



16<sup>th</sup> International  
Science Youth Forum

# Science & Technology for Humanity: Building a Sustainable Future

8-12 Jan 2023

Organised by:



Supported by:



Ministry of Education  
SINGAPORE

# About ISYF



## Our Goals:

### Inspire Passion for Science Among Youth

ISYF aims to provide students who are highly inquisitive and passionate about the sciences with ample opportunities to share and discuss their interest in Science, technology and scientific research. They will be exposed to many fields of science which will broaden their outlook and understanding of the scientific world. Invited Nobel laureates and eminent scientists will inspire them through stories of their own life experiences and scientific discoveries. These interactions will help create greater awareness among the youth about the importance of broad-based knowledge, fuel their curiosity, engender relentless tenacity and a global outlook when considering the pursuit of science as a meaningful and fulfilling endeavour.

# About ISYF

## **Establish Cooperation and Friendship Amongst Young Talented Science Students**

Students will have many opