaoke hour	School courtyard	<ul style="list-style-type: none"> The guest speaker will address the group following dinner in the lecture theatre. He will then join us for star gazing in the courtyard following his presentation
6.30 – 9.00 pm	<p>Star Party Night</p> <ul style="list-style-type: none"> Guest speaker: Dr Brad Tucker Astrophysicist/ Cosmologist, ANU Dr Benjamin Pope, The University of Queensland Star gazing 	Lecture Theatre	<ul style="list-style-type: none"> Please be patient as you wait to view our Southern Hemisphere night sky through the telescopes – weather permitting! Students will also have the opportunity to ‘croon’ their favourite ‘space’ songs as part of Karaoke Hour
9.00 pm	Bus boarding	QASMT to St Leos, UQ	<ul style="list-style-type: none"> Return bus travel to accommodation departing at 9.00 pm Daily bus travel schedule for 3 buses <ul style="list-style-type: none"> Bus 1 – Red flag Bus 2 - Yellow flag Bus 3 - Blue flag
9.30 pm	<ul style="list-style-type: none"> Room check and roll call by chaperones 	Student accommodation blocks	<ul style="list-style-type: none"> Bedtime check-in with block supervisor at 9.30 pm Students are to remain in their room blocks until morning

GUEST SPEAKERS

Dr Brad Tucker

Astrophysicist and Cosmologist (Australian National University, College of Science)



The majority of Brad's work involves Exploding stars called Supernova, and Cosmology, the study of the Universe. A certain type of supernova, called a type Ia, can be used as a standard candle that can trace our Universe's history.

For this work, he is involved with a number of supernova surveys. He works on the ESSENCE Project, The CfA Supernova Search, The Carnegie Supernova Project and also used Mt. Stromlo's new SkyMapper telescope. He is one of the leads of the Kepler Extra-Galactic Survey, KEGS; a Kepler Space Telescope Key Program, to understand why and how stars blow. Brad leads a project to build a network of ultraviolet telescopes in the upper atmosphere which are being built at Mt. Stromlo.

He has developed a series of Astronomy coins in conjunction with the Royal Australian Mint, consulted on science fiction movies, advised on Astronomy-themed art projects, and has been featured in specials on the National Geographic Channel. He is often on the media in Australia speaking about all things happening in space.

Dr Benjamin Pope

ARC DECRA Fellow (School of Mathematics and Physics, The University of Queensland)



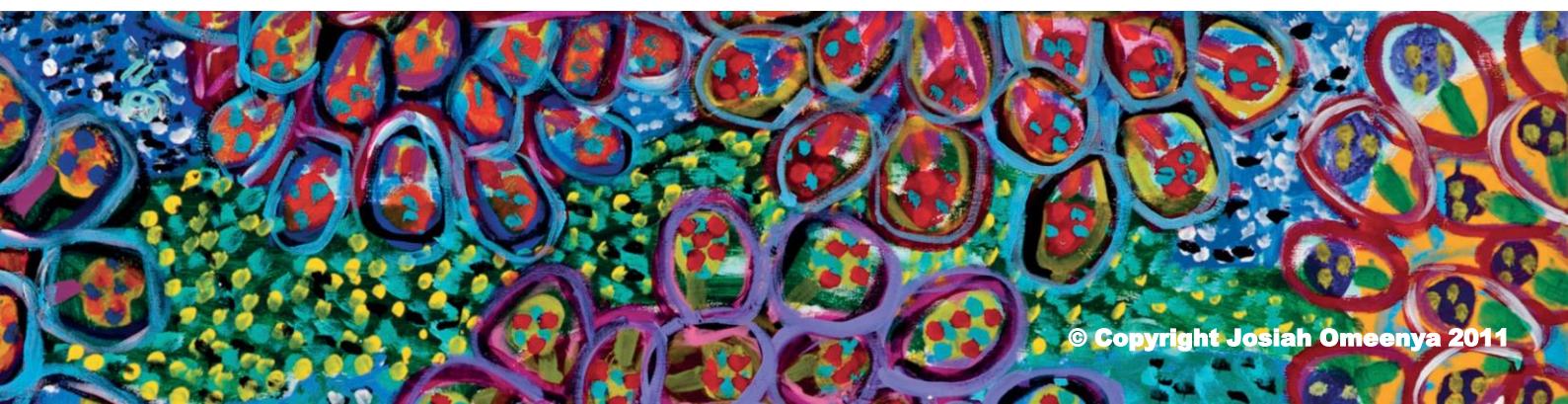
Ben researches extrasolar planets - planets around other stars - and focuses on developing and applying new data science approaches for detecting and characterizing them. He has taken nearly every approach to exoplanet and stellar observation, including transits, radial velocities, direct imaging, and asteroseismology.

He is an ARC DECRA Fellow, working on exoplanet direct imaging with the James Webb Space Telescope, and especially how we can use differentiable & probabilistic programming to enhance data analysis to detect faint objects in noisy data. He also works on radio astronomy to study planets' magnetic interactions with their host stars and using radiocarbon in tree rings as a tracer of long-term solar activity.

Thursday 7 December 2023

Program Day 4

Time	Program	Location	Notes
6.00 am 6.15 am	Breakfast – collect packed breakfast to eat on bus Bus boarding	St Leo's, UQ	<ul style="list-style-type: none"> • Dress in sun safe clothing for the beach • Please wear swimsuit, long-sleeved t-shirt/rashee, ISSF2023 board brimmed hat, enclosed shoes, shorts/pants/dress • Bring with you: towel, flipflops/ slip-on shoes, change of underwear and dry clothes, sunscreen, refillable water bottle, insect repellent, room key on lanyard and a pen or pencil) • Collect packed breakfast from dining area at 6.00 am • Assemble in the foyer for bus boarding by 6.15 am • Daily bus travel schedule for 3 buses <ul style="list-style-type: none"> - Bus 1 – Red flag - Bus 2 - Yellow flag - Bus 3 - Blue flag
6.30 -	Day trip to Minjerribah (North Stradbroke Island)	Minjerribah (North Stradbroke Island)	<ul style="list-style-type: none"> • It is essential that you drink lots of water during the day and stay sun safe – regular application of sunscreen, keep your hats on and sit in shaded areas • Access to large containers of water is available on each bus
6.00 – 7.00 pm	Dinner: Italian themed dinner	St Leo's, UQ	<ul style="list-style-type: none"> • Dress casual for evening program • Make sure your luggage is packed for an early departure in the morning – leave out your clothes and toiletries for the next day
7.00 – 9.00 pm	Movie Night	St Leo's, UQ	<ul style="list-style-type: none"> • Bedtime check-in with block supervisor at 9.00 pm • Students are to remain in their room blocks until morning



Minjerribah Day Trip Program

(Minjerribah means *Island in the Sun* in the local Jandai language.)



6.30 am	Bus boarding and departure to Cleveland
8.00 am	Vehicle ferry to the island
9.00 am	Rocky Shore adventure
10.00 am	Low Energy Rocky Shore <ul style="list-style-type: none">• Students will place transects in the intertidal area and identify species and record abundance and distribution of them across the intertidal. Apart from this, they will measure and document the physical parameters as temp, salinity, pH.
11.30 am	Bus to Brown Lake
12 noon	Lunch Brown Lake
12.30 pm	Brown Lake activity <ul style="list-style-type: none">• Students will identify the biodiversity associated to the lake, particularly invertebrates and insects using a hand net. They will also collect some water quality parameters
1.30 pm	Bus to Cylinder Beach
2.00 pm	Swim (optional) and beach activities at Cylinder Beach
3.00 pm	Depart Cylinder Beach

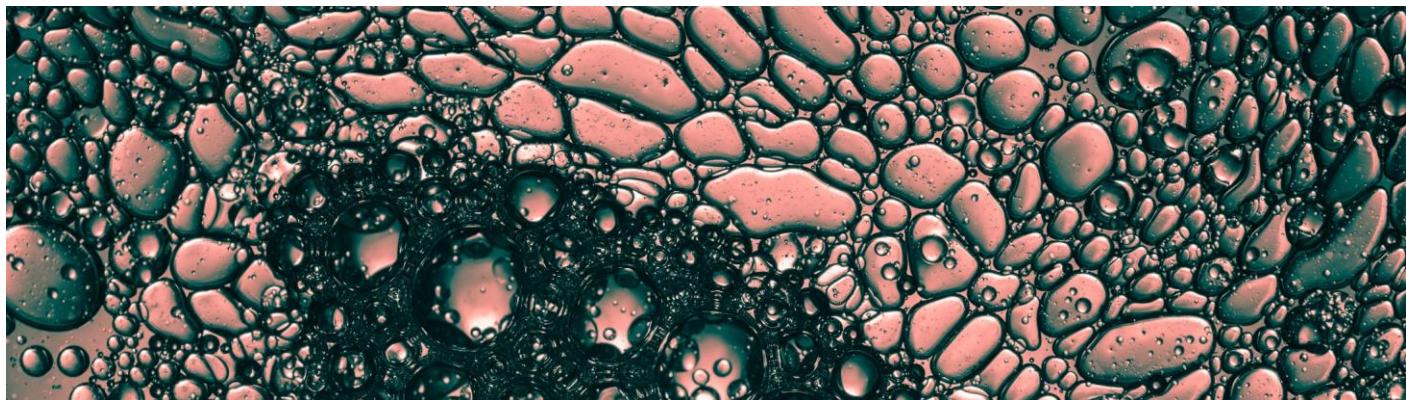
Friday 8 December 2023

Program Day 5 - Departure Day

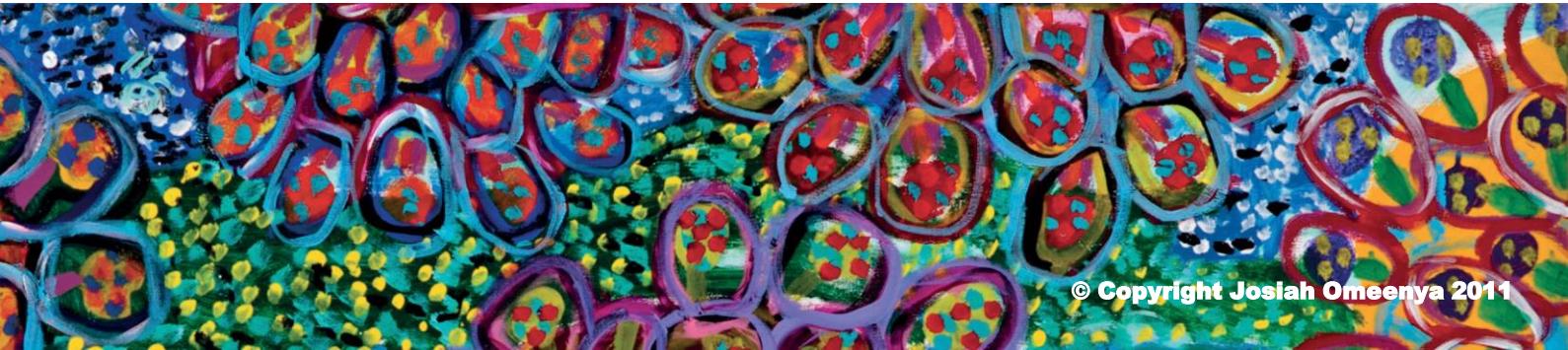
Time	Program	Location	Notes
6.00 – 7.00 am 7.00 – 7.30 am	Breakfast and room check <ul style="list-style-type: none">• Luggage loading on buses• Collection of packed lunches	St Leo's, UQ	<ul style="list-style-type: none"> • Dress casual for day program • You will need: hat, sunscreen and drink bottle • Please leave your room neat and tidy, and remove all rubbish • Wait for your block supervisor to check your room, collect your room key and release you • Then, take your luggage and belongings to the foyer and assemble as a school group - students and teacher - wait for further directions • Following luggage loading, return to foyer, collect your lunch and prepare for rocket launch activity
7.45 – 9.30 pm	Rocket launch <ul style="list-style-type: none">• Follow-up to UQ Rocket Workshop with Mr James Orman held earlier in the week	UQ Oval 2	<ul style="list-style-type: none"> • For student safety, please follow all instructions given by the supervising staff
9.30 am 10.00 -11.00 am	Bus travel to State Library Queensland Museum, Art Gallery (If time permits)	Cultural precinct, Southbank	<ul style="list-style-type: none"> • Bus travel schedule will be determined by bus departure times to the airport • Student and teachers are to travel on the bus with their luggage
11.30 –12.30 pm	Closing ceremony	State Library of Queensland	<ul style="list-style-type: none"> • Please be seated by 11.20 am • Teachers and students are asked to sit together • ISSF 2023 concludes at the end of the Closing Ceremony
12.30 pm	Picnic lunch available (Takeaway style)	Southbank	<ul style="list-style-type: none"> • Schools are free to depart from the venue and enjoy a picnic lunch at Southbank Parklands • If you are booked on a bus to the airport, please ensure you arrive at the collection point 30-minutes prior to the departure time • Buses will depart from the drop-off point located on Stanley Place outside State Library
Afternoon	Optional Southbank or Brisbane city visit	Various	

POSTER PRESENTATIONS

Biology and molecular biosciences Poster



Students	Title	School	Poster
Daniel D'Souza, Rachel Rabuya, Lucas Lim	The effect of Gibberellic Acid on Brassica rapa Rosette-Dwarf Mutant plant growth	Queensland Academy for Science Mathematics and Technology	BMB01
Chananrat Tiranumpongvanich, Virakarn Boonfahpratan	Extraction and purification of compounds in Carissa carandas L. fruit extract for determining antibacterial and antioxidant efficiencies	Kamnoetvidya Science Academy (KVIS)	BMB02
Nicharee Chaisamritpol, Nutchaya Chaisamritpol, Ananya Chaiyanopakul	Effect of chitosan and guar gum on extending the shelf life of champignon mushroom (Agaricus bisporus)	Mahidol Wittayanusorn School	BMB03
Yang Yilin	The impact of YEATS2 knockout on the proliferation and migration of prostate cancer cells	Experimental School of Beihang University	BMB04
Charlotte Okome, Justin Koross, Eric Ouma	Solar Desalination	Solar Desalination	BMB05
Yuto Inoue	Substances Affecting Mold Suppression	Ritsumeikan High School	BMB06
Tanyapat Triwitayakorn	Genetic diversity and antibacterial activities of crude extracts from leaves of rain tree (<i>Samanea saman</i> (Jacq.) Merr.) in Chulalongkorn University	Chulalongkorn University Demonstration Secondary School	BMB07



Earth and environmental science

Poster



Students	Title	School	Poster
Matt Long, Hope Parkhill-Wylie, Dom Tracy	Assay to determine the caffeine levels in local water samples	Lewiston-Porter	EES01
Chan Yi Qian	Image data acquisition and analysis from weather satellites using SDR	School of Science and Technology Singapore	EES02
Colin Lee Zheng Ting	Development of a system for data acquisition on lightning occurrences	School of Science and Technology Singapore	EES03
Caroline Escobedo, Yaretzi Guerrero, Zubeir Noorani	Bioremediation of polyurethane in soil using P. Microspora	West Aurora High School	EES04
Tanan Mungunchuluun, Bolormaa Luvsandorj, Anar Nergui	Climate Change of Mongolia	New Beginning International School of Mongolia	EES05
Aidan Rhys Fernandes	Sustainable Energy Production: The designing of wind turbines that can sustain a high output facing unique and/or chaotic wind conditions	John Monash Science School	EES06
Jinghua Zhao, Nuotong Wang	Heavy Metal Biosorption by White Rot Fungus (<i>Ganoderma lucidum</i>) Within Aqueous Solutions	Fort Richmond Collegiate	EES07
Rangchak Tripura, Vincent Mondol, Niyaz Hasan	The effect of fan speed alongside air conditioning temperature on maximising the optimal “feel” temperature whilst minimising energy costs	Darwin High School	EES08
Kaixin Qiang, Isabelle Ang, Wan Ying Lim	Phytoremediation of Zn ²⁺ Ions using sunflowers	National Junior College Singapore	EES09
Joshua Lee	Soil carbon sequestration for climate change mitigation: understanding enzyme temperature optimum and function for soil organic carbon stability	Illinois Mathematics and Science Academy	EES10

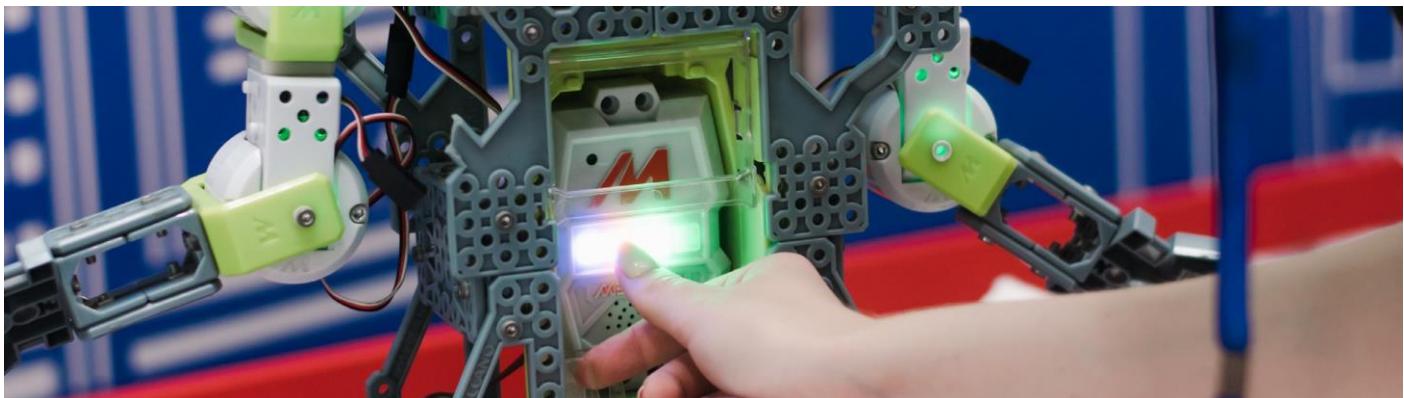
Chemistry and nanoscience

Poster



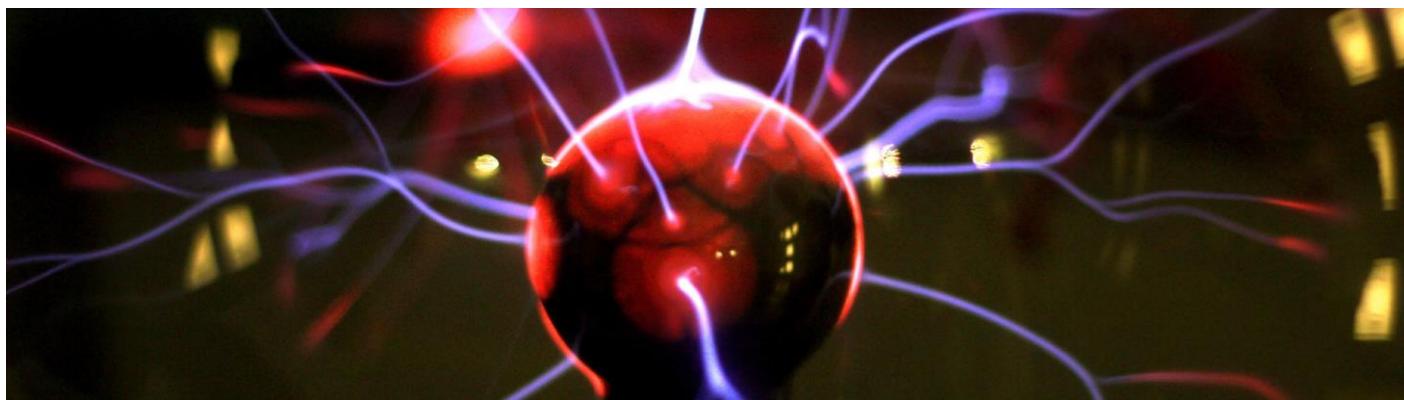
Students	Title	School	Poster
Ayaka Takema, Yui Takeyasu, Sachina Watanuki	Evaluation of mud microbial fuel cells with carboxylates or 2-Hydroxy Carboxylates added as nutrients for bacteria	Tokyo Tech High School of Science and Technology	CN01
Lim Teck Kong	Enantioselective synthesis of biaryl atropisomers using distal ionic interactions from Suzuki Miyaura Reaction	NUS High School of Mathematics and Science	CN02
Timur Akhmedov	Enantiomerically enriched (2-fluoroallyl) pyridinium salts: synthesis and their application as the mechanistic probe in Pd-catalyzed asymmetric allylic amination	Moscow South-Eastern School named after V.I. Chuikov	CN03
Viktoria Dragun	Reductive amination without external hydrogen sources	Moscow South-Eastern School named after V.I. Chuikov	CN04
Wang Borui	Preparation process and application of conductive hydrogel	Experimental School of Beihang University	CN05
Queena Calya Rabbanee Wibowo, Selaksa Alun Samudra, Sabila Ramadhan Putriku Calita	Potential of edible film from aloe vera and lime (<i>Citrus aurantiifolia</i>) peel extract for traditional snack	Budi Mulia Dua International High School, Indonesia	CN07
Divya Brahmbhatt	Precision immuno- Immuno- RadioNanoTherapy for metastatic cancer	Illinois Mathematics and Science Academy	CN08

Robotics and technology Poster



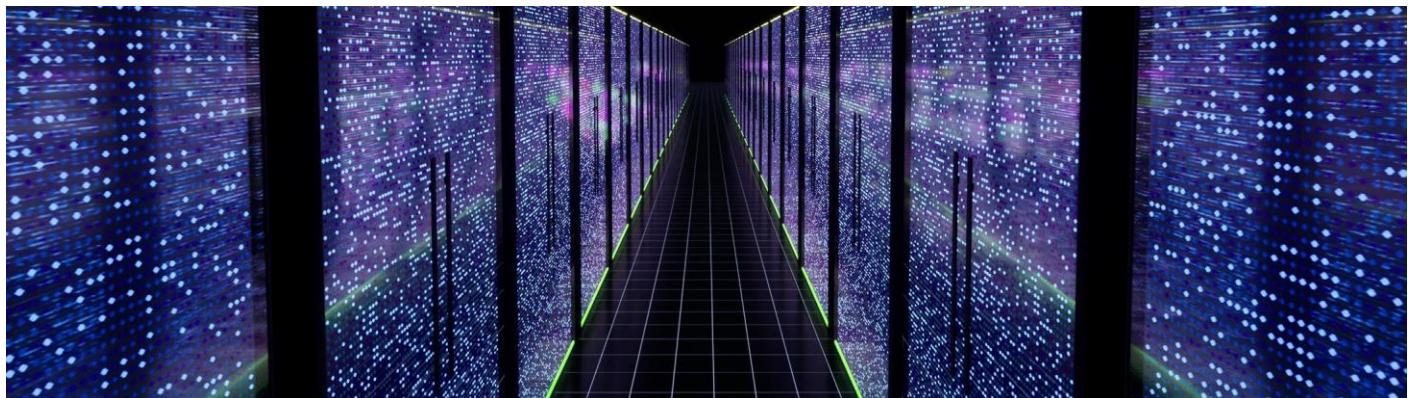
Students	Title	School	Poster
Chan Daravatey, Thong Pagnatepy, Heng Chanmongkul	Non-invasive blood glucose level monitor for diabetes pre-detection	Preah Sisowath High School, New Generation School	RT01
Aathithya Jegatheesan	Investigation of storage capacity of DVD under different environmental conditions	School of Science and Technology Singapore	RT02
Daniel Bruton & Jamie Gore	Could synthetic DNA be the solution to the world's growing demands for large-scale data storage?	Camborne Science and International Academy	RT03
Yasintorn Poonyawanich, Weerawin Vaitoonkiat	Narcolepsycue	Chulalongkorn University Demonstration Secondary School	RT04

**Physics and engineering
Poster**



Students	Title	School	Poster
Alex Anthony Andal, Martin Gabriel Lopez, Salvador Recio	Development of an H-Darrieus vertical axis wind turbine with sailfish-inspired blades	Philippine Science High School Main Campus	PE01
Vicky Lee, Sofia Obradovic, Romy Burger, Sophie Verhagen, Jente Nefkens	Investigation of the sustainable generation of electricity from human movement: Electricity generated by piezo elements	Australian Science and Mathematics School and St-Odulphuslyceum	PE02 / PE03
Shawna Amihere and Selihom Yohannees	Kanada Project - Purification of polluted water by solar energy	Galaxy International School Uganda	PE04
Seongmin Hong, Jiwoo Hong	Verification of quantum key distribution via description and implementation of mixed states	Korea Science Academy of KAIST	PE05

Computing and mathematics Poster

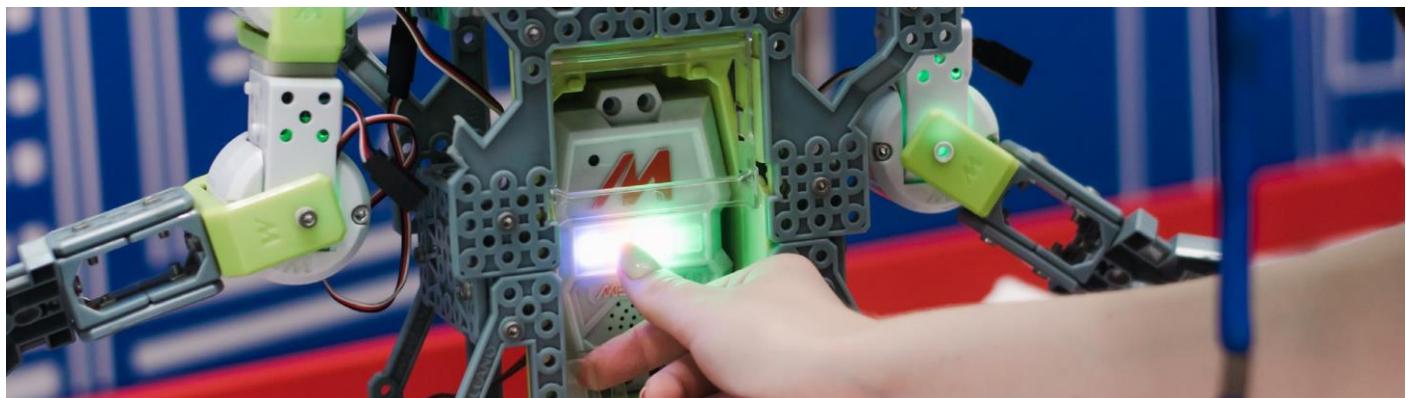


Students	Title	School	Poster
Prannaya Gupta, Ananya Nallapuraju	A picture is worth a thousand steps: Using image processing techniques to predict freezing of gait in Parkinson's patients	NUS High School of Mathematics and Science	CM01
Mishanya Romadinov, Raghav Zutshi	Creating an AI based model for predicting potential epidemics and the impact of preventative measures on the emerging epidemics (how to minimise impact and environmental costs)	John Monash Science School	CM02
Liu Zhixuan	Automated air traffic control system	Experimental School of Beihang University	CM03
Ryo Imaizumi	Optimal frequency ratio for chords	Ritsumeikan High School	CM04

ORAL PRESENTATIONS

Robotics and technology

Oral presentations

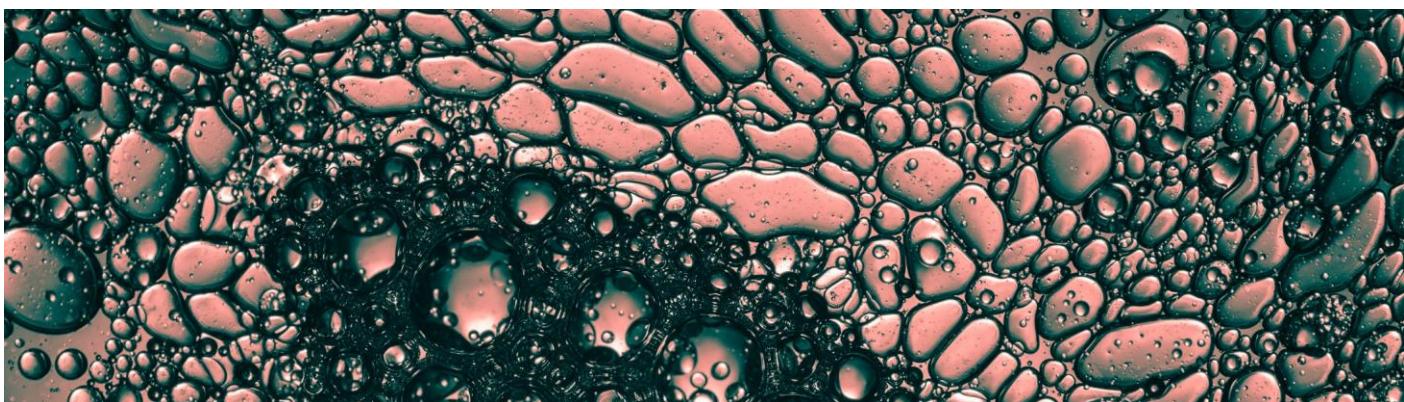


Venue location: Forgan-Smith E107, UQ

Presenters	School	Topic
Chan Daravatey, Thong Pagnatepy, Heng Chanmongkul	Preah Sisowath High School, New Generation School	RT01 Non-invasive blood glucose level monitor for diabetes pre-detection (SDG 3,7)
Aathithya Jegatheesan	School of Science and Technology Singapore	RT02 Investigation of storage capacity of DVD under different environmental conditions (SDG 9)
Daniel Bruton & Jamie Gore	Camborne Science and International Academy	RT03 Could synthetic DNA be the solution to the world's growing demands for large-scale data storage? (SDG 9)
Yasintorn Poonyawanich and Weerawin Vaitoonkiat	Chulalongkorn University Demonstration Secondary School	RT04 Narcolepsycue (SDG 11)



Biology and molecular biosciences
Oral presentations



Venue location: Modwest 110, UQ

Presenters	School	Topic
Daniel D'Souza, Rachel Rabuya, Lucas Lim	Queensland Academy for Science Mathematics and Technology	BMB01 The effect of Gibberellic Acid on Brassica rapa Rosette-Dwarf Mutant plant growth (SDG 12)
Chananrat Tiranumpongvanich, Virakarn Boonfahpratan	Kamnoetvidya Science Academy (KVIS)	BMB02 Extraction and purification of compounds in Carissa carandas L. fruit extract for determining antibacterial and antioxidant efficiencies (SDG 12)
Nicharee Chaisamritpol, Nutcha Chaisamritpol, Ananya Chaiyanopakul	Mahidol Wittayanusorn School	BMB03 Effect of chitosan and guar gum on extending the shelf life of champignon mushroom (<i>Agaricus bisporus</i>) (SDG 12)
Yang Yilin	Experimental School of Beihang University	BMB04 The impact of YEATS2 knockout on the proliferation and migration of prostate cancer cells (SDG Other)
Charlotte Okome, Justin Koross, Eric Ouma	Brookhouse School Kenya	BMB05 Solar Desalination (SDG 12, 14 and 15)
Yuto Inoue	Ritsumeikan High School	BMB06 Substances affecting mould suppression (SDG 14 and 15)
Tanyapat Triwitayakorn	Chulalongkorn University Demonstration Secondary School	BMB07 Genetic diversity and antibacterial activities of crude extracts from leaves of rain tree (<i>Samanea saman</i> (Jacq.) Merr.) in Chulalongkorn University (SDG 11, 13 and 15)

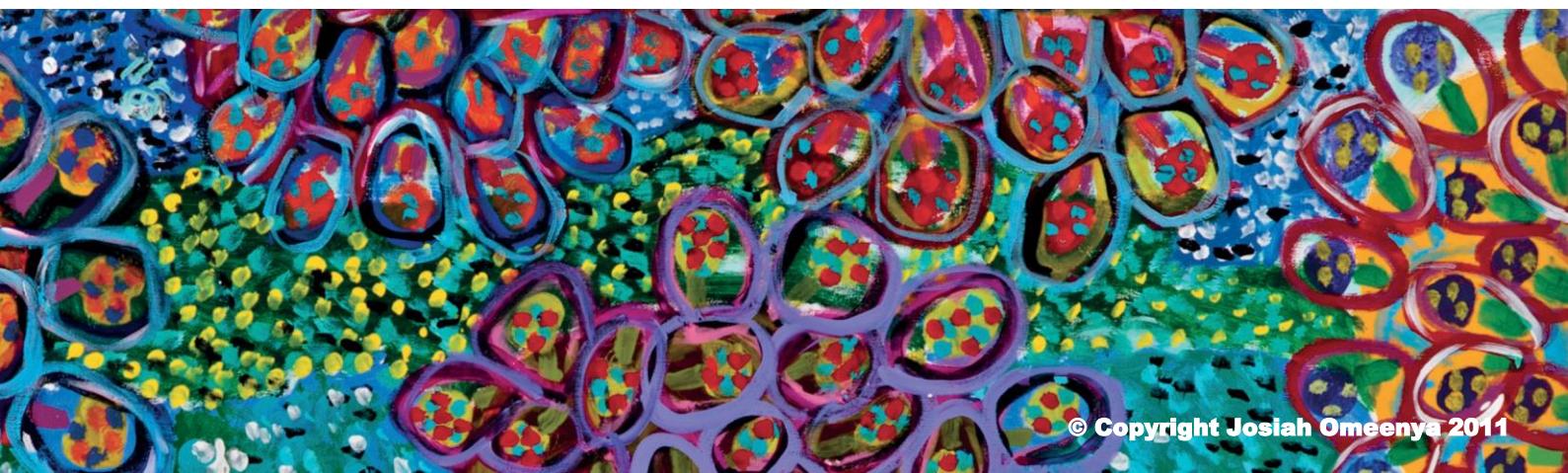
Earth and environmental science
Oral presentations



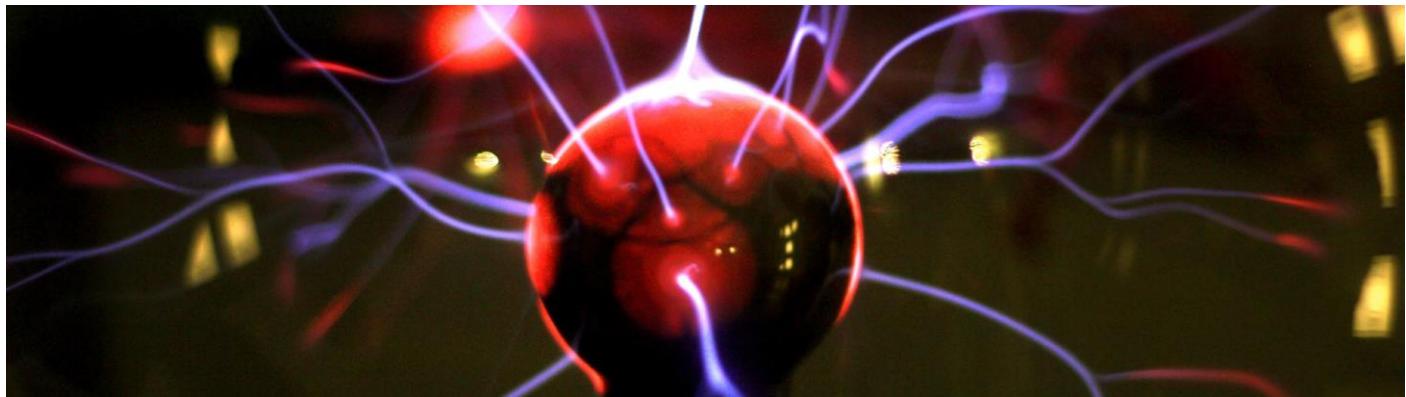
Venue location: Modwest 111, UQ

Presenters	School	Topic
Matt Long, Hope Parkhill-Wylie, Dom Tracy	Lewiston Porter	EES01 Assay to determine the caffeine levels in local water samples (SDG 12, 13 and 14)
Chan Yi Qian	School of Science and Technology Singapore	EES02 Image data acquisition and analysis from weather satellites using SDR (SDG 13)
Colin Lee Zheng Ting	School of Science and Technology Singapore	EES03 Development of a system for data acquisition on lightning occurrences (SDG 13)
Caroline Escobedo, Yaretzi Guerrero, Zubeir Noorani	West Aurora High School	EES04 Bioremediation of polyurethane in soil using P. Microspora (SDG 12 and 15)
Tanan Mungunchuluun, Bolormaa Luvsandorj	New Beginning International School of Mongolia	EES05 Climate change of Mongolia (SDG 13)
Aidan Rhys Fernandes	John Monash Science School	EES06 Sustainable Energy Production: The designing of wind turbines that can sustain a high output facing unique and/or chaotic wind conditions (SDG 7 and 11)

Jinghua Zhao, Nuotong Wang	Fort Richmond Collegiate	EES07 Heavy Metal Biosorption by White Rot Fungus (<i>Ganoderma lucidum</i>) Within Aqueous Solutions (SDG 12)
Rangchak Tripura, Vincent Mondol, Niyaz Hasan	Darwin High School	EES08 The effect of fan speed alongside air conditioning temperature on maximising the optimal “feel” temperature whilst minimising energy costs (SDG 11, 12 and 13)
Kaixin Qiang, Isabelle Ang, Wan Ying Lim	National Junior College Singapore	EES09 Phytoremediation of Zn ²⁺ Ions using sunflowers (SDG 11, 12 and 15)
Joshua Lee	Illinois Mathematics and Science Academy	EES10 Soil carbon sequestration for climate change mitigation: understanding enzyme temperature optimum and function for soil organic carbon stability (SDG 13)



Physics and engineering
Oral presentations

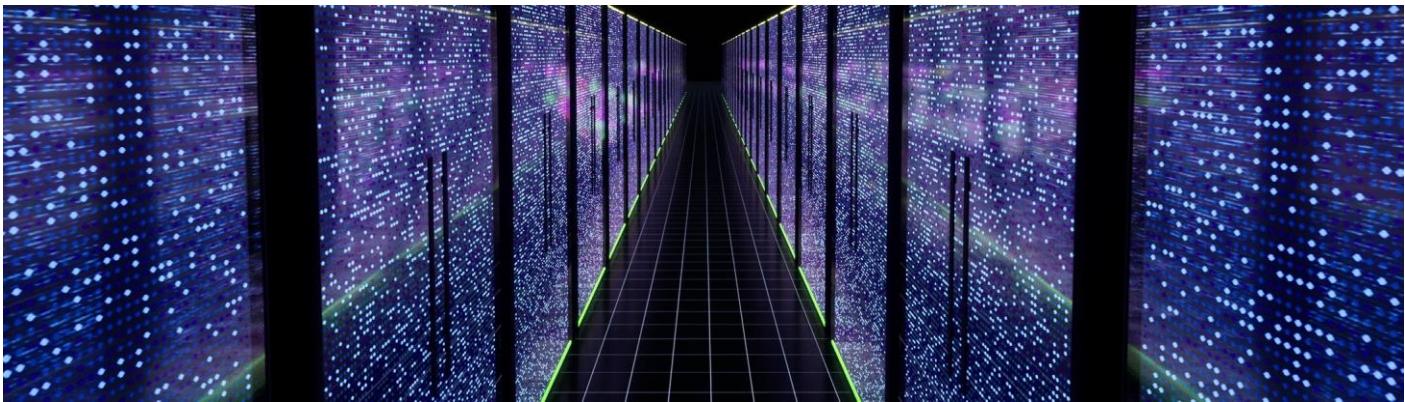


Venue location: Midwest 121, UQ

Presenters	School	Topic
Alex Anthony Andal, Martin Gabriel Lopez, Salvador Recio	Philippine Science High School Main Campus	PE01 Development of an H-Darrieus Vertical Axis Wind Turbine with Sailfish-inspired Blades (SDG 7, 11)
Vicky Lee, Sofia Obradovic, Romy Burger, Sophie Verhagen, Jente Nefkens	Australian Science and Mathematics School and St-Odulphuslyceum	PE02 + PE03 Investigation of the sustainable generation of electricity from human movement. Electricity generated by piezo elements (SDG 7, 11 and 12)
Shawna Amihere and Selihom Yohannees	Galaxy International School Uganda	PE04 Kanada Project - Purification of polluted water by solar energy (SDG 7)
Seongmin Hong, Jiwoo Hong	Korea Science Academy of KAIST	PE05 Verification of quantum key distribution via description and implementation of mixed states (SDG Other)

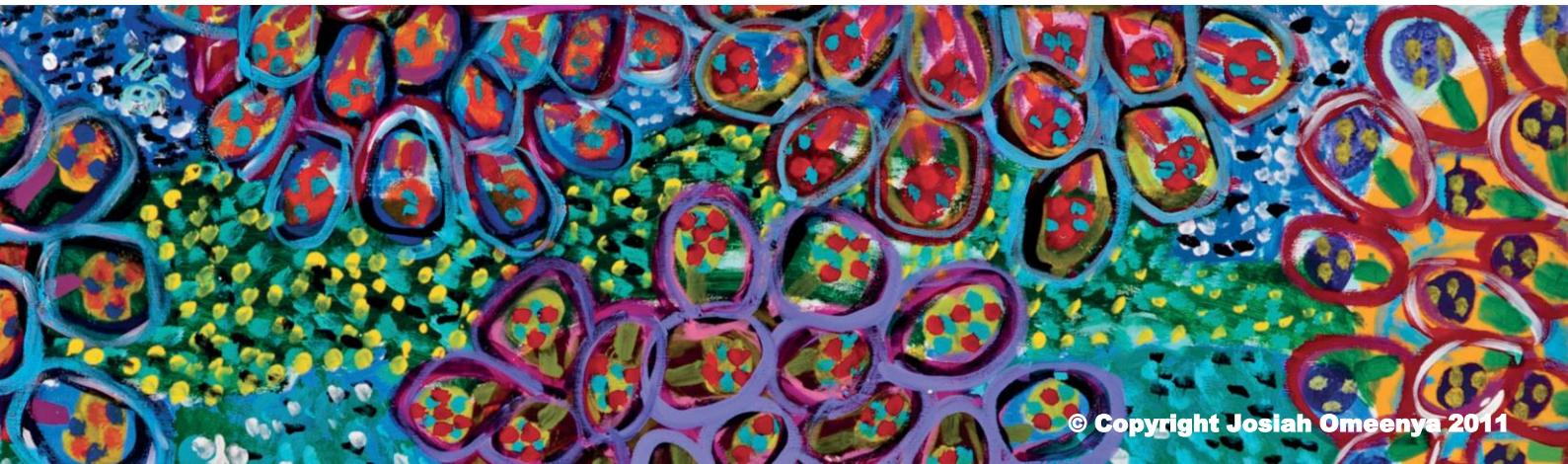
Computing and mathematics

Oral presentations



Venue location: Modwest 131, UQ

Presenters	School	Topic
Prannaya Gupta, Ananya Nallapuraju	NUS High School of Mathematics and Science	CM01 A picture is worth a thousand steps: Using image processing techniques to predict freezing of gait in Parkinson's patients (SDG 11)
Mishanya Romadinov, Raghav Zutshi	John Monash Science School	CM02 Creating an AI based model for predicting potential epidemics and the impact of preventative measures on the emerging epidemics (how to minimise impact and environmental costs) (SDG 3)
Liu Zhixuan	John Monash Science School Experimental School of Beihang University	CM03 Automated air traffic control system (SDG Other)
Ryo Imaizumi	Ritsumeikan High School	CM04 Optimal frequency ratio for chords (SDG Other)



Chemistry and nanoscience

Oral presentations



Venue location: Midwest 130, UQ

Presenters	School	Topic
Ayaka Takema, Yui Takeyasu, Sachina Watanuki	Tokyo Tech High School of Science and Technology	CN01 Evaluation of mud microbial fuel cells with carboxylates or 2-Hydroxy Carboxylates added as nutrients for bacteria (SDG 7)
Lim Teck Kong	NUS High School of Mathematics and Science	CN02 Enantioselective synthesis of biaryl atropisomers using distal ionic interactions from Suzuki Miyaura Reaction (SDG 11)
Timur Akhmedov	Moscow South-Eastern School named after V.I. Chuikov	CN03 Enantiomerically enriched (2-fluoroallyl) pyridinium salts: synthesis and their application as the mechanistic probe in Pd-catalyzed asymmetric allylic amination (SDG 12)
Viktoria Dragun	Moscow South-Eastern School named after V.I. Chuikov	CN04 Reductive amination without external hydrogen sources (SDG 12)
Wang Borui	Experimental School of Beihang University	CN05 Preparation process and application of conductive hydrogel (SDG Other)
Queena Calya Rabbanee Wibowo, Selaksa Alun Samudra, Sibila Ramadhan Putriku Calita	Budi Mulia Dua International High School, Indonesia	CN07 Potential of edible film from aloe vera and lime (<i>Citrus aurantiifolia</i>) peel extract for traditional snack (SDG 12)
Divya Brahmbhatt	Illinois Mathematics and Science Academy	CN08 Precision immuno- Immuno-RadioNanoTherapy for metastatic cancer (SDG 3)

ABSTRACTS

Robotics and technology

Abstracts

Presentation: RT01

School: Preah Sisowath High School, New Generation School

Project title: Non-invasive blood glucose level monitor for diabetes pre-detection

Presenters: Chan Daravatey, Thong Pagnatepy, Heng Chanmongkul

Sustainable Development Goals: 3 and 7

The past few decades have seen ongoing development of continuous glucose monitoring (CGM) systems that are noninvasive and accurately measure blood glucose levels. The conventional finger-prick method, though accurate, is not feasible for use multiple times a day, as it is painful and test strips are expensive. Although minimally invasive and noninvasive CGM systems have been introduced into the market, they are expensive and require finger-prick calibrations. As the diabetes trend is high in low- and middle-income countries, a cost-effective and easy-to-use noninvasive glucose monitoring device is the need of the hour.

This project briefly discusses the noninvasive way to measure glucose. The technologies discussed are acetone concentration in the breath is a great biomarker that has a linear relationship with the amount of blood sugar. This small concentration of acetone (~1ppm) in the breath was measured using expensive equipment in older research publications. Recent works have shown that a simple MQ-135 gas sensor that is available as an Arduino module measures Volatile Organic Compounds (VOCs). Acetone is one of the gases that it is sensitive to in the range that we are interested in.

The purpose of a non-invasive glucometer using breath is to provide a convenient and painless method for measuring blood glucose levels in individuals with diabetes. Non-invasive glucometers aim to eliminate the need for blood sampling by analyzing the chemical composition of exhaled breath, which contains (VOCs) that can provide information about glucose levels in body. (NIG) using breath work by detecting and analyzing specific VOCs that are associated with glucose metabolism. When glucose is metabolized in the body, it produces certain byproducts that are released into the bloodstream and eventually exhaled through the breath. By capturing and analyzing these VOCs, non-invasive glucometers can estimate blood glucose levels without the need for invasive procedures.



Presentation: RT02

School: School of Science and Technology Singapore

Project title: Investigation of storage capacity of DVD under different environmental conditions

Presenters: Aathithya Jegatheesan

Sustainable Development Goals: 9

The DVD is an optical storage which has been an essential part for the growth of computer. It served as one of the most significant medium for data storage before cloud technology and more trust worthy storage drives came about. The reason for the fall of DVD was due to its degradation and the use of cloud storage. However, cloud storage was deemed expensive and consuming of resources.

This research investigates the properties that cause the degradation of DVDs and simulates what it goes through over the years and see the drop in capacity by using 2 methods, measuring via a DVD reader and through laser diffraction methods. We will be subjecting the DVD through different temperature tests to see the effects on the storage capacity. With the information gathered, we will be able to find ways to continue to use such storage medium which is extremely low cost and compact for a longer period-of-time.

Presentation: RT03

School: Camborne Science and International Academy

Project title: Could synthetic DNA be the solution to the world's growing demands for large-scale data storage?

Presenters: Daniel Bruton & Jamie Gore

Sustainable Development Goals: 9

This project explores the possibility of encoding information onto synthetic DNA in large-scale data storage systems (which would potentially have massively more capacity than current systems), and critically evaluates it from the perspective of sustainability. This is a vastly under-researched area of bioinformatics that could bring a promising solution to society's rapidly increasing data storage needs. Analysing evidence from key experiments, expert organisations, and accepted subject information, this project shows that the sustainability of DNA-based data storage is superior to current data storage methods, due to both lower energy consumption, and reduced reliance on various non-renewable resources required for constructing currently used data storage systems.

This project aimed to evaluate the use of synthetic DNA as a data storage medium. We compared this to the suitability of various current data storage solutions by analysing factors such as their capacity per unit volume, cost effectiveness, and estimated greenhouse gas emissions. Previous studies that were used to obtain primary data include Erlich & Zielinski (2017) and several papers by Bornholt. All of these studies were able to successfully create a functioning DNA-based data storage system and reported their findings in published papers. A few other small scale lab tests have been completed of these systems, but this is a very new field. As such, the reliability of a similar system on an industrial scale is not yet confirmed. The project also discusses potential drawbacks to the technology's use: long retrieval times preventing a system from achieving efficiency, extremely high synthesis costs, and the lack of evidence to suggest reliability. All of these issues are likely to improve dramatically as more research is conducted on the topic, and we have predicted that they will improve sufficiently to make DNA data storage a viable and effective option in the near future.

Presentation: RT04

School: Chulalongkorn University Demonstration Secondary School

Project title: Narcolepsycue

Presenters: Yasintorn Poonyawanich and Weerawin Vaitoonkiat

Sustainable Development Goals: 11

According to Thailand's Transport Accident Management Systems, estimated 1,064 crashes or 5.69% of all car accidents happen each year in Thailand these past 9 years, all caused by drowsy driving. Falling asleep at the wheel is unequivocally menacing and even if you do not, enervation still affects you to lose your ability to drive safely and this is where our innovation takes place.

Our solution to detect the driver's drowsiness is by using openCV and Dlib to calculate the eye level and after processing the information, our codes will decide whether the driver is sleepy or not via our researched criteria. After processing and detecting that the driver is drowsy, the system will spray the wasabi solution to wake the driver up. If the system sprayed 2 times rapidly and the system still detects drowsy driving behaviours it will send a text to our Line Official account in order to let their close relatives acknowledge their location. Furthermore, we've tested our wasabi spray solution in order to obtain the best formula for the best quality. Not only that, we've also tested the angle of the spray, volume after spraying for a certain time and heart rate of the subject got sprayed by the solution.

The results are each subject's heart rate has increased noticeably which means that they are awake. The results that we got were 3 seconds of spray for 0.1 ml, the spraying angle from the X-axis is 20 degrees and the suitable distance to the driver is around 20 centimetres. We also tested it with people in real case scenarios and their responses were the same as the subjects in the experiment. In conclusion, the wasabi had a really strong smell that woke the subjects up in an instant.



Biology and molecular biosciences

Abstracts

Presentation: BMB01

School: Queensland Academy of Science Mathematics and Technology (QASMT)

Project title: The Effect of Gibberellic Acid on Brassica rapa Rosette-Dwarf Mutant Plant Growth

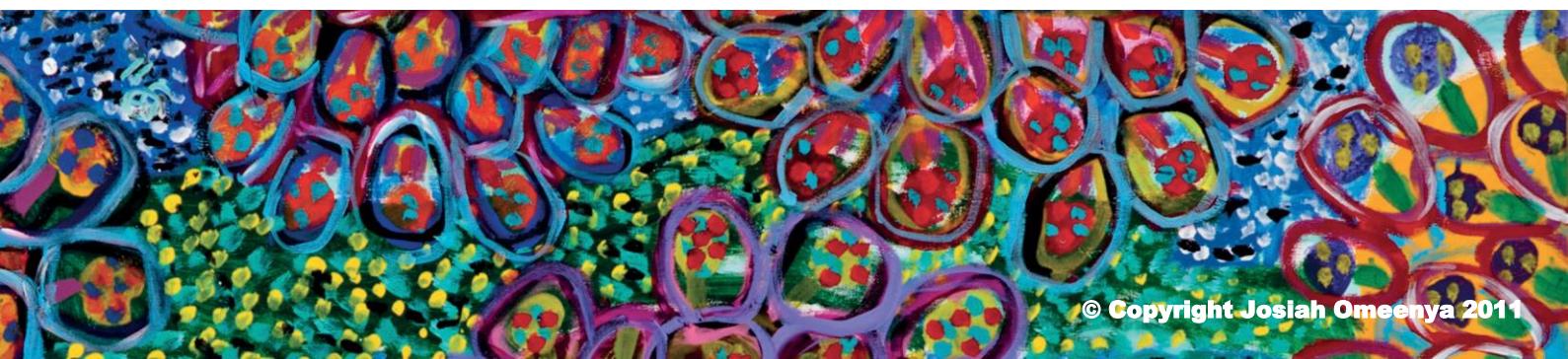
Presenters: Daniel D'Souza, Rachel Rabuya, Lucas Lim

Sustainable Development Goals: 12

Gibberellic acid (GA) as an endogenous phytohormone contributes to the regulation of plant attributes such as the stimulation of germination, cell elongation, and enhancement of shoot growth. GA activates the expression of genes promoting elongation which have been previously inactivated, stimulates cell elongation through GID1, a nucleus-localized receptor, and induces the degradation of DELLA repressor proteins that function as a negative regulator of gibberellin. Thus, the present study was conducted to elucidate and provide support regarding the effects of such phytohormone on plant growth and development.

Using the rosette mutant Brassica rapa plant variety, which observes deficiencies in GA, exogenous application of gibberellic acid was conducted with a series of increasing gibberellic acid concentrations (0-ppm, 50-ppm, 100-ppm, 150-ppm, 200-ppm) over the course of 20 days. Results from the growth of such Brassica rapa mustard plants following GA application indicated a strong positive correlation between plant height after 20 days and gibberellic acid concentration, showing values of $R^2 = 0.72$. Additionally, growth rate as a metric of plant development (via the measurement of plant height) indicated a positive correlation of $R^2 = 0.77$, further indicating that increased gibberellic acid concentrations increased the growth rate of rosette dwarf mutants. Furthermore, quantitative observations comparing mean height of 0ppm treated plants (11.6mm after 20 days) to 200ppm plants (49.8mm after 20 days) also substantiate gibberellic acid as a potentially advantageous phytohormone for plant growth and enhancement.

Treatment of this gibberellic acid on the GA deficient mutant plants thus contribute towards the understandings of this phytohormone as a potential chemical in the growth acceleration and increasingly efficient developments of industrial plants. Research of such mechanisms and the phytohormone's ability to overcome plant dormancy, stimulate germination, as well as enhance shoot growth sustains implications for potential applications in crop improvement strategies and agricultural industries.



Presentation: BMB02

School: Kamnoetvidya Science Academy (KVIS)

Project title: Extraction and purification of compounds in *Carissa carandas* L. fruit extract for determining antibacterial and antioxidant efficiencies

Presenters: Chananrat Tiranumpongvanich, Virakarn Boonfahpratan

Sustainable Development Goals: 12

Carissa carandas is a tropical fruit commonly found in Thailand. It's known for its medicinal properties, containing high amounts of antibacterial and antioxidant phytochemicals such as alkaloids, phenol, and flavonoids. This research aims to investigate the antibacterial activity and antioxidant activity of unripe and ripe purified fruit extracts. Crude extract was extracted using ethanol as a solvent. Four concentrations of crude extracts, consisting of 100, 200, 300, and 400 mg/ml, were tested with 3 gram-positive and 3 gram-negative bacteria species; the result suggested that both types of crude extracts can inhibit all bacteria species in which the highest antibacterial activity for gram positive and negative was obtained from *Bacillus cereus* and *Salmonella typhimurium*, respectively.

The antioxidant activity was evaluated by mixing crude extracts with DPPH solution, which plays a role as free radicals, and measuring the absorbance value at 517 nm using a UV-Vis spectrophotometer. The antioxidant activity of crude extracts has no significant difference between ripe and unripe fruits, for the ratio between the amount of ripe fruit extract and DPPH 1:14 in the solution, the fruit extract has 84.51% antioxidant activity. The half maximal inhibitory concentration (IC₅₀) is 2.924 mg/ml for both ripe and unripe fruit extracts. In the next step, the column chromatography and thin layer chromatography method were used to obtain the purified extracts. Each band of the extracts is dissolved by different solvents, including ethyl acetate, ethanol, and distilled water. The purified extracts also showed antibacterial activity against both bacteria grams.

Finally, the purified extracts are tested with NMR spectroscopy method to identify the specific compounds that exhibited antibacterial and antioxidant activities.

Presentation: BMB03

School: Mahidol Wittayanusorn School

Project title: Effect of chitosan and guar gum on extending the shelf life of champignon mushroom (*Agaricus bisporus*)

Presenters: Nicharee Chaisamritpol, Nutcha Chaisamritpol, Ananya Chaiyanopakul

Sustainable Development Goals: 12

The champignon mushroom (*Agaricus bisporus*) holds a prominent global popularity and stands out as one of Thailand's foremost fresh mushroom exports. However, due to their high respiration rate, mushrooms have a relatively short shelf life. Prolonging the shelf life could enhance the mushrooms availability in the market, mitigate economic losses, and prevent food waste from spoiled mushrooms. This research aimed to study the effects of chitosan and guar gum coatings on the shelf-life extension of champignon mushrooms. The mushrooms were stored in perforated PE bags at 4 °C for nine days. Weight loss, browning index, and colour difference (DE) were evaluated every three days. In the first trial, mushrooms were coated with chitosan (1%, 1.5%, 2% w/v) and guar gum (1%, 1.5%, 2% w/v). Chitosan at 2% w/v was the most effective in delaying weight loss, while guar gum at 1% and 1.5% w/v were the most effective in controlling the browning index and colour difference. In the second trial, mushrooms were coated with 2% chitosan mixed with 1% guar gum at a ratio of 75:25, 50:50, and 25:75. The results showed that all chitosan-guar gum composite treatments did not significantly differ from each other regarding weight loss, browning index, or colour difference.

Nevertheless, weight loss and colour difference were significantly lower in the treated groups than in the control group. Moreover, their browning index and colour difference were significantly lower than 2% chitosan treatment, and their weight loss was lower than 1% guar gum treatment. These findings suggest that chitosan-guar gum coatings could be further developed and applied to extend the shelf life of champignon mushrooms.

Presentation: BMB04

School: Experimental School of Beihang University

Project title: The impact of YEATS2 knockout on the proliferation and migration of prostate cancer cells

Presenters: Yang Yilin

Sustainable Development Goals: Other

YEATS2 is a YEATS domain-containing protein, which is also believed to be an enzyme that can recognize histone crotonylation. Histone crotonylation is a newly discovered epigenetic modification based on histone acetylation and is mainly regulated by the cellular concentration of crotonyl-CoA. Histone crotonylation plays a vital role in various physiological and pathological processes.

To investigate the effect of YEATS2 on prostate cancer cells and explore new targets for the treatment of prostate cancer related diseases. Our project used DU145 cells as a model, utilizing siRNA transfection and CRISPR-Cas9 technology to each knock down and knock out YEATS2, which aims to observe its effects on the proliferation and migration of prostate cancer cells, and to discuss possible mechanisms of action as well.

Presentation: BMB05

School: Brookhouse School Kenya

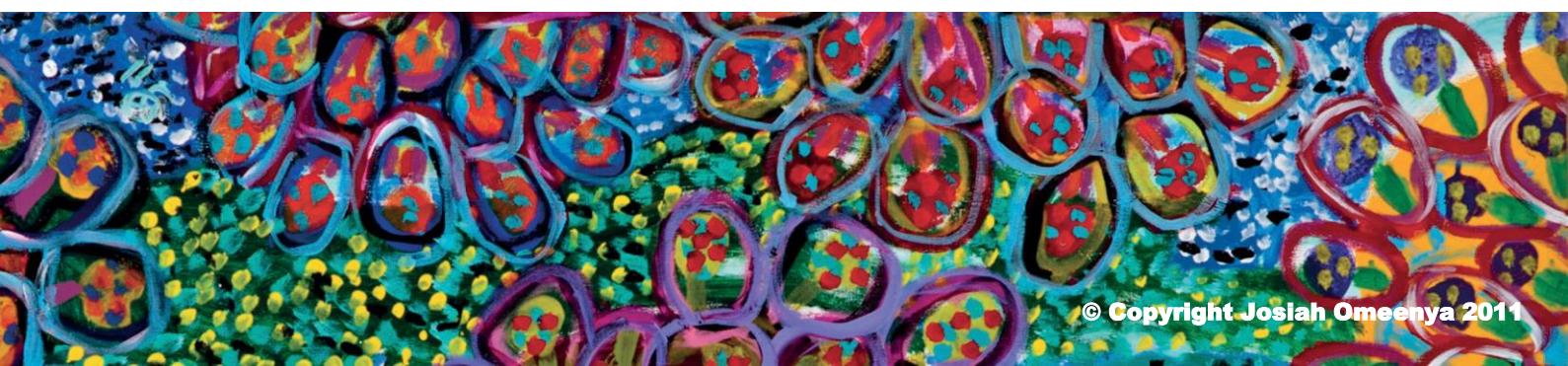
Project title: Solar Desalination

Presenters: Charlotte Okome, Justin Koross, Eric Ouma

Sustainable Development Goals: 12, 14 and 15

Across the globe, different regions experience water shortage and a lack of a clean supply of water for both drinking and domestic purposes. This has led to severe food insecurity, malnutrition, deaths and various human conflicts worldwide. The regions in most distress tend to be countries within Africa, Asia and parts of South America. This project involves researching and investigating the sustainable use of water desalination plants and systems to produce a cleaner supply of water to be used by coastal people and those within nearby inland areas. The area of focus for this research and experimentation will be the Kenyan coastline and its surroundings, specifically the towns of Mombasa and Kilifi.

A comparative study will be carried out to evaluate if the method and materials used is cost effective and environmentally friendly system to reduce the effects of harsher droughts that have affected Kenya in recent years due to Climate Change. With Kenya beginning to shift to more cleaner forms of energy such as Solar and Geothermal, it would be enthralling to explore which materials would be best to create a desalination plant that can operate at a much larger scale along coastlines such as that of Kenya.



Presentation: BMB06

School: Ritsumeikan High School

Project title: Substances affecting mould suppression

Presenters: Yuto Inoue

Sustainable Development Goals: 11, 13 and 15

The objective of this research is to find the substances that affect the suppression of mould growing on bread. The bread was placed in a container with lemon, grated garlic, and wasabi paste, all of which have a strong odour, and observed for about two weeks. Later, focusing on allicin, a component of garlic, an experiment was conducted on mould suppression by comparing two samples of garlic. One sample contained a clove of garlic that was cut and the other was grated, then heated.

The results showed that allicin, a volatile antimicrobial component in garlic, had an effect on the inhibition of mould growth. From there, the focus shifted to finding the mechanism of the inhibitory effect of allicin on mould. Alliin was extracted from American peeled garlic and added to an alliinase enzyme solution to make an allicin solution. Future research should focus on the thermostability of allicin, concentrating on the variation of its inhibitory effect with temperature change.

Presentation: BMB07

School: Chulalongkorn University Demonstration Secondary School

Project title: Genetic diversity and antibacterial activities of crude extracts from leaves of rain tree (*Samanea saman* (Jacq.) Merr.) in Chulalongkorn University

Presenters: Tanyapat Triwitayakorn

Sustainable Development Goals: 14 and 15

Rain tree (*Samanea saman* (Jacq.) Merr.) is a symbolic plant of Chulalongkorn University that plays important roles in providing shade and habitat for life, absorbing carbon dioxide to reduce the effects of climate change by decreasing concentrations of greenhouse gas and improving air quality by capturing particulate matter and releasing oxygen. Recently, the number of rain trees dwindled, partly due to diseases and the construction of new buildings. In addition, one of five important trees planted by the King Rama IX was uprooted by the storm. Thus, conservation of these trees is required for maintaining the population on campus.

To develop the conservation plan, genetic diversity of the species should be evaluated because it is a fundamental component of biological diversity and considered key to ensure the long-term survival of natural populations. This study therefore focused on genetic diversity analysis of the rain tree population on campus using microsatellite DNA markers and also examine the potential utilization of extracted compounds from leaves as a natural product. The results indicated that genetic diversity of the rain tree population remained relatively high and unable to cluster the samples based on collecting locations. This may be due to these trees were originally introduced and have been naturally growing in the area. However, relatively close genetic relationship was found in those four important trees and that may be because they were siblings from the same source with close genetic relationships.

Regarding the antibacterial test the results showed that leaf extracts using water had activity to inhibit the growth of *Escherichia coli* and *Bacillus subtilis*. The results of this project provide crucial information for preservation of the original rain trees, environmental conservation and improve the quality of life for the population in a sustainable manner.

Earth and environmental science

Abstracts

Presentation: EES01

School: Lewiston Porter

Project title: Assay to Determine the Caffeine Levels in Local Water Samples
(SDG 12, 13 and 14)

Presenters: Matt Long, Hope Parkhill-Wylie, Dom Tracy

Sustainable Development Goals: 12, 13 and 14

In this study, a method was developed to analyze caffeine contamination of various water samples collected in Western New York. The method used solid phase extraction (SPE) and liquid chromatography-mass spectrometry (LCMS) to determine caffeine concentrations. Due to an increased consumption of caffeinated products, such as Redbull and Celsius energy drinks, caffeine can enter streams, rivers and lakes through littering and excretory processes. Wastewater treatment plants may not adequately remove caffeine from wastewater before it is released back into local waterways.

After analysis, water samples taken directly from the community were found to have caffeine concentrations ranging from 5.88-6.02 parts per billion (ppb). Caffeine has emerged as a contaminant to our marine environment. Studies have shown that caffeine can affect aquatic life behaviour. The ultimate purpose of this study is to understand the effects of caffeine at trace concentrations on marine organisms (zebra mussels) reproduction rates.

Presentation: EES02

School: School of Science and Technology Singapore

Project title: Image data acquisition and analysis from weather satellites using SDR

Presenters: Chan Yi Qian

Sustainable Development Goals: 13

This report focuses on how we can make use of a simple and low-cost SDR (software-defined radio) antennae and computer set-up to allow for the acquisition of Satellite Imagery, specifically NOAA satellites. The report begins by providing an overview of weather satellites and their importance in collecting valuable meteorological data. It then introduces how SDR can be used as a cost-effective and versatile tool for the purpose of image data acquisition from NOAA satellites. Here we report a comprehensive methodology for data collection and analysis for image data acquisition, including required hardware and software, instructions on how to get good satellite image data, processing data, and alternative hardware and software. The results section presents the acquired image data from NOAA satellites, featuring a mix of enhancement features available to visualise the image data. For the applications regarding climate action, the report presents how the analysis of weather in the short-term as well as the climate in the long-term. Overall, this report demonstrates how images from weather satellites can increase scholarly understanding of the weather and climate. The report also serves as an updated manual as to how we can receive and process data from weather satellites, using latest operating systems with older software.

Presentation: EES03

School: School of Science and Technology Singapore

Project title: Development of a system for data acquisition on lightning occurrences

Presenters: Colin Lee Zheng Ting

Sustainable Development Goals: 13

It is an indisputable fact that lightning plays a pivotal role in our society. The recent proliferation in technological developments has led to advancements in infrastructure. Consequently, as buildings continue to rise in height and complexity, the risk that lightning poses is thus significantly greater. The potential impact of lightning includes fire, power outages and many more, in long term this could lead to detrimental impacts in the form of disruptions in economical activities.

To mitigate and minimise these hazards, a sufficient understanding of this intriguing phenomena has to be obtained. This can be achieved by systematically monitoring and recording lightning behaviours and patterns in urban areas. With this goal in mind, a simple yet effective system of Software Define Radios (SDR) together with double plated antennas, and machine learning algorithms to identify the lightnings. To manage both the safety threats and potential damage to infrastructure and environment posed by lightning in Singapore, we aim to reveal more knowledge about the lightning phenomena to benefit the society.

Presentation: EES04

School: West Aurora High School

Project title: Bioremediation of polyurethane in soil using P. Microspora

Presenters: Caroline Escobedo, Yaretzi Guerrero, Zubeir Noorani

Sustainable Development Goals: 12 and 15

Microplastics, and their implications for the environment, remain an intricate and not fully understood subject of scientific inquiry. For this reason, we dedicated our research to this field. We also had an interest in the environment, specifically in soil, the foundation of nearly all land-based life on Earth. By pursuing avenues of bioremediation of soil, we aim to offer potential solutions to the vast array of problems associated with microplastics; including lower pH, lower seed germination, lower plant biomass, lower earthworm biomass, accumulation of toxic metals, and alterations in soil stability, all of which impact crucial soil functions.

Microplastics are the result of the breakdown of plastic materials that theoretically will occur over hundreds of thousands of years. These microplastics come from common products including textile fibers, cleaning and personal care products, and many types of packaging materials found in landfills. As plastics are found in most consumer products, their presence and consequences will be prevalent in the future. Eventually, these small plastic particles find their way into water and soil, leaching chemicals and other contaminants into nature. As we just focused on soil, our research centers on the contamination of soil by microplastics, their interactions and consequences on the environment.

Our preliminary research discovered the potential of a fungus, Pestalotiopsis microspora, to break down microplastics. In a lab setting, the fungus P. microspora has shown promise in breaking down plastic, but its ability in-situ is untested. This experiment seeks to see if P. microspora can break down microplastics, specifically polyurethane, within recreated natural conditions to assess their potential as a form of bioremediation.

School: New Beginning International School of Mongolia

Project title: Climate change of Mongolia

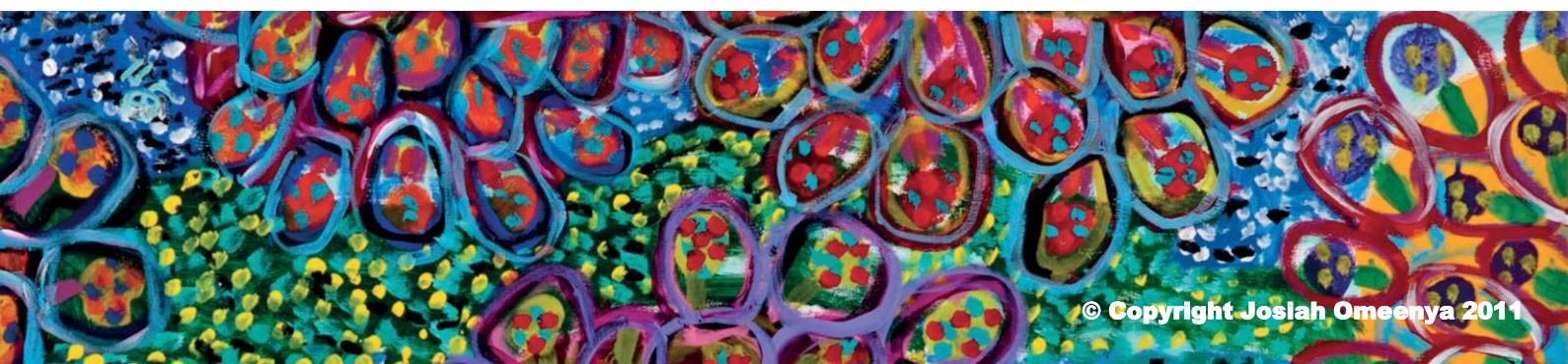
Presenters: Tanan Mungunchuluun, Bolormaa Luvsandorj

Sustainable Development Goals: 13

Things such as global warming and climate change are pressing problems even in our country. Human activities have been affecting the climate since around the 19th century and are having a major impact on global warming. First of all, based on historical records and archival data, the average surface temperature of Mongolia between the years 1900-1930 and the average surface temperature between 1990-2020 has warmed by approximately 2.1 °C. In addition, the average temperature of the earth's surface is about 1.1 °C (Source : Climate Change Knowledge Portal (CCKP)). According to this, temperature changes in Mongolia have increased more intensively than the world average.

Due to global warming and other major issues, Mongolia has been getting frequent cases of drought, more desertification and further problems that could affect our lifestyle heavily. In order to mitigate consequences caused by global warming we had to research various methodologies. Trees have substantial influence in CO₂ atmosphere – Trees would be able to reduce greenhouse gas. Therefore, our project carried out further investigations to discover the most suitable trees in our harsh climate. According to “BMEL” we found out that most suitable type of tree to grow is larch in our case. Larch trees live up to 600-1000 years, stores about 5 tonnes of water in its roots, stores 35.91 kg CO₂/year, produces O₃ [Root Knot – 30mg every 10 minutes] with the help of microorganism nematodes in the soil, produces 29.06 kg O₂/year, absorbs dust, has cold tolerance “-50°C” and when you burn it as fuel, it produces less smoke and heat compared to most of the common ones. Also, professionals said that they have good chance of growing well. So, we’re testing by planting them to test and increase its growing chance and survival ability even further. We may need some fertilizers - That way, everything would be more effective and efficient etc.

In conclusion, data indicate that Mongolia’s climate change is aggravating significantly compared to global - so with regards to Mongolia’s climate and larch wood’s suitable attributes, we hope it will bring positive outcomes.



School: John Monash Science School

Project title: Sustainable energy production: The designing of wind turbines that can sustain a high output facing unique and/or chaotic wind conditions

Presenters: Aidan Rhys Fernandes

Sustainable Development Goals: 7 and 11

This project was developed with the ongoing fight against climate change in mind. The consistent reports of a large shift in favour of renewable energies in both the media and international discussions, such as the upcoming 28th United Nations Climate Change Conference of Parties (COP28), has guided us for our aims.

This project was developed with climate change in mind as it is consistently present in the media. Our project focuses on renewable energies, which international discussions such as the upcoming 28th United Nations Climate Change Conference of Parties (COP28), show a large shift in favour towards. The project aims to compare different wind turbine designs to create a design that has the highest average rotations per minute (rpm) in face of chaotic wind in order to create a wind turbine that can sustain rotation within chaotic wind conditions present in landscapes such as cities or high-density areas.

The method undertaken for this project was designing two Horizontal Axis Wind Turbines (HAWT), with one being based on Bernoulli's principle and the other on lift. These were experimental designs combining different points of current wind turbine models using Computer Aided Modelling Software (CADs) and then 3D printed by Monash University. They were assembled using a combination of wood and 3D printed materials to create our wind turbines for testing.

It is hypothesised that our second design will have better results as the design is less reliant on perfect angles and design to function, but more on the wind being caught by the segments. The implications for this project would be around producing energy from within cities, enabling self-sustainability and green energy production.



Presentation: EES07

School: Fort Richmond Collegiate

Project title: Heavy Metal Biosorption by White Rot Fungus (*Ganoderma lucidum*) Within Aqueous Solutions

Presenters: Jinghua Zhao, Nuotong Wang

Sustainable Development Goals: 12

The UN Sustainable Development goal aims to ensure sustainable consumption and production patterns. The production of many electronic devices produces heavy metals wastes, which are catastrophic to the thriving of an ecosystem. Our project focuses on the ability of *G. lucidum*, a white rot fungus, to uptake heavy metal contaminants in the bioremediation process. The mycelium were grown in solutions of Copper(II), Zinc, Nickel(II) ions, then compared both qualitatively and quantitatively with a control group grown uncontaminated. The presence and relative concentration of heavy metal contaminants in both groups was tested using the IDEAS beamline at the Canadian Light Source.

At the time of publication, the results have not been determined. Ideally a large portion of the heavy metal was bio-absorbed, providing a cleaner, cheaper, and more efficient way to promote the sustainable development and consumption patterns for removal of heavy metals from soil and water. The planning and executing of our research spans 2 years, involving collaboration with many different institutions. As students participating in the Students on the Beamline program at the University of Saskatchewan's Canadian Light Source (CLS), the only synchrotron in Canada, we have worked extensively with the educational support team at the CLS. Our mycelium samples of Lingzhifungus, were supplied by Doctor Georg Hausner at the University of Manitoba.

Presentation: EES08

School: Darwin High School

Project title: The effect of fan speed alongside air conditioning temperature on maximising the optimal “feel” temperature whilst minimising energy costs

Presenters: Rangchak Tripura, Vincent Mondol, Niyaz Hasan

Sustainable Development Goals: 11, 12 and 13

Darwin, the northern-most tropical city in the Northern Territory of Australia, is notoriously known for its sweltering temperatures and unbearable humidity. Additionally, heat-related incidents and accidents are common; especially in buildings and classrooms which are, at times, highly conductive of the outer solar radiation and improperly circulative of the gusts of air-conditioning. This leads to health consequences; most commonly including heat exhaustion, dehydration, and symptoms related to hyperthermia.

This project was conducted to investigate the “perfect” relationship between ceiling fan speed and air-conditioning temperature to create the optimal “feel” environment, which included factors such as dry ambient temperature, relative humidity, wind speed, and solar radiation of the air temperature. The relationship between these variables were factored together to form the “feels-like heat index”, which are a series of calculations that are useful in providing evidence for suitable and unsuitable environments for the human body to thrive in. In a school environment, this data is intended to be implemented to create an optimal cool environment which improves students physical and mental health and well-being. The financial factor was also considered to minimise the school’s average energy costs. By heightening the air-conditioning temperature and lowering the fan speed to an optimal point which achieves its target of a comfortable temperate environment, costs can be saved from the current power outputs from these electrical devices.

Presentation: EES09

School: National Junior College Singapore

Project title: Phytoremediation of Zn²⁺ ions using sunflowers

Presenters: Kaixin Qiang, Isabelle Ang, Wan Ying Lim

Sustainable Development Goals: 11, 12 and 15

Zinc (Zn) is one of the essential mineral ions needed for successful plant growth. However, it is also a heavy metal that may pose harm to the environment and humans if found in excess concentrations. Currently, industrial wastewaters contaminated with Zn²⁺ that are released into soils and irrigative lands enable Zn²⁺ ions to leach into soils. This not only affects soil microbial diversity and pH, but also stunts growth and reduces crop yield. But sunflowers, described as zinc hyperaccumulators, have been shown to have the potential to undergo phytoremediation to absorb zinc in soil.

This paper investigates the tolerance of sunflowers at different concentrations of Zn²⁺. Sunflowers were grown under different concentrations of Zn²⁺ ions from 0ppm to 200ppm. The growth of plants was measured with 3 methods — height of the plant, number of leaves of the plant and the level of stress of the plant was estimated by taking the ratio of the amount of chlorophyll A to chlorophyll B. The results showed that the sunflowers managed to survive up to 100ppm of Zn²⁺. A decrease in number of flowers was seen after 20ppm.

Presentation: EES010

School: Illinois Mathematics and Science Academy

Project title: Soil carbon sequestration for climate change mitigation: understanding enzyme temperature optimum and function for soil organic carbon stability

Presenters: Joshua Lee

Sustainable Development Goals: 13

One of the leading ways to combat climate change is by reducing the amount of carbon dioxide in the air by means of carbon sequestration. Biological carbon sequestration is the process of storing carbon through vegetation, soil, and oceans. Understanding and utilizing the benefits of biological carbon sequestration requires a precise method of measuring the carbon composition of the soil. One of the ways to measure carbon composition is by using enzyme assays. Enzymes assays are highly valuable in biochemistry as they offer a method of measuring enzyme activity, which is an important factor when measuring soil quality and health.

An important factor when running enzyme assays is the incubation process. In order to make sure that an enzyme is giving an accurate reading of its potential enzyme activity, the enzyme needs to be incubated at its temperature optima. Many enzymes, especially ones that inhabit mammals, are often kept at the body temperature of about 37 degrees Celsius, which is the reason many enzymes' assays say to incubate the enzymes at a similar temperature. Because the enzymes that often inhabit soils are different from those that inhabit mammals, there is speculation on whether 37 degrees Celsius truly reflects the temperature optima for all enzymes. Our research shows that the temperature optima is not consistent across all enzymes. When running the assay for soils that react with para-nitrophenol linked substrates, specifically phosphomonoesterase (PME), there is clear evidence that the traditional 37 degrees Celsius used during incubation is not reflective of the temperature optima for PME which may be as high as 70 degrees Celsius.

Physics and engineering Abstracts

Presentation: PE01

School: Philippine Science High School Main Campus

Project title: Development of an H-Darrieus Vertical Axis Wind Turbine with Sailfish-inspired Blades (SDG 7,11)

Presenters: Alex Anthony Andal, Martin Gabriel Lopez and Salvador Recio

Sustainable Development Goals: 7 and 11

It was targeted by the Department of Energy that by 2030, 100% of Filipino households would have access to electricity services. However, inaccessibility to electricity in the Philippines, particularly in remote and isolated areas, remains an evident issue. To address this, renewable energy technology such as wind turbines, specifically Vertical Axis Wind Turbines (VAWT), can be used. The H-Darrieus Vertical Axis Wind Turbine (VAWT) has certain advantages over other turbines but, its main drawback is its low efficiency.

This project aims to provide electricity to areas without access to electricity by implementing an H-Darrieus VAWT with modified blades to increase its reliability and efficiency. The airfoil of the blade will be designed based on the body shape of a sailfish (*Istiophorus platypterus*). Simulation studies involving the performance of a sailfish airfoil were already conducted through the use of computational fluid dynamics (CFD) to determine the coefficients of lift. The coefficients of lift of the sailfish airfoil was compared to the produced coefficients of lift of the NACA0018 airfoil at five different angles of attack (-10°, -5°, 0°, 5°, 10°), and it was evident that the sailfish airfoil produced high coefficients of lift. A set of H-Darrieus VAWT blades with a sailfish airfoil and control NACA0018 airfoils were 3D printed. A modified and a control VAWT were assembled with blade count of 3, blade span of 1m, chord length of 0.083m, and rotor radius of 0.375m.

The modified VAWT will then be compared to the control VAWT with NACA0018 blades. Both set-ups will be tested, and their performance will be compared by investigating their power coefficients.

Presentation: PE02

School: Australian Science and Mathematics School

Project title: Investigation of the sustainable generation of electricity from human movement

Presenters: Vicky Lee and Sofia Obradovic

Sustainable Development Goals: 7, 11 and 12

This investigation is exploring the sustainable generation of electricity through human movement. The collaboration of students from the Australian Science and Mathematics School and St Odulphyslyceum in the Netherlands has resulted in the prototyping of a shoe which generates electricity from the process of walking. The mechanical energy generated from the impact of feet onto the ground is converted into electricity through piezoelectric transducers. These contain crystals which convert mechanical energy into electrical energy; this is known as the piezoelectric effect. The aim of the project is to collect and harness electrical energy and store it in a battery for personal uses, such as charging your phone. The widespread application of electricity generating shoes could help minimise the amount of electricity produced by the combustion of fossil fuels, ultimately lowering the amount of greenhouse gases in the atmosphere, reducing the effects of global warming and climate change.

Presentation: PE03

School: St-Odulphuslyceum

Project title: Electricity generated by piëzo elements

Presenters: Romy Burger, Sophie Verhagen, Jente Nefkens

Sustainable Development Goals: 7

There are lots of ways to generate energy, but they are all pretty big and not all ways are clean. We were thinking on a smaller scale and came up with an idea to generate energy by walking. Even though public transport and cars are popular, walking is still a big form of transport. In the Netherlands you aren't allowed to drive a car until the age of 18. Until then, many children cycle and walk. The elderly can sometimes no longer drive, and therefore have to walk as well. We started looking for a way in which people of all ages can generate energy.

We are going to generate energy by using the pressure that your foot exerts into your shoe sole and transferring that into electrical energy. By generating energy in this way, no pollution occurs. This contributes to reducing climate change, but also has another effect. Because people may walk more, we also contribute to positive health. The title of our project is: Generating electricity with piëzo Elements. We hope to contribute to the supply of green energy with this project.

Presentation: PE04

School: Galaxy International School, Uganda

Project title: Kanada Project - Purification of polluted water by solar energy

Presenters: Shawna Amihere and Selihom Yohannees

Sustainable Development Goals: 7

With the increase of population in the world, shortage of potable water is becoming more noticeable. Just hundred years ago water was free and you couldn't imagine that some day you will pay too much money for a bottle of water. In the past few years, some large bottling companies have tried to dominate the water resources of the word by purchasing natural springs and other water rights in many different countries. Soon many people in the world cannot afford to purchase fresh or drinking water. When we run out of freshwater resources, we will need to purify water for our consumption.

We shall consider distillation method for our project. Distillation is the most reliable and efficient method of water purifications. All other methods including de-ionization and filtration can only remove parts of impurities and often introduce new impurities to the water. Distillation is often performed by heating water to its boiling point. At that temperature water evaporates and is directed to condensers where liquid water will be formed again. The purpose of this investigation is to design and construct a water distillation apparatus that can work with solar energy.

In this experiment we intend to make low-cost, practical means to provide safe drinking water in rural and urban areas where needed. The key to this method lies in the ability of direct sunlight to evaporate water faster. Solar radiation is a form of renewable energy that is abundant and accessible in many parts of the world. The system can potentially be used in small communities, refugee camps, institutions, disaster situations and in factories for their water recycle.

School: Korea Science Academy of KAIST

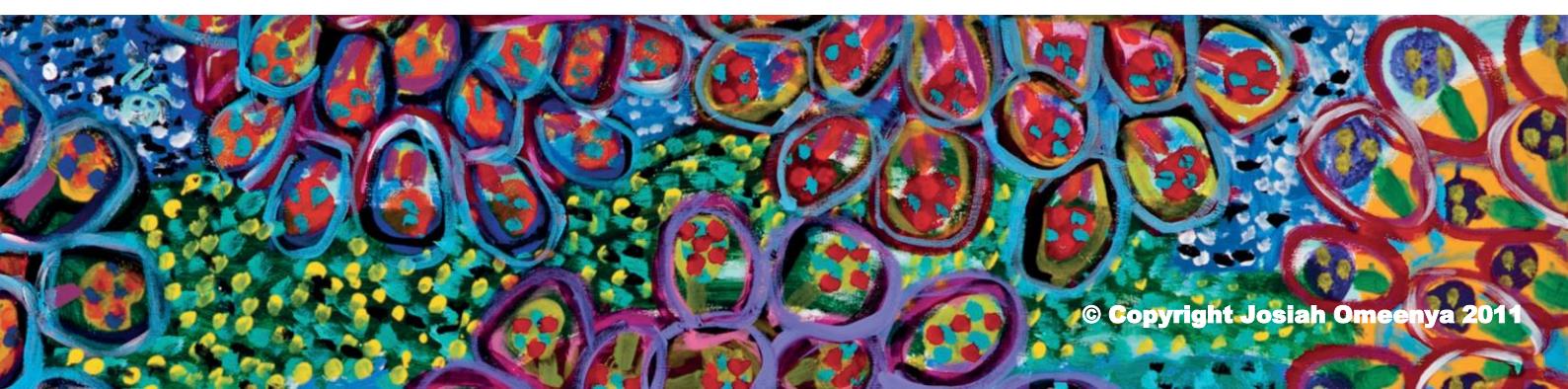
Project title: Verification of quantum key distribution via description and implementation of mixed states

Presenters: Seongmin Hong, Jiwoo Hong

Sustainable Development Goals: Other

Quantum physics presented a totally new scheme for the operation of closed systems, enabling to leap over classical limits to miraculous applications. Its usage in information theory led to a new systematic approach to secure communications; quantum key distribution (QKD). The area of QKD began to grow with from when Bennett and Brassard devised towards the first QKD protocol in 1984, allowing to detect eavesdroppers, and gained acceleration from then where it is widely used everywhere. Meanwhile, starting with John Stewart Bell in 1964, a lot of critics including Clauser-Horn-Shimony-Holtz suggested various forms of inequalities which satisfy when assuming local realism. Experimentalists including Alan Aspect showed those inequalities are violated via experiments involving quantum entanglement, laureated with the Novel Prize in 2022 for the achievement. One infamous example of the development, E91 protocol (suggested by Ekert in 1991) highlighted that the violation can work as a quantitative measure for the information loss due to deviations and eavesdroppers. However, the security of the protocol is based on a somewhat subtle assumption, where the intervention of eavesdropper breaks quantum interactions-inducing the CHSH inequality true.

Since the application of QKD to cryptography ensures security, enabling members of society to trust the communication system, guaranteeing the soundness of the protocol – which might lead to fundamental security – is integral for sustainable communities. Hence, we aim to clarify the boundaries of E91 protocol in quantum physics theoretically and experimentally. For this, investigation for the conditions where the measurement of the eavesdropper drops the CHSH coefficient less than 2 will be done mathematically. Also, we will implement the system using simply modified E91 protocol and construct the E91 protocol directly using quantum computer provided by IBM.



Computing and mathematics

Abstracts

Presentation: CM01

School: NUS High School of Mathematics and Science

Project title: A picture is worth a thousand steps: Using image processing techniques to predict freezing of gait in Parkinson's patients

Presenters: Prannaya Gupta, Ananya Nallapuraju

Sustainable Development Goals: 11

Parkinson's Disease is a neurodegenerative disease that affects the ability to perform activities of daily living. A debilitating syndrome of Parkinson's is Freezing of Gait (FoG), where patients are unable to move forward despite intention of walking, resulting in the forward momentum shifting to the torso and leading patients to fall, causing serious medical consequences. Prior work has explored that use of gait tests, medical questionnaires and inertial measurement units to predict FoG events.

In this research, a comprehensive review of various input formats, signal processing algorithms and machine learning algorithms to predict FoG has been performed. Raw signal data and the Moore-Bachlin algorithm have been studied, and we introduce a novel method for image representation via autoscaling and RGB pixilation. We find that a 2-dimensional convolutional neural network (CNN) performs the best on scaled images, attaining a state-of-the-art accuracy 99.50% and sensitivity of 99.65%, that has been verified via various K-Folds and overfitting tests. We also integrate this model into an Android application which can be used by patients and doctors to predict and track freeze events over a period of time. This can help doctors diagnose patients and gauge the severity of the disease to prescribe medication accordingly.

Presentation: CM02

School: John Monash Science School

Project title: Creating an AI based model for predicting potential epidemics and the impact of preventative measures on the emerging epidemics (how to minimise impact and environmental costs)

Presenters: Mishanya Romadinov, Raghav Zutshi

Sustainable Development Goals: 3

Artificial intelligence has significantly changed the landscape of research and with a substantiated promise of practical applicability in the real world. From historic pandemics like the Spanish flu to the more recent challenges posed by COVID-19, our struggle against unfamiliar infectious diseases has often been hampered by a lack of effective strategies. This is why with the rise of artificial intelligence it is imperative that we utilize machine learning to predict pandemics.

The aim of this project is to prepare us for the unknown by creating an accurate artificial intelligence-based model to predict pandemics and to see the impact of preventative measures, like masks and lockdowns on emerging epidemics. This project will help governments to manage resources and implement proper epidemiological countermeasures effectively. Through judicious use of limited resources and preventative measures, we aim to avoid epidemics, which have huge environmental, health, economic, and productivity ramifications.

The initial model started from a basic simulation of particles acting as people with random velocities in a closed box and seeing how it spread. We then later develop this model with more features that increase its accuracy and consider more variables in the equation. By taking inspiration from similar models such as the SIR (susceptible-infected-removed) model, we aim to improve the accuracy of our model over time. Additionally, the backpropagation trains our model a step further with covid records containing key data, such as the number of deaths and infections. This backpropagation adjusts the variables such as the radius and how the individuals move in order for it to match with its training data. Through using past cases we are able to increase the reliability of our model and then see what preventative measures would work for varying infectious diseases.

Presentation: CM03

School: Experimental School of Beihang University

Project title: Automated air traffic control system

Presenters: Liu Zhixuan

Sustainable Development Goals:

The project is a centralized system targeted to planning flight paths in a way to avoid collisions, and to keep the paths as optimized as possible. The system would, for each flight path, give it a score according to the pilot's intentions (for example, if the pilot would like to climb, but the flight path would have the plane to descend, the score gets very low). The system would insistently try to have the sum of the all the scores of the flight paths to be as high as possible. In order to achieve such, the system would first generate an 'Ideal flight path' for each aircraft according to pilot intentions, and modify them only when possible collisions with either other aircraft or terrain were to occur. The project provides a linear way to modify the flight paths, as well as some data structures to store the terrain location.

Presentation: CM04

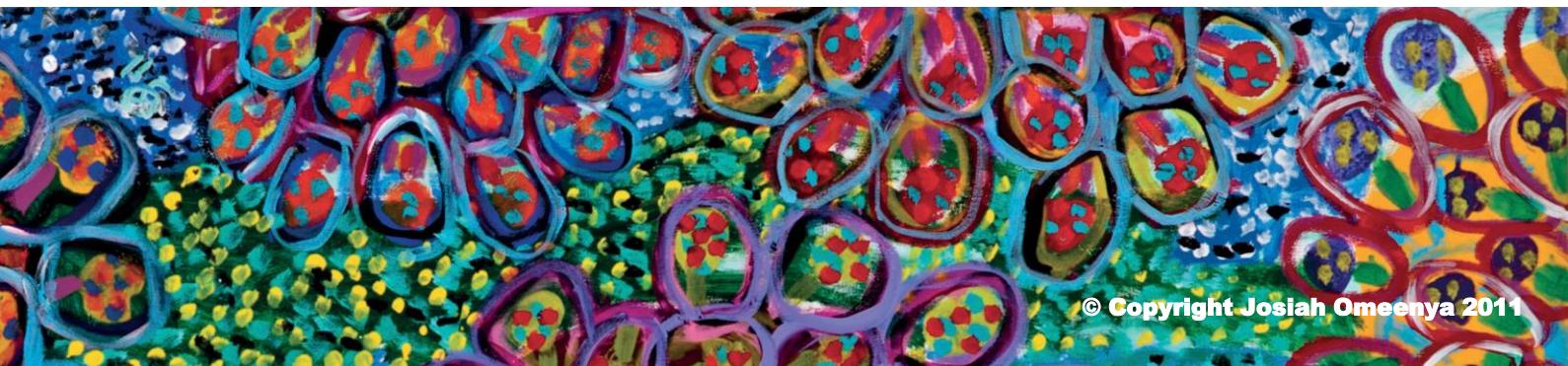
School: Ritsumeikan High School

Project title: Optimal frequency ratio for chords

Presenters: Ryo Imaizumi

Sustainable Development Goals: 3 Other

The research aims to determine optimal frequency ratios to enhance chord quality. While Equal Temperament, a commonly used tuning method for instruments like pianos, has its merits, it cannot produce the best-sounding chords. To address this issue, Adjusting the intervals is essential to obtain better-sounding chords. The beauty of chords is closely linked to the least common multiple (LCM) of their frequency ratios. Through this research, optimal frequency ratios have been identified for various chord types: Major chords: 4:5:6. Minor chords: 10:12:15. Augmented chords: 16:20:25. Diminished chords: 5:6:7. Suspended 4th chords: 6:8:9. Utilizing these ratios helps musicians create more beautiful chords. Additionally, an instrument is planned for automatic adjustment to these optimal intervals during chord play.



Chemistry and nanoscience Abstracts

Presentation: CN01

School: Tokyo Tech High School of Science and Technology

Project title: Evaluation of mud microbial fuel cells with Carboxylates or 2-Hydroxy Carboxylates added as nutrients for bacteria

Presenters: Ayaka Takema, Yui Takeyasu, Sachina Watanuki

Sustainable Development Goals: 7

Currently, the “energy problem” is a global issue. One solution may be the use of mud cells, which have potential as a renewable energy source because they generate electricity using the life activities of microbes in the soil. Moreover, mud cells may contribute to the achievement of Goals 7 and 8 of the SDGs. Soil collected from the school ground was mixed with water to make mud and placed in plastic pots. Mud cells were assembled using a platinum-catalyzed carbon felt as the anode, and a carbon felt as the cathode. The mud cells were placed in an incubator to maintain a constant temperature, and the voltage was recorded with a data logger connected to a fixed 10 kΩ resistor. Once a week, the power density of the cells was measured with a potentiostat.

In this study, some kinds of nutrients, namely carboxylates and 2-hydroxy carboxylates, were tested to see if they increase power-generating bacteria in the cells. Also, separation and identification of bacteria increasing around the anode were tested by constructing electrochemical cells, using a portion of the anode from the cell as the working electrode, platinum as the counter electrode, Ag/AgCl reference electrode, and a culture fluid including phthalic acid, which is predicted to be a nutrient for power generating bacteria. The electrochemical cells, maintained at 30°C, were connected to a potentiostat. The working electrode was set at -0.2 V vs. SHE. The analysis was performed using next generation sequencing to identify the bacteria flora in the anodes. In addition, to investigate the possibility of bacteria multiplication from waste ingredients, 5g each of edible and waste portions of potato, lemon, onion and radish were placed in the mud cells, and changes in the voltage were recorded.

Presentation: CN02

School: NUS High School of Mathematics and Science

Project title: Enantioselective synthesis of biaryl atropisomers using distal ionic interactions from Suzuki Miyaura Reaction

Presenters: Lim Teck Kong

Sustainable Development Goals: 11

Biaryl atropisomers are important in the synthesis of antiviral, antihypertensive and antifungal drugs. While the traditional Suzuki-Miyaura reaction with a neutral ligand is the most widely used method to construct biaryl atropisomers, there remain certain compounds difficult to synthesize with favourable enantiomeric purity. Hence, in this report, we investigated the use of novel chiral anionic ligands in Suzuki-Miyaura reaction to synthesise biaryl atropisomers with high enantiomeric purity.

It was observed that anionic chiral ligands have the potential to display distal ionic substrate-catalyst interactions and direct axial chirality of resulting biaryl compounds. As such, we investigated the use of ionic interactions in Suzuki-Miyaura reactions by changing the substituents of the boronic acid and bromide substrates reacting with a novel anionic chiral ligand. There was a significant increase in enantiomeric excess (ee) of up to 74% when anionic ligand is used instead of neutral ligand. We also managed to optimise a disubstituted diamine biaryl atropisomer reaction by varying bases and found that K₂CO₃ was the superior base affording product in 60% ee.

With the use of ionic interactions in Suzuki Miyaura reactions, we were able to improve upon traditional Suzuki Miyaura reactions with neutral ligand to obtain compounds with excellent yield and enantiomeric purity, thereby providing a potentially more efficient method for the enantioselective synthesis of biaryl atropisomers.

Presentation: CN03

School: Moscow South-Eastern School named after V.I. Chuikov

Project title: Enantiomerically enriched (2-fluoroallyl) pyridinium salts: synthesis and their application as the mechanistic probe in Pd-catalyzed asymmetric allylic amination

Presenters: Timur Akhmedov

Sustainable Development Goals: 12

Fluorinated compounds have found a broad application in modern drug design. In particular, fluoroalkene moiety is an efficient mimic of the amide bond, due to the similarity of steric and electronic parameters. In turn, this increases the hydrolytic stability, lipophilicity, and permeability through membranes. Thus, substances containing fluoroalkene moiety manifest antimicrobial, anticancer, anti-diabetic, anti-HIV and other types of pharmacological activities.

At this stage, the effective preparation of fluoroalkene compounds based on Tsuji-Trost reaction has been studied using allyl pyridinium salts, because only pyridine stands as a good leaving group. Based on the classical ideas about the mechanism of Pd-AAA (AAA = Asymmetric Allylic Amination), the configuration of the chiral center is preserved because of the double configuration inversion. As a result, a racemic product is obtained from a racemic substrate. In attempt to produce a single enantiomer, a palladium catalyst with a chiral ligand was used.

As we know, fast equilibrium in the palladium complex $\eta^3\text{-}\eta^1\text{-}\eta^3$ does not lead to its racemization. Therefore, in our work we decided to synthesize enantiomerically enriched pyridine salts in order to investigate whether there is an equilibrium between enantiomers of palladium complex and how it can be controlled. The initial task was to obtain chiral primary amines from pyridinium salts. Our group achieved this by Tsuji-Trost reaction with chiral palladium complexes based on oxazoline ligands. The next step was to produce chiral pyridinium salts, which is not described in the literature. There are several methods to obtain pyridinium salts, but Zincke reaction is a fairly reliable method that is applicable to a wide scope of substrates. Using the previously obtained Zinc salt, we tried to synthesize enantiomerically enriched pyridinium salts.

Presentation: CN04

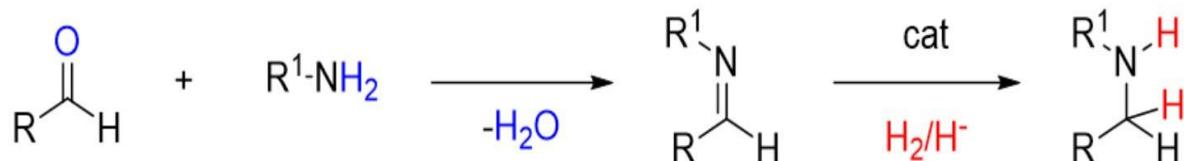
School: Moscow South-Eastern School named after V.I. Chuikov

Project title: Reductive amination without external hydrogen sources

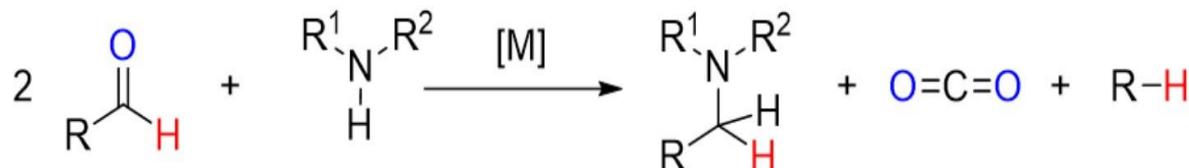
Presenters: Viktoriia Dragun

Sustainable Development Goals: 12

Nowadays life without amine compounds and their products is hard to imagine. Amines and their derivatives are used in industry and medicine. The most common approach for the synthesis of amines of complex structure is reductive amination. This method is based on the reaction between a carbonyl compound and an amine with the following reduction.



Meanwhile some of the reducing agents needed for the second step could not be accessible in the laboratory. For this project, we wanted to figure out whether reductive amination can be accessible without external hydrogen sources in the presence of an aldehyde and an amine only. As a result, we have shown that it is fundamentally possible to provide such a transformation.



Presentation: CN05

School: Experimental School of Beihang University

Project title: Preparation process and application of conductive hydrogel

Presenters: Wang Borui

Sustainable Development Goals: Other

My project is called conductive hydrogel, the reason why I choose it is that I am interested in chemistry, especially in electricity also, conductive hydrogel has wide use recent days. And have many possibilities. The ultimate expectation of this project is to control its conductivity based on the salt added. It is mainly made by salt and water, there is also initiator and adhesive. After diluting, it will be put into ultraviolet lamp to cure it and make it as a gel. At last it will become a substance that lies between solid and liquid. The result conductive hydrogel is that the more salt added, the less resistance it has. The descent of the resistance is conspicuous. By the way, conductive hydrogel also plays an important role on technological use such as spread electric signal in people's body or be the bone of the flexible sensor that can be put into wearable devices.

Presentation: CN07

School: Budi Mulia Dua International High School, Indonesia

Project title: Potential of edible film from aloe vera and lime (*Citrus aurantiifolia*) peel extract for traditional snack

Presenters: Queena Calya Rabbanee Wibowo, Selaksa Alun Samudra, Sabila Ramadhan Putriku Calita

Sustainable Development Goals: 12

Traditional Indonesian food wrappers have shifted from leaves to plastic. Due to the plastic used is not sustainable, it is required to replace non-degradable plastic with biodegradable edible film. Edible coatings on food wrappers must be supplemented with antioxidants to increase food safety and quality by suppressing food degradation reactions. Antioxidants included in aloe vera and orange peel help to improve the quality of edible films. In Indonesia, aloe vera and orange juice are common beverage ingredients. Drinks made from these two components can be found everywhere from vendors to restaurants. However, the ingestion of aloe vera and orange juice results in waste in the form of peels. Mass production of aloe vera and orange drinks results in the accumulation of skin waste. Aloe vera and orange peels are organic waste that is rich in antioxidants so that these two substances have the potential to enrich edible films that can be used as food wrappers. This study aims to compare the mechanical (thickness, tensile strength, elongation at break), hydrodynamic, colour, and antioxidant properties of edible films enriched with aloe vera and lemon peel.

Presentation: CN08

School: Illinois Mathematics and Science Academy

Project title: Precision Immuno-RadioNanoTherapy for metastatic cancer

Presenters: Divya Brahmbhatt

Sustainable Development Goals: 3

This research focuses on X-ray-induced photodynamic therapy (XPDT) for the treatment of ovarian cancer, with specific emphasis on Immuno-RadioNanoTherapy (IRNT). The approach combines low dose radiation therapy with immunotherapy, targeting Interleukin-13 receptor alpha 2 (IL-13Ra2) in ovarian cancer with nanoparticles that have the ability to generate an enhanced amount of reactive oxygen species (ROS), which are meant to eradicate cancerous cells while sparing healthy ones. Y2O3:Eu nanoparticles were first synthesized and then coated with silica shells.

The core sizes and shell thicknesses of the Y2O3:Eu@SiO₂ nanoparticles (NPs) along with their morphology were measured by a transmission electronic microscope (TEM). Next, the antibody against tumor surface protein Interleukin13 receptor α2 (IL13Ra2) was conjugated to Y2O3:Eu@SiO₂ to produce NPs that specifically target cancer (NP-AbIL13Ra2). An enzyme-linked-sandwich-assay (ELISA) was performed to determine the functionality of the antibodies on NP-AbIL13Ra2 after the conjugation. Their ability to generate radiation-induced ROS was also confirmed by dihydroethidium (DHE).

The TEM showed that the NPs had a spherical shape with a mean core size of 133 nm and a mean coating size of 7 nm. Compared to the purified IL13Ra2 antibody standard, the NP-AbIL13Ra2 showed similar binding activity to its antigen IL13Ra2 as demonstrated by the ELISA results. The radiation-induced ROS production presented as the ratio of DHE fluorescent intensity was 2.3 fold higher than the ratios generated by PBS only.

When intraperitoneally injected into ovarian cancer mouse models, these nanoparticles show enhanced mouse survival rates. We are employing intravital multiphoton microscopy and molecular imaging to track nanoparticle fate in the reticuloendothelial system, optimizing pharmacodynamics and minimizing nanotoxicity concerns. Ultimately, our research aims to improve healthcare delivery and patient outcomes, and thus, further research should focus on this therapy's clinical use.

EDUCATOR ABSTRACTS

Monday 4 December 2023

**Mr Alejandro Jose
Tuazon**

Philippine Science High
School

Introducing engineering in high school: Philippine Science High School experience

A sharing of the PSHS experience in teaching engineering to senior high school students

The Philippine Science High School (PSHS) revamped the school curriculum 10 years ago to provide students the needed skills and knowledge they are expected to face both in university and in their professional careers. One of these changes is the offering of an Engineering elective class for grade 11-12 students that focuses on giving students a taste of what it feels to be an engineer. Topics tackled are career exploration, contextualizing the relationship of engineering and society, engineering ethics, experiential activities, engineering techniques in problem identification, problem solving, and soft skills such as team management and communication skills all with no math involved. The presentation shares the PSHS experience in teaching engineering and the various activities the students experience.

Dr Janjira Maneesan

Kamnoetvidya Science
Academy

The abundant elective subjects in school, helps students accomplish their project and further study goals

In KVIS, many Elective Subjects are provided for M. 5 and M.6 students. The students need to finish at least 10 credits before graduation in Grade 12. There are various choices in different fields, from science and technology subjects such as Physics, Chemistry, Biology, Mathematics, Computer Sciences and Engineering, to non-Science subjects such as Foreign Language (3rd language (Japanese, Spanish, Chinese, Korean, German, French, etc.), modern Thai language and social subjects. All the elective subjects focus on advanced knowledge and new skills, and some parts are beyond high school level which are not included in the normal subjects. Students can select based on their interests related to their project, their further study, or their favourite fields. Moreover, these subjects also open a new world for students who do not yet know or want to know more about the nature of each field to help them seek a suitable field of study for themselves.

Jennifer Piasecki

Fort Richmond Collegiate

Extracurricular science involvement in Canada

As the teacher of an Extracurricular Topics in Science class, involving students in science opportunities outside of the classroom is the focus of the course. Ideas and details will be shared for SHArK citizen science, Synchrotron research, Brain Bee competitions, Namao research vessel explorations, SHAD Canada, Adopt a Physicist, Engineer in Residence, plus many more.



James Wanamaker

Lewiston-Porter

How I learned to stop worrying and love the storylines

Learn about an educator's journey from being a traditional "Sage on the Stage" style of teacher to the "Guide on the Side," through the use of storyline-based biology. Hear about the successes and near-disasters of taking this great educational leap into a more modern style of teaching. See how storylines can replace the more conventional units like genetics, evolution, and ecology. The power of student-driven instruction has many strengths and can be a great motivator to students who get bored easily when a teacher starts talking to their class. Jim Wanamaker, a teacher from Lewiston-Porter High School in New York state with over 30 years of classroom experience, will share some of his experiences and what made him choose such a drastic change to his teaching methods at this stage in his career. He has always been a proponent of making his class be the type that he would want to be a student in. So the decision to change methods was the result of a great amount of deliberation and trepidation.

Dr. Ramazan Bayar

Galaxy International

Embracing innovation in education: Harnessing technology for project-based learning

In the rapidly evolving landscape of education, the integration of innovative technologies and project-based learning has emerged as a transformative approach to engage students and foster critical skills. This presentation aims to explore the dynamic intersection of these two educational paradigms, shedding light on their synergy and potential to enhance the learning experience.

We will delve into the various innovative technologies that can be seamlessly incorporated into the classroom, including virtual reality, artificial intelligence, online collaboration tools, and more. These technologies not only facilitate personalized learning but also empower students to explore and create in ways previously unimaginable.

Project-based learning, as a cornerstone of 21st-century education, will be at the forefront of our discussion. We will delve into its principles, benefits, and strategies for effective implementation. By combining project-based learning with cutting-edge technology, educators can create an immersive, student-centred environment that promotes critical thinking, problem-solving, and collaboration skills.

Elena Germanovich

Moscow

South-Eastern School
named after
V. I. Chukov**Integration as an effective method of teaching**

Nowadays, a modern school is faced with the most important educational task: to form an idea of a unity and diversity of the world. And in this case, it is impossible to separate English from other school subjects. My pedagogical methods for teaching English are based on the idea of integration. To my mind, integration forces students to analyze and compare, search the connections between phenomena and objects around them. As for me, I use this direction in project activities with pupils from the age of 10-11. These projects are often followed by discoveries both in the field of the main subject (biology, IT, chemistry, literature etc.) and the English language and they are always connected with any practice that is close to our life. For instance, students can do the research work in the fields of zoology (watching the living conditions of animals in the Moscow Zoo) and defend this project in English. Another example is IT and English connection when students create and code their own educational chatbot to get ready for the State English Exam. Such projects give even young pupils the opportunity to participate in international competitions and conferences.

Ng Oon Hui

NUS High School of Mathematics and Science, Singapore

Sustainability and Innovation in curriculum for soon-to-be graduates

This presentation explores a pedagogical approach that integrates Differentiated Instruction (DI), Sustainability, and Innovation into the final year biology curriculum.

Our journey begins with an exploration of the foundations of DI, emphasizing its potential to cater to diverse learning styles, abilities, and interests within the classroom. Next, we will showcase some practical strategies that empower educators to customize their teaching to meet individual student needs, fostering a deeper and more inclusive learning experience.

Finally, with the basis of DI, we craft assessments that infuse sustainability and innovation, allowing students to engage with real-world challenges within the context of their own school. Witness how they foster critical thinking, problem-solving, and a profound sense of environmental stewardship as they go about completing their collaborative projects that seek to inspire the next generation of school-going staff and students coming into NUS HIGH SCHOOL.

Emma Haase

Camborne Science and International Academy

Metacognition

Metacognition is the process of thinking about one's own thinking and learning. This presentation will feature how the latest research in this field is successfully applied through pedagogy in UK schools.

Mr. Tan Hoe Teck

School of Science and Technology, Singapore

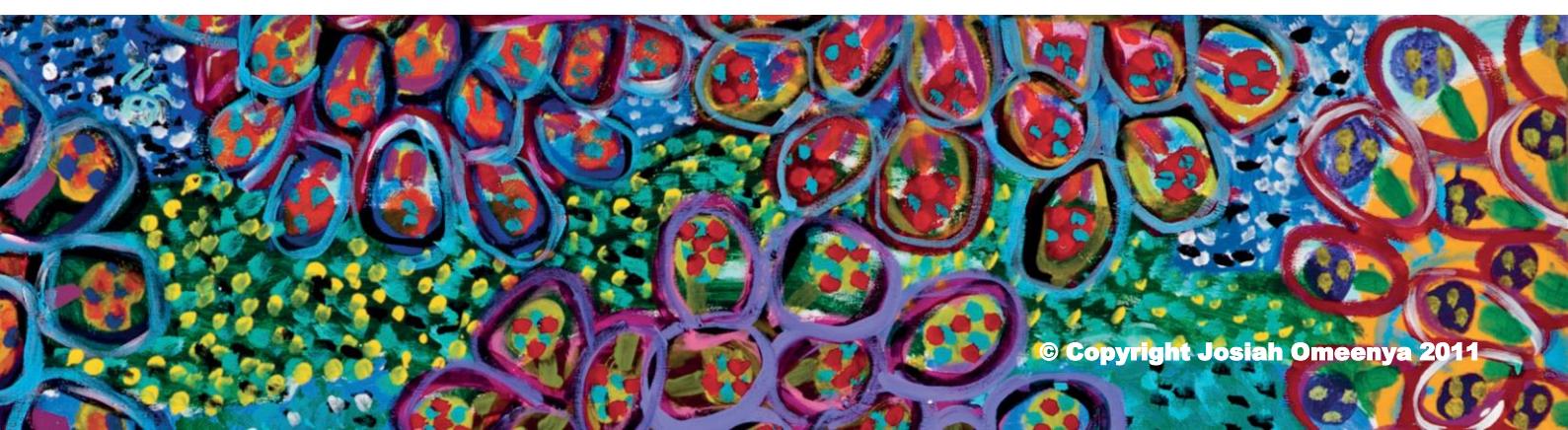
Development of Arduino-based labs for science investigations

Traditionally, student science experiments are used in the science curricula to let the students discover and measure phenomena that they are studying. Experimental setups can range from rudimentary (e.g., a stopwatch to measure the fall of a rock) to highly elaborate (E.g., using spectrometer to measure ones).

A key parameter for successful learning is student engagement.

Engagement can take the form of hands-on activity where students participate actively in the development or modification of the measuring instrument. The Arduino microcontroller device can be used as data logger. Its low-cost and publicly available support can encourage sharing of ideas, tinkering and creativity amongst the students in problem solving during science experiments.

In terms of pedagogy, such an engaging environment is ideally suited to a project-based learning (PBL) framework. In this workshop, we will look at how the Arduino can be used to improve student engagement in data collection.



Arthur Goh

National Junior College
Singapore

STE(A)M Interdisciplinary approach to promote future readiness

STE(A)M education is paramount for preparing our youth for current and future challenges. We would be sharing our experiences in the use of interdisciplinary approach within a context-driven curriculum and integrating gamified inquiry-based learning. This allows an engaging and authentic educational journey that fosters holistic character and skill development. Rooted in real-life contexts (such as food security, healthcare, resource management), this approach ensures that STE(A)M learning is not just theoretical but practical, meaningful, and relevant. We endeavour to develop students who are not only academically adept but also future-ready, armed with agile problem-solving acumen essential for navigating the ever-evolving demands of the professional landscape.

Fiona Bui

John Monash Science
School

Positive Education in the classroom

Positive Education is a set of values that is embraced in all facets of school-life at John Monash Science School and seeks to promote all aspects of positive psychology, including positive relationships, health, emotions, engagement, accomplishment and purpose. Over the past few years we have strived, in particular, to help all members of the school community to embrace the understanding that looking after student wellbeing can help them to thrive academically as well as personally.

In this session we will provide some insight into the journey taken by John Monash Science School as we work to embed the principles and practices of Positive Education into our classrooms. We will share some of the learnings and practical strategies that we have incorporated into our classrooms to ensure student achievement is linked to student wellbeing. In particular, we will focus on the areas of sleep, brain breaks and positive relationships and showcase some of the strategies explored.

Sandy Scott

West Aurora High School,
USA

My experience with driving question boards

West Aurora has focused on incorporating driving question boards into our science curriculum over the past year. A student-led driving question board is an educational tool that empowers students to take the reins of their learning experience by generating and exploring questions to propel their studies forward. At its core, this approach encourages inquiry-based learning. Instead of passively absorbing information, students actively engage with course material by formulating open-ended questions that spark curiosity. These questions serve as the compass guiding their exploration of topics, allowing for personalized and deeper understanding. I recently incorporated this technique into our Nuclear Energy unit. Students had a chance to analyze information and then create, select and prioritize questions.

Throughout their learning journey they had opportunities to consider their learning goals, engage in meaningful discussions and determine the relevance of each query. I have found that this approach promotes collaboration, peer interaction, and a sense of shared responsibility for learning, ultimately leading to a more engaging and student-driven classroom environment.

Lia Yuniarti

Budi Mulia Dua

International High School,
Indonesia

Differentiating instruction in inquiry-based learning to assess science process skills

Inquiry-based learning has been widely applied in science education to improve students' Science Process Skills (SPS). Since not all students learn at the same pace or in the same way, Differentiated Instruction (DI) is essential to ensure that all students can access and benefit from inquiry-based science education. Therefore, this paper presented an in-subject study that explores science process skills in a differentiated inquiry instruction setting.

The study was conducted in an Indonesian secondary school for grade 10. Students were divided into three groups based on learning readiness. Students then studied electrolyte and non-electrolyte solutions with differentiated inquiry instructions. Data were collected through observations & worksheet assessment. The results showed that most of the students' SPS profiles were nearing mastery level, with the highest average SPS score achieved by the group with high learning readiness, while the lower learning readiness achieved the lowest average. This research contributes new knowledge to understand DI in inquiry-based learning better, resulting in meaningful implications on pedagogy and assessment in the field of SPS.

**Dr Glenn Beaumont
& Dr Inga Mertens-
Walker**

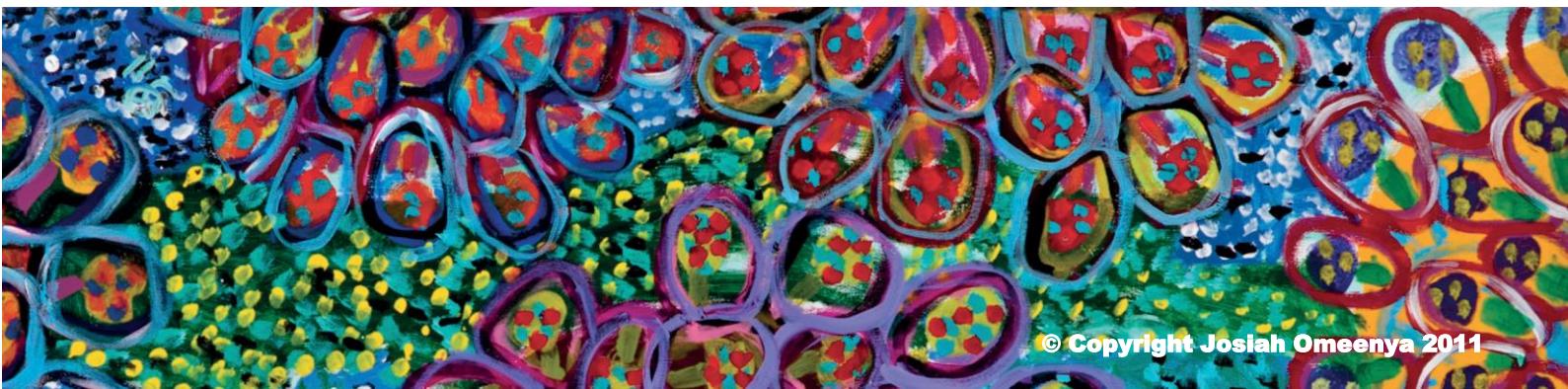
QASMT

Queensland Virtual STEM Academy (QVSA)

An insight into a system initiative which provides enrichment in STEM for highly capable students from rural and remote schools, utilising an innovative virtual platform and digital teaching and learning practices.

The Queensland Virtual STEM Academy (QVSA) is a state schooling initiative which delivers courses to expand and enhance STEM opportunities for highly capable students in grades 5-9 through enriching and challenging courses. The program specifically seeks to enhance opportunities and the aspiration of our female, indigenous, rural and remote, and socio disadvantaged students to create a motivated STEM learning community.

In this session, you will be introduced to how the QVSA threads together STEM pedagogical frameworks, 21st century skills and high potential educational practices alongside digital teaching and learning principals. The outcomes of this are immersive virtual learning enrichment courses, where student collaborate with other like-minded students and experts in developing STEM solutions to the challenges that face our world.

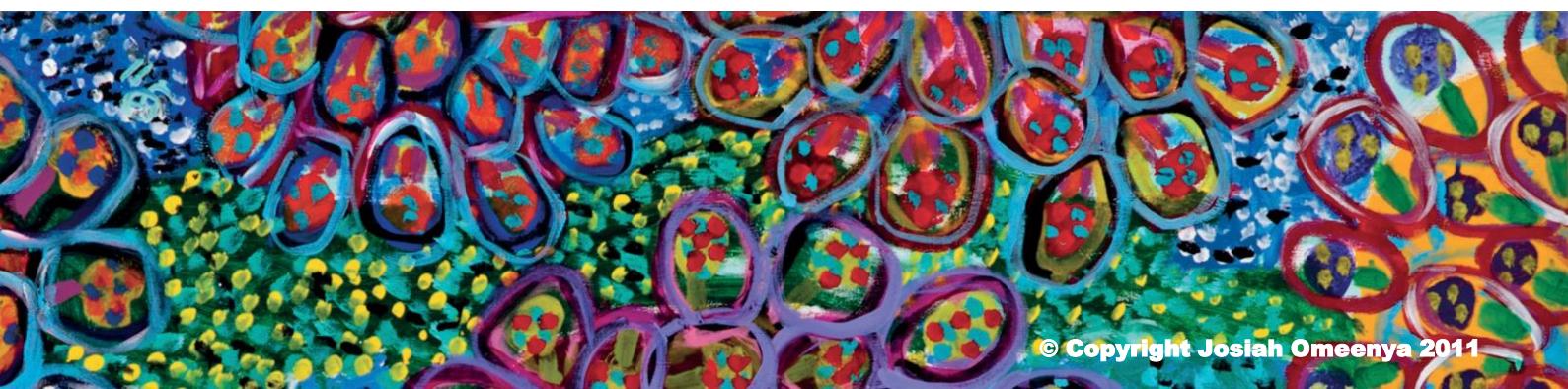


APPENDIX 1: QASMT STEM WORKSHOPS ALLOCATION LIST

Monday 4 December 2023

Workshop 1 Microfiltration	Workshop 2 Water planning	Workshop 3 Hendra Virus	Workshop 4 Gratzel Cell	Workshop 5 Fruity Tones	Workshop 6 Dreaming Gold	Workshop 7 Rubbish Robots
Location: L01	Location: L16/17	Location: L10/11	Location: L08/09	Location: L06/07	Location: L03/04	Location: L18/19
Kaixin Qiang (NJC)	Haruho Yamaguchi (Ritsumeikan)	Isabelle Ang (NJC)	Matthew Long (Lew_Porter)	Ryo Imaizumi (Ritsumeikan)	Romy Burger (St-Odulphusl)	Leonardo Zhao (Fort Richmond)
Wan Ying Lim (NJC)	Raelyn Liang (QASMT)	Chananrat Tiranum-pongvanich (KVIS)	Hope Parkhill-Wylie (Lew_Porter)	Yuto Inoue (Ritsumeikan)	Jente Nefkens (St-Odulphusl)	Tony Wang (Fort Richmond)
Dominic Tracy (Lew-Porter)	Queena Calya Rabbanee Wibowo (Budi Mulia Dua)	Virakarn Boonfahpratan (KVIS)	Aaron Wei (QASMT)	Aakash Racha (QASMT)	Sophie Verhagen (St-Odulphusl)	Rachel Rabuya (QASMT)
Mary Do (QASMT)	Selaksa Alun Samudra (Budi Mulia Dua)	Sejal Gupta (QASMT)	Timur Akhmedov (Moscow)	Emma Liang-Godber (QASMT)	Iris Landy (QASMT)	Daniel D'Souza (QASMT)
Chan Yi Qian (SST, Singapore)	Sabila Ramadhan Putriku Calita (Budi Mulia Dua)	Ayaka Takema (Tokyo Tech)	Selihom Eskndr Yohannees (Galaxy)	Viktoriia Dragun (Moscow)	Bolormaa Luvsandorj (Mongolia)	Lucas Lim (QASMT)
Anika Gupta (QASMT)	Mido He (QASMT)	Yui Takeyasu (Tokyo Tech)	Lim Teck Kong (NUS)	Colin Lee Zheng Ting (SST, Sing)	Seongmin Hong (Korea Science)	Claire Kong (QASMT)
Caroline Escobedo (West Aurora)	Shawna Abena Amihere (Galaxy)	Sachina Watanuki (Tokyo Tech)	Liam Place (QASMT)	Heng Chanmongkul (Preah Sisowath)	Yuri Son (QASMT)	Sana Shah (QASMT)
Yaretzi Guerrero (West Aurora)	Arianne Hildegard Diku (Galaxy)	Jyothika Cheerath (QASMT)	Yasintorn Poonyawanich (Chulalongkorn)	Chan Daravatey (Preah Sisowath)	Aidan Rhys Fernandes (John Monash)	Tanan Mungunchuluun (Mongolia)
Zubeir Noorani (West Aurora)	Milana Plekhanova (QASMT)	Nicharee Chaisamritpol (MWIT)	Weerawin Vaitoonkiat (Chulalongkorn)	Saanvi Patchakayala (QASMT)	Raghav Zutshi (John Monash)	Anar Nergui (Mongolia)

Workshop 1 Microfiltration	Workshop 2 Water planning	Workshop 3 Hendra Virus	Workshop 4 Gratzel Cell	Workshop 5 Fruity Tones	Workshop 6 Dreaming Gold	Workshop 7 Rubbish Robots
Nerissa Do (QASMT)	Rangchak Tripura (Darwin)	Nutcha Chaisamritpol (MWIT)	Tanyapat Triwitayakorn (Chulalongkorn)	Daniel Bruton (Camborne)	Kelvin Chan (QASMT)	Jiwoo Hong (Korea Science)
Liu Zhixuan (Beihang)	Vincent Mondol (Darwin)	Ananya Chaiyanopakul (MWIT)	Aarash Hashmi (QASMT)	Jamie Gore (Camborne)	Thong Pagnatepy (Preah Sisowath)	Mishanya Romadinov (John Monash)
Wang Borui (Beihang)	Nyaz Hasan (Darwin)	Ananya Nallapuraju (NUS)	Lawrence Yu (QASMT)	Heidie Palade (QASMT)	Sera Chattha (QASMT)	Aathithya Jegatheesan (SST, Sing)
Yang Yilin (Beihang)	Jenny Pham (QASMT)	Eesha Sharma (QASMT)	Divya Brahmbhatt (Illinois)	Sofia Obradovic (ASMS)	Japneet Kaur (QASMT)	Salvador Recio (Philippine)
Minah Kim (QASMT)		Jasmine Peng (QASMT)	Joshua Lee (Illinois)	Vicky Lee (ASMS)	Arjun Prasanth (QASMT)	Alex Anthony Andal (Philippine)
Shivani Singh (QASMT)			Patipoon Foongkajornkiat (QASMT)		Jiwoo Seo (QASMT)	Martin Gabriel Lopez (Philippine)
Zade Zhou (QASMT)						Stanley Wang (QASMT)
						Prannaya Gupta (NUS)



APPENDIX 2: ORDER OF CULTURAL PRESENTATIONS

Wednesday 6 December 2023

School	Performance title
QASMT	First Nations cultural performance
St-Odulphuslyceum	The Netherlands in a nutshell
Kamnoetvidya Science Academy	Yamyen, the integration
Fort Richmond Collegiate	Flute and oboe duet
Mahidol Wittayanusorn School	Traditional Thai songs, performed with Thai traditional musical instruments
Moscow South-Eastern School named after V.I. Chuikov	Traditional Russian song and dance
Tokyo Tech & Ritsumeikan High School	Soran qian Bushi (Fisherman's dance)
NUS High School of Mathematics and Science& National Junior College, Singapore	The Little Red Dot: Singapore
Preah Sisowath High School, New Generation School	Traditional dancing/singing
Korea Science Academy of KIAST	The introduction of Busan city in South Korea
Galaxy International School Uganda	The dance of Africa
Experimental School of Beihang University	Singing facial makeup
New Beginning International School of Mongolia	Mongolian cultural performance
Budi Mulia Dua International High School	Nusantara dance
Brookhouse School Kenya	African dance
Chulalongkorn University Demonstration School	Ngu Kin Hang

APPENDIX 3: EXCURSION ALLOCATION LIST

Wednesday 6 December 2023

Group 1 - Red	Group 2 - Green	Group 3 - Blue	Group 4 - Purple	Group 5 – Pink
Toohey Environmental (9.00 – 12 noon)	Toohey Environmental (9.00 – 12 noon)	Sparq-Ed 3 (9.00 – 12 noon)	Lone Pine Koala Sanctuary (9.00 – 12 noon)	Lone Pine Koala Sanctuary (9.00 – 12 noon)
Lone Pine Koala Sanctuary (1.00 – 4.00 pm)	Lone Pine Koala Sanctuary (1.00 – 4.00 pm)	Lone Pine Koala Sanctuary (1.00 – 4.00 pm)	Botanic Gardens (1.00 – 4.00 pm)	Botanic Gardens (1.00 – 4.00 pm)
Charlotte Achieng Okome (Brookhouse)	Jiwoo Hong (Korea Science)	Yuto Inoue (Ritsumeikan)	Ryo Imaizumi (Ritsumeikan)	Eric Ochola Ouma (Brookhouse)
Justin Koross (Brookhouse)	Seongmin Hong (Korea Science)	Romy Burger (St-Odulphusl)	Kaixin Qiang (NJC)	Selaksa Alun Samudra (Budi Mulia Dua)
Hope Parkhill-Wylie (Lewiston_Porter)	Yuri Son (QASMT)	Jente Nefkens (St-Odulphusl)	Isabelle Ang (NJC)	Mido He (QASMT)
Matthew Long (Lewiston-Porter)	Aidan Rhys Fernandes (John Monash)	Sophie Verhagen (St-Odulphusl)	Wan Ying Lim (NJC)	Chan Yi Qian (SST, Singapore)
Dominic Tracy (Lewiston-Porter)	Raghav Zutshi (John Monash)	Virakarn Boonfahpratan (KVIS)	Chananrat Tiranumpongvanich (KVIS)	Colin Lee Zheng Ting (SST, Singapore)
Raelyn Liang (QASMT)	Anika Gupta (QASMT)	Rachel Rabuya (QASMT)	Mary Do (QASMT)	Aathithya Jegatheesan (SST, Singapore)
Aaron Wei (QASMT)	Nicharee Chaisamritpol (MWIT)	Daniel D'Souza (QASMT)	Sejal Gupta (QASMT)	Kelvin Chan (QASMT)
Queena Calya Rabbanee Wibowo (Budi Mulia Dua)	Nutch Chaisamritpol (MWIT)	Lucas Lim (QASMT)	Shawna Abena Amihere (Galaxy)	Heng Chanmongkul (Preah Sisowath)
Timur Akhmedov (Moscow)	Ananya Chaiyanopakul (MWIT)	Claire Kong (QASMT)	Arianne Hildegard Diku (Galaxy)	Chan Daravatey (Preah Sisowath)
Sachina Watanuki (Tokyo Tech)	Salvador Recio (Philippine)	Iris Landy (QASMT)	Arjun Prasanth (QASMT)	Liu Zhixuan (Beihang)
Jyothika Cheerath (QASMT)	Alex Anthony Andal (Philippine)	Leonardo Zhao (Fort Richmond)	Selihom Eskndr Yohannees (Galaxy)	Wang Borui (Beihang)

Group 1 - Red	Group 2 - Green	Group 3 - Blue	Group 4 - Purple	Group 5 – Pink
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Caroline Escobedo (West Aurora)	Martin Gabriel Lopez (Philippine)	Tony Wang (Fort Richmond)	Daniel Bruton (Camborne)	Yang Yilin (Beihang)
Yaretzi Guerrero (West Aurora)	Jade Zhou (QASMT)	Nerissa Do (QASMT)	Jamie Gore (Camborne)	Jasmine Peng (QASMT)
Zubeir Noorani (West Aurora)	Rangchak Tripura (Darwin)	Sabila Ramadhan Putriku Calita (Budi Mulia Dua)	Sera Chatha (QASMT)	Arya Shrestha (Budhanikantha)
Thong Pagnatepy (Preah Sisowath)	Vincent Mondol (Darwin)	Bolormaa Luvsandorj (Mongolia)	Ananya Nallapuraju (NUS)	Shivani Singh (QASMT)
Saanvi Putchakayala (QASMT)	Nyaz Hasan (Darwin)	Tanan Mungunchuluun (Mongolia)	Lim Teck Kong (NUS)	Divya Brahmhatt (Illinois)
Lawrence Yu (QASMT)	Jenny Pham (QASMT)	Anar Nergui (Mongolia)	Prannaya Gupta (NUS)	Joshua Lee (Illinois)
Yasintorn Poonyawanich (Chulalongkorn)	Jiwoo Seo (QASMT)	Heide Palade (QASMT)	Liam Place (QASMT)	Joy Chen (QASMT)
Weerawin Vaitoonkiat (Chulalongkorn)	Sana Shah (QASMT)	Haruho Yamaguchi (Ritsumeikan)	Stanley Wang (QASMT)	Abby Hatchell (QASMT)
Tanyapat Triwitayakorn (Chulalongkorn)	Aarash Hashmi (QASMT)	Emma Liang-Godber (QASMT)	Mialana Plekhanova (QASMT)	Gabriel Pavilion (QASMT)
Xiaoya Xu (QASMT)	Sofia Obradovic (ASMS)	Viktoria Dragun (Moscow)	Japneet Kaur (QASMT)	
Vicky Lee (ASMS)	Aakash Racha (QASMT)	Ayaka Takema (Tokyo Tech)		
Eesha Shaarma (QASMT)	Minah Kim (QASMT)	Yui Takeyasu (Tokyo Tech)		
Patipoon Foongkajornkiat (QASMT)	Sophia Clark (QASMT)	Mishanya Romadinov (John Monash)		

APPENDIX 4: EXCURSION ALLOCATION LIST

Wednesday 6 December 2023

Group 1 - Red	Group 2 - Green	Group 3 - Blue	Group 4 - Purple	Group 5 – Pink
Toohey Environmental (9.00 – 12 noon)	Toohey Environmental (9.00 – 12 noon)	Sparq-Ed 3 (9.00 – 12 noon)	Lone Pine Koala Sanctuary (9.00 – 12 noon)	Lone Pine Koala Sanctuary (9.00 – 12 noon)
Lone Pine Koala Sanctuary (1.00 – 4.00 pm)	Lone Pine Koala Sanctuary (1.00 – 4.00 pm)	Lone Pine Koala Sanctuary (1.00 – 4.00 pm)	Botanic Gardens (1.00 – 4.00 pm)	Botanic Gardens (1.00 – 4.00 pm)
QASMT Leads				
Francis Potter	Susan Wisowaty	David Pearce	Lyle Fredericksen	Keita Ishi
Jade Josey-Napier	Belynda Nichols	Meng Yin Leong	Delaney Watene-Taie	Rachel Wilson
Teachers				
Elena Germanovich Moscow	Sophie McConnell Darwin	Jennifer Piasecki Fort Richmond	Oon Hui (Phebee) ng NUS	Hoe Teck Tan School of Science and Tech.
Sandy Scott West Aurora	Kiattipoom Rodpun MWIT	Munkh-Ochir Urtsaikhan Mongolia	Wayne Riley Camborne	Du Wei Beihang
James Wanamaker Lewiston-Porter	Mr Alejandro Jose Tuazon Philippine	Niels Hesselberth St-Odulphuslyceum	Racheal Ainembabazi Galaxy	Huot Seanghay Preah Sisowath
Gurkiran Chana Brookhouse	Zae Young Ghim KSA of KAIST	Janjira Maneesan KVIS	Arthur Goh NJC	Lia Yuniarti Budi Mulia Dua
Komed Nachaeng Chulalongkorn	Fiona Bui John Monash	Shunsuke Shibanuma Tokyo Tech	Natsuki Kasamaki Ritsumeikan	Brian Trainor Illinois
	Maryann Doolittle ASMS	Kirsten Hogg QASMT		

APPENDIX 5: POSTER AND ORAL PRESENTATIONS

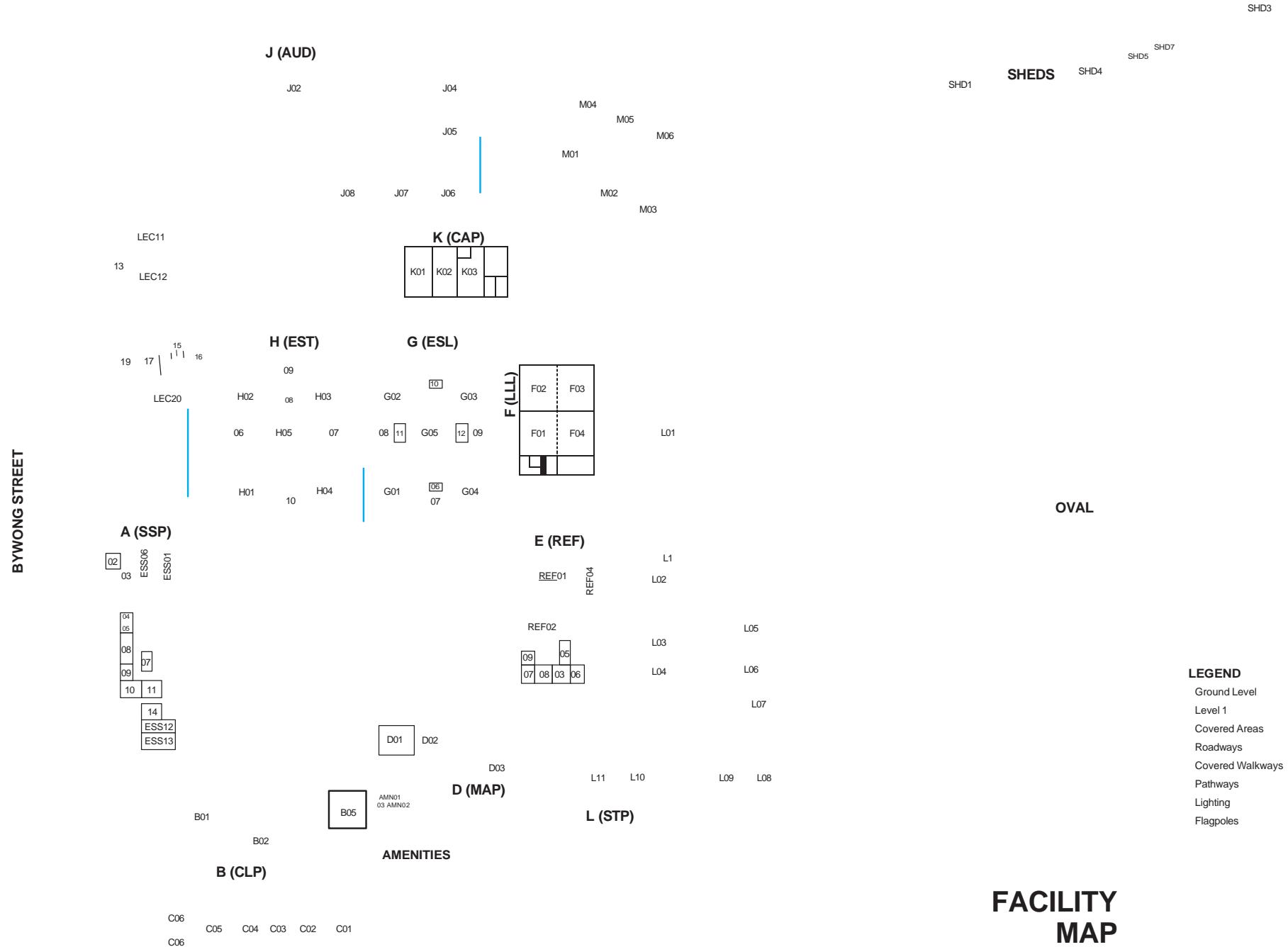
Discussion panel

Poster presentations (Monday 4 December, 3.30 – 5.30 pm)

Topic	Presenters	Location
BMB: Biology and molecular biosciences	<ul style="list-style-type: none"> • Dr Rachel Chen • Aileen Davis • Ross Avery • Jack Batson 	Auditorium
RT: Robotics and technology	<ul style="list-style-type: none"> • Associate Professor Jen Jen Chung • Troy Villani • Madeleine Brookes 	Auditorium
EES: Earth and environmental science	<ul style="list-style-type: none"> • Dr Rowena Long • Vanessa Bermingham • Glen Beaumont • Inga Mertens-Walker 	Auditorium
PE: Physics and engineering	<ul style="list-style-type: none"> • Dr Nishta Arora • Andrea Lock • Simon Hu 	Auditorium
CM: Computing and mathematics	<ul style="list-style-type: none"> • Dr Zoltan Neufeld • Jade Josie-Napier • Georgina Lunn • Francis Potter 	Auditorium
CN: Chemistry and nanoscience	<ul style="list-style-type: none"> • Professor Andrew Whittaker • Saras Chetty • Esme Hatchell 	Auditorium

Oral research presentations (Monday 4 December, 3.30 – 5.30 pm)

Topic	Presenters	Location
BMB: Biology and molecular biosciences	<ul style="list-style-type: none"> • Professor Avril Robertson • Saengdao Philavane • Davika Kocherla 	Modwest 110, UQ
RT: Robotics and technology	<ul style="list-style-type: none"> • Associate Professor Jen Jen Chung • Troy Villani • Larry Vint 	Forgan Smith E107, UQ
EES: Earth and environmental science	<ul style="list-style-type: none"> • Dr Rowena Long • Vanessa Bermingham • Glen Beaumont • Inga Mertens-Walker 	Modwest 111, UQ
PE: Physics and engineering	<ul style="list-style-type: none"> • Dr Nishta Arora • Simon Hu • Anthony Swan 	Modwest 121, UQ
CM: Computing and mathematics	<ul style="list-style-type: none"> • Dr Zoltan Neufeld • Jane Gorman • Simon Freeman 	Modwest 131, UQ
CN: Chemistry and nanoscience	<ul style="list-style-type: none"> • Professor Andrew Whittaker • Kaz Hosokawa • Jack Bailey 	Modwest 130, UQ



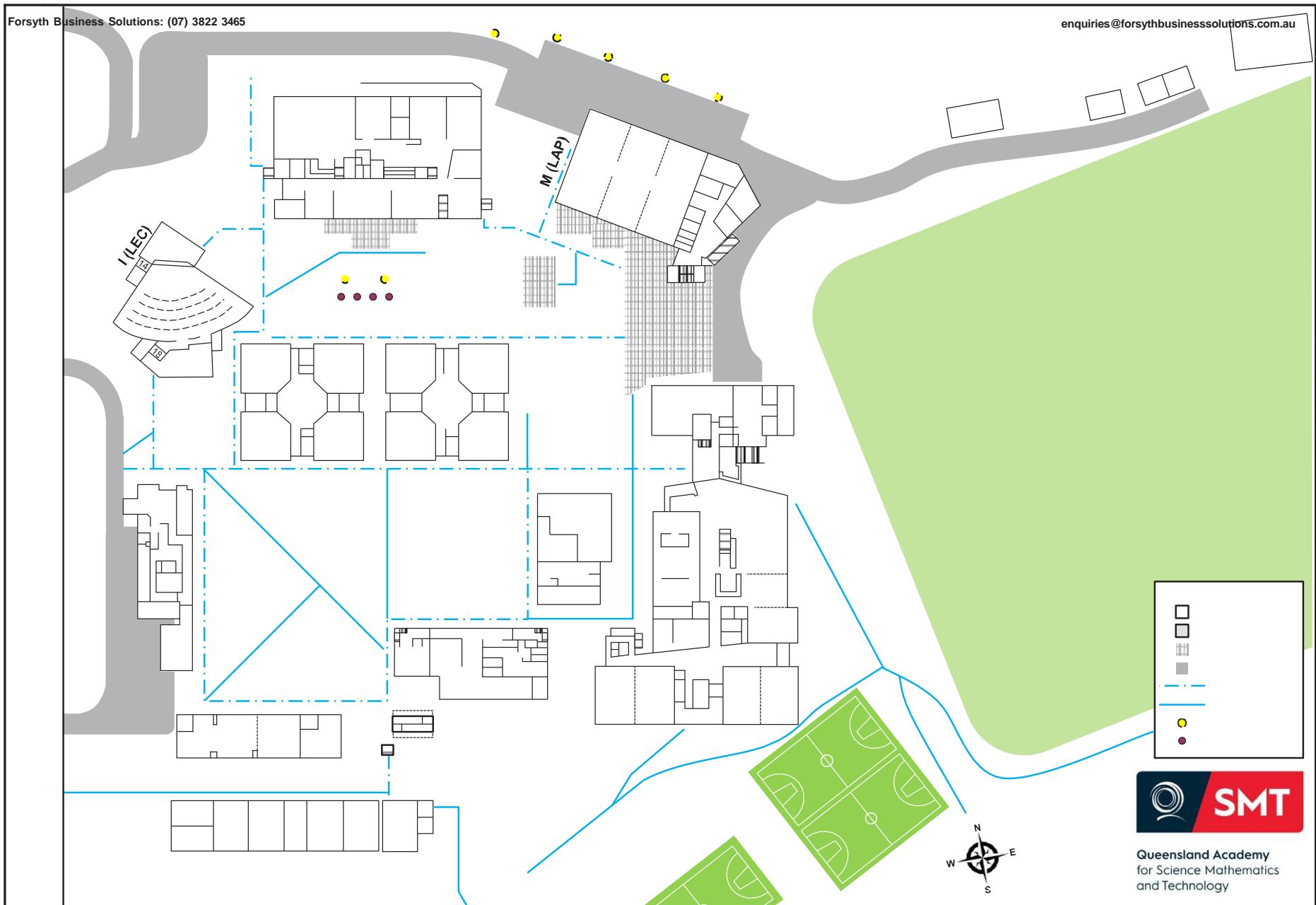
APPENDIX 6: MAPS

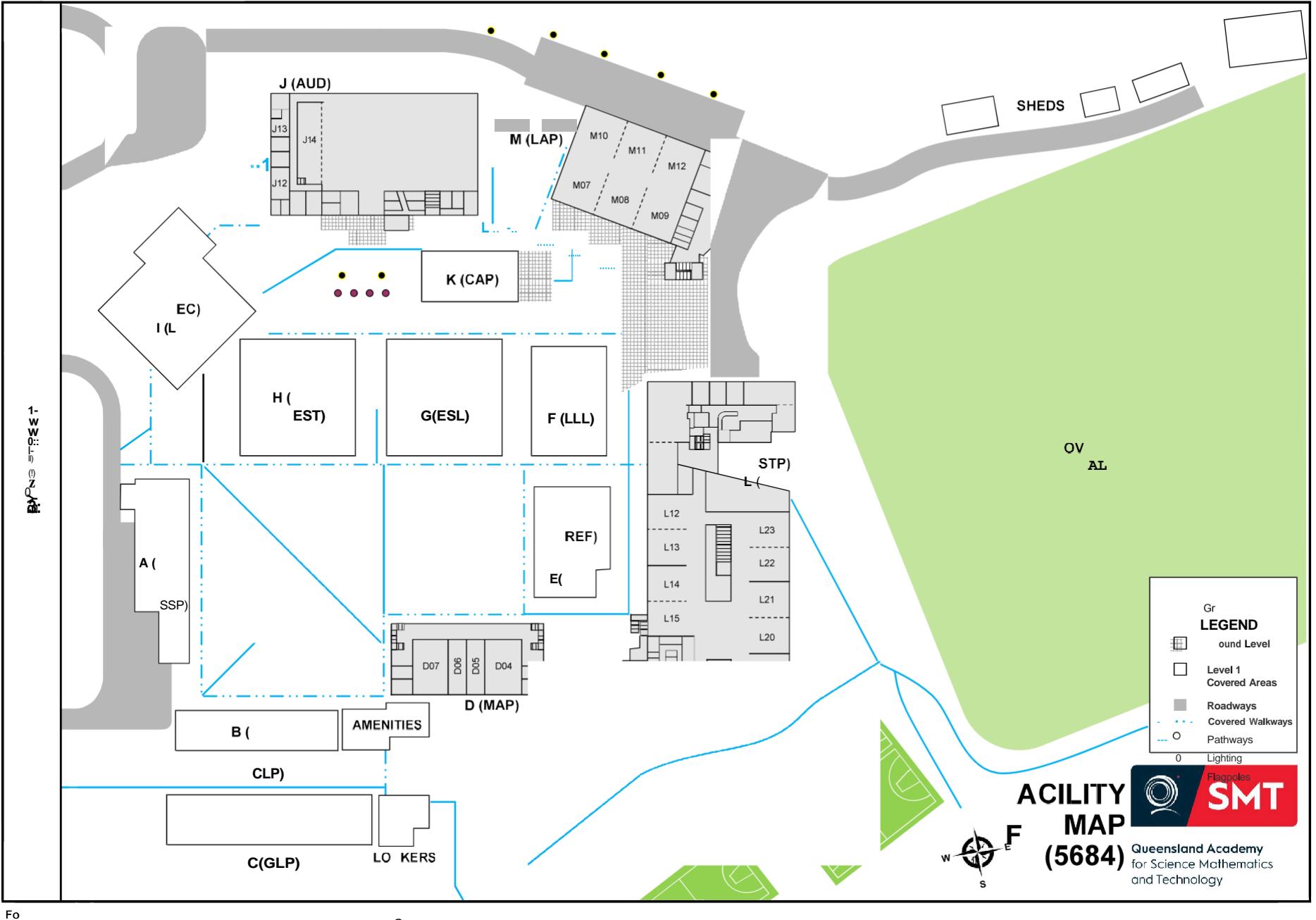
Queensland Academy for Science Mathematics and Technology

C (GLP)

LOCKERS

(5684)





Brisbane CityCat ferry services

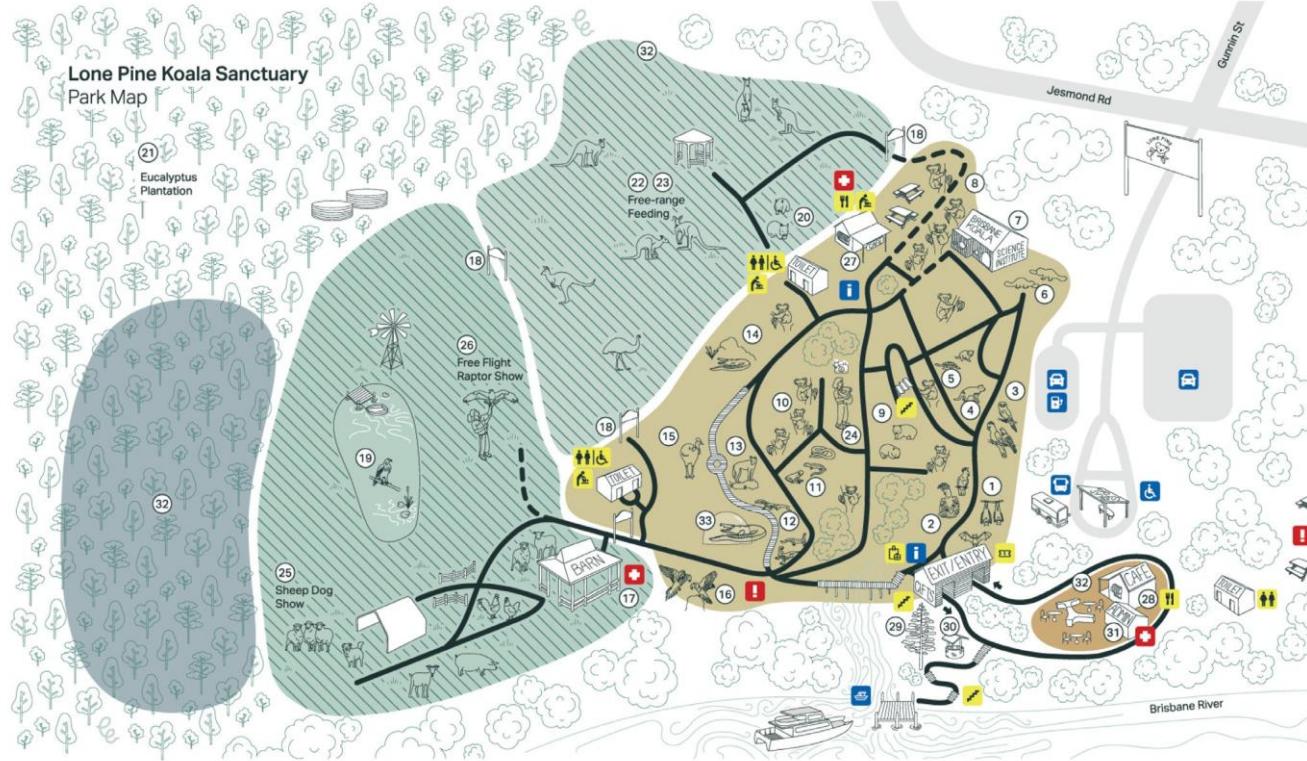
CityCat services

Dedicated to a better Brisbane



Daily Schedule

102



ANIMALS	
1 Flying Foxes	10 Main Koala Exhibit
2 Birds	11 Amphibian & Reptile Habitat
3 Birds	12 Perentie, Water Monitor & Lace Monitor
4 Tasmanian Devils	13 Dingoes
5 Turtles	14 Freshwater Crocodiles
6 Platypus	15 Cassowary
7 Brisbane Koala Science Institute	16 Wild Lorikeet Feeding
8 Koala Forest	17 Barn Animals
9 Common Wombats	18 Kangaroo Reserve Entry/Exit

ACTIVITIES	
23 Free-range Feeding	24 Wildlife Photo Opportunities
20 Southern Hairy-nosed Wombats	21 Eucalyptus Plantation
25 Sheep Dog Show	22 Kangaroos, Wallabies & Emus
26 Free Flight Raptor Show	33 Estuarine Crocodile

OTHER	
29 The Lone Pine	30 Wishing Well
31 Administration	32 Coming Soon!
EMERGENCY	
First Aid	
Emergency Assembly Area	

ACCESSIBILITY	
Steep Incline	
Paved Path	
Unpaved	
Stairs	

ICONS	
Information	Entry / Tickets
Bus Stop	Gift Shop / Exit
Car Park	Cafe
Boat Jetty	Toilets
Electric Car Charging Station	Baby Change



9:45am	Wild Lorikeet Feeding
10:00am - 11:00am	Touch a Koala
10:30am	Free Flight Raptor Show
11:00am	Sheep Dog Show
11:30am	Koala Talk
11:00am - 12:30pm	Hold a Koala
12:00pm	Crocodile Talk
12:30pm	Snake Photos
1:00pm	Free Flight Raptor Show
1:30pm	Sheep Dog Show
1:45pm	Dingo Photos
2:00pm - 3:30pm	Hold a Koala
3:00pm	Dingo Talk
3:15 - 3:45pm	Touch a Koala
3:45pm	Wild Lorikeet Feeding

APPENDIX 7: EMERGENCY RESPONSE QASMT

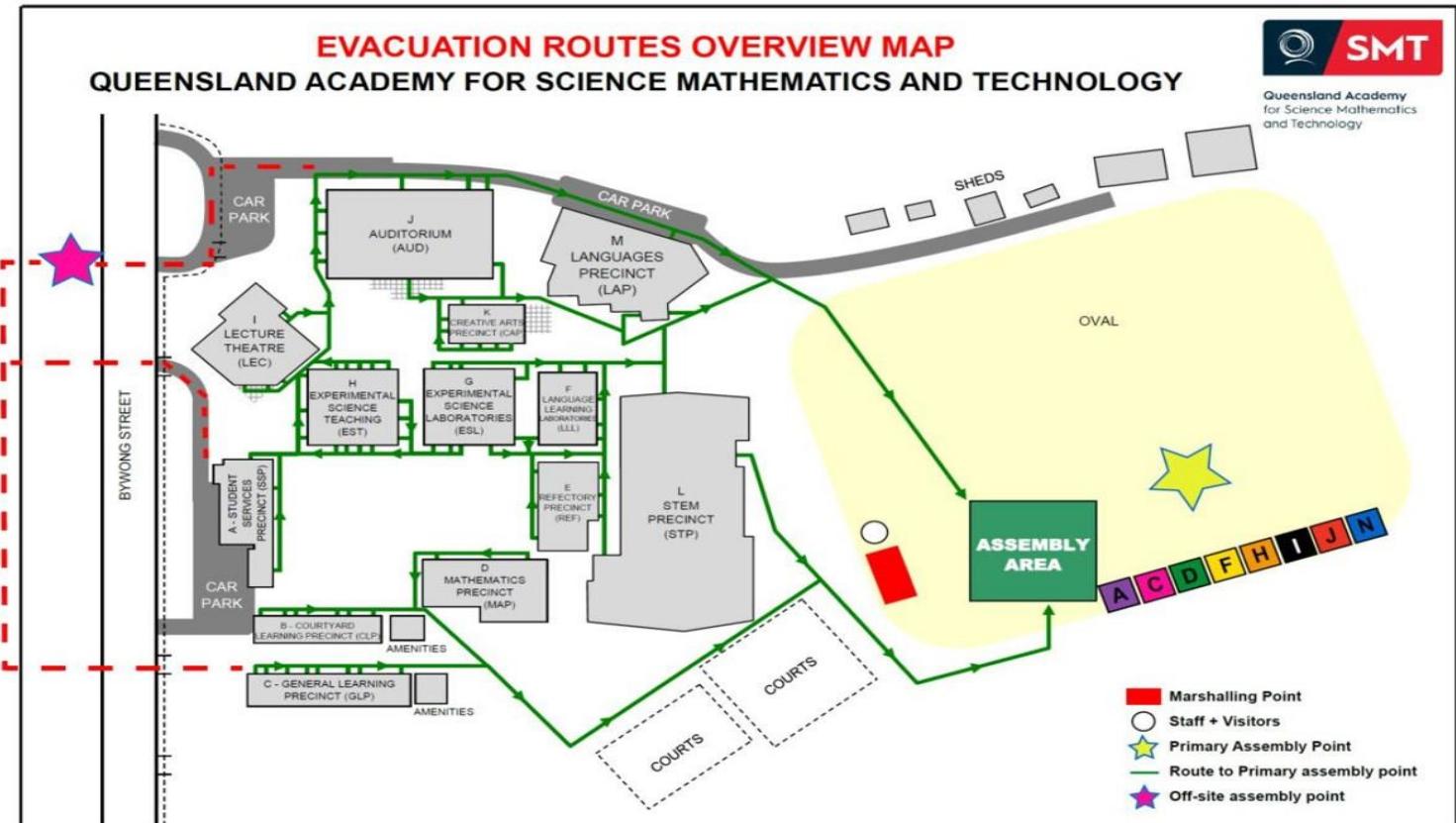
Emergency Services is contactable on triple zero (000)

Evacuation Procedure (Beep beep beep)

All students and staff are to move towards the assembly evacuation area as per evacuation plan displayed at each exiting door.

Lockdown (Drumming Music)

Students are to remain calm and silent inside classrooms out of line of sight i.e. under desks or against walls.



Distance to off-site assembly point:	5mins
Approx. time to reach off-site assembly point:	
Legend	
Primary assembly point	
Route to Primary assembly point	
Off-site assembly point	
Route to off-site assembly point	

APPENDIX 8: EMERGENCY EVACUATION, ST LEO'S COLLEGE UQ

EVACUATION SIGN



EVACUATION PROCEDURES

- Follow all instructions given by Wardens or Fire Officers.
 - Leave immediately by the nearest safe exit and do not use lifts in a fire situation.
 - Move quickly, do not run.
 - If possible, close doors behind you.
 - Report to your designated Assembly Area.
 - Advise a Warden immediately if you are aware of people trapped in the building.
 - Do not leave the Assembly Area until the Chief Warden gives the 'All-Clear'.
 - If any injuries are sustained, notify a Warden.

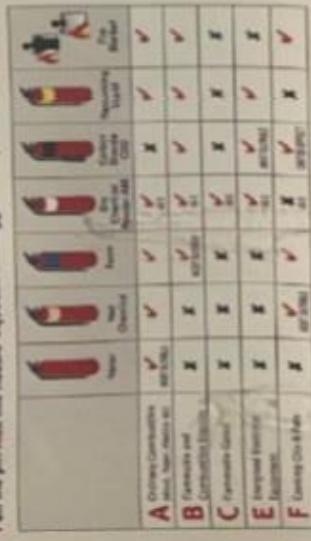
SAFETY CONSIDERATIONS



FIRE EXTINGUISHERS

OPERATING INSTRUCTIONS

Tell the truth. If the article *Sounds like the trigger* [were] the basis of the fire



EVACUATION DIAGRAM (NOT TO SCALE)



APPENDIX 9: BEACH SAFETY FOR VISITORS TO AUSTRALIA

Beach Safety for Visitors to Australian Beaches



Always swim between the red and yellow flags

一定要在紅黃旗之間游泳。

保持在红黄旗之间的区域游泳。

常に赤と黄色の旗の間で泳ぐ

항상 붉은색과 노란색의 깃발 사이에서만 수영하십시오

हमेशा लाल और पीले झंडों के बीच तैरें।

Sentiasa berenang antara bendera merah dan kuning.

قم بالسباحة دائمًا بين الأعلام الحمراء والصفراء

Read the safety signs



阅读安全標示。

阅读安全标记。

安全標示を読む

안전 표지판을 읽으십시오

सुरक्षा-चिह्नों को पढ़ें

Bacalah tanda keselamatan.

اقرأ علامات السلامة

Ask a lifeguard for safety advice



向救生員求助。

向救生员求助。

ライフガードに助けを求める

인명구조대원에게 도움을

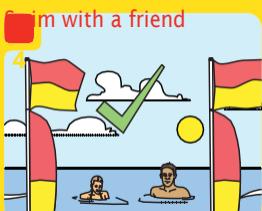
요청하십시오。

जीवन-रक्क द्वारा सहायता मांगें।

Minta perlongan daripada

penyelamat kelemasan.

اطلب المساعدة من حارس الإنقاذ



切勿单独游泳。

不要独自游泳。

一人では泳がない

혼자 수영하지 마십시오。

अकेले न तैरें।

Jangan berenang berserangan.

لا تسبح بمفردك



如遇麻烦，就大声呼救。

并把手臂举过头挥舞。

トラブルが起きたら助けを呼び

頭上で手を振る。

위험에 처하면 소리쳐 도움을

구하고 머리 위로 팔을 흔드십시오.

यदि आप प्रश्नानंतर मौसूली हो आवाज दें और

अपने शिर के ऊपर अपना हाथ छुमाएं।

Jika menghadapi kesusahan, jerit

untuk pertolongan dan lampaikan

lengan di atas kepala anda.

www.beachsafe.org.au



APPENDIX 10: SUN SAFETY

SURF LIFE SAVING AUSTRALIA

BEACH SAFETY – SUN SAFETY



The Australian summer is synonymous with long, hot and sunny days. This means there is an increased exposure to the heat and potentially-dangerous UV rays. To enjoy the beach it is important that you follow a number of simple steps when it comes to sun safety.

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SLIP ON PROTECTIVE CLOTHING

Slip on protective clothing that covers as much of your body as possible. If you're swimming a Lycra long sleeve shirt can protect you from the sun.



SLOP ON SUNSCREEN

Slop on sunscreen that is SPF30 or higher. Apply to your skin at least 20 mins before leaving the house. Ensure it's waters resistance and reapply every 2 hours.



SLAP ON A HAT

Slap on a hat, ideally a wide brimmed hat that covers your face, nose, neck and ears.



SEEK SHADE

Seek shade! This can be under a sun tent, a tree or other cover from the sun. If there is no shade, take breaks from the sun and avoid the sun during the highest UV rated times of the day.



SLIDE ON SUNGLASSES

Slide on some sunglasses that meet the Australian standards.



APPENDIX 11: BEACH SAFETY FLAGS AND SIGNS

SURF LIFE SAVING AUSTRALIA

BEACH SAFETY – FLAGS & SIGNS



The beach is a dynamic, ever-changing environment. Although it can be fun, it can also be unpredictable and dangerous to people who are unaware of the hazards that can be present at times. That's why trained lifeguards who understand the beach use a system of flags and signs to advise the people who visit with the important things they need to know.

The most important flags on the beach are the **RED** and **YELLOW** flags. These show the supervised area of the beach and that a lifesaving service is operating. If there are no red and yellow flags, check with the lifeguards and if unsure don't go in the water.

Safety signs are put in place to warn you about the permanent and occasional hazards that are present in the environment. Some of these signs are permanent for long term hazards. However, others are put into place each day by the lifeguards to show you the hazards present on that day in a specific location: such as rip currents which can change locations on different days.

BEACH FLAGS



RED & YELLOW FLAGS
Swim between the flags



BLACK & WHITE FLAG
Surfcraft riding area boundary



RED FLAG
No swimming



YELLOW FLAG
Caution required.
Potential hazards.



RED & WHITE FLAG
Evacuate the water

WARNING SIGNS

Use a yellow background, and include simple images to communicate what you should be aware of. It's important to always observe and abide by the safety signs.



WARNING



SWIMMING NOT ADVISED



LARGE WAVES



MARINE STINGERS

REGULATORY SIGNS

Regulatory signs advise you about prohibited or permissible activities at the beach. These are red circles, with diagonal lines across a black symbol. There may be penalties imposed if you disregard these signs. A green circle means an activity is permissible.



INFORMATION SIGNS

Provide information about features or activities which may be present on the beach.



SAFETY SIGNS

Indicate the safety provisions or provide safety advice such as emergency beacons, public rescue equipment or first aid.



APPENDIX 12: BEACH SAFETY - LIFE GUARD TOP TIPS

SURF LIFE SAVING AUSTRALIA

BEACH SAFETY - LIFEGUARD TOP TIPS



Millions of people visit Australia's beautiful beaches every year to enjoy the environment and participate in different activities. Although Australian beaches may look amazing, they can be unpredictable and dangerous to anyone.

Here you will find some very helpful advice from our Lifeguards on beach safety, to ensure you enjoy your visit to the beach and stay safe!

SWIM BETWEEN THE RED AND YELLOW FLAGS

When you see red and yellow flags on a beach, it indicates that there is currently a lifesaving service operating on that beach. The lifeguards have chosen a section of the beach that's best for swimming and they'll closely supervise this area.



READ THE SAFETY SIGNS

Before you go on to the beach be sure to read the safety signs. This will ensure you're aware of any warnings or dangers on the beach. You can also find other helpful information to make your day at the beach more enjoyable. You might also find single signs placed on the beach to highlight specific warnings.



ASK A LIFEGUARD FOR SAFETY ADVICE

Lifeguards are highly trained and very knowledgeable about beach safety and conditions. When you arrive at the beach look for the lifeguards. Feel free to ask them about the day's conditions, as well any additional beach safety advice they might have for that specific beach – because every beach is different.



SWIM WITH A FRIEND

Not only is swimming with a friend (or family member) a fun way to enjoy the beach, it is also very sensible. While you're swimming together you can keep an eye out for each other, and if further assistance is required, one person could call or go for help. If everyone swimming together knows their own limits it's a good idea to share this with those around you so you can all stay within everyone's comfortable limits.



IF YOU NEED HELP, STAY CALM AND ATTRACT ATTENTION

Even the most careful people can find themselves out of their limits in the water. If you are not feeling comfortable in the water and you require a lifeguard's assistance to get back to shore, stay calm, raise your arm in the air and wave it from side to side. This will attract the attention of a lifeguard who will be able to come to your assistance. You should conserve your energy by floating on your back and staying calm. This will ensure you have the energy to remain afloat until further aid arrives.



APPENDIX 13: EMERGENCY CONTACTS AND ADDRESSES

24 Hour emergency contact

ISSF 2023 Program Manager

- **Phone:** 0499 189 360
- **Email:** ISSF2023@qasmt.eq.edu.au

Emergency Services (Ambulance, Police, Fire Department)

- **Phone:** 000

Local Services

Medical Practitioner

- St Lucia Medical Centre
- **Phone:** (+617) 3371 6005
- **Address:** 32 Hawkin Drive, St Lucia QLD 4067

Wesley Hospital

- **Phone:** (+617) 3232 7000 or 3232 7333
- **Address:** Chasely Street, (Main Entrance), Auchenflower

Indooroopilly Police Station

- **Phone:** (+617) 3377 9444

Queensland Academy for Science Mathematics and Technology

- **Phone:** (+617) 3377 9333
- **Address:** 78 Bywong Street, Toowong QLD 4066

St Leo's College, The University of Queensland

- **Phone:** (+617) 3878 0600
- **Address:** College Road, St Lucia QLD 4067

Jephson Hotel

- **Phone:** (+617) 3736 4400
- **Address:** 63 Jephson St, Toowong QLD 4066

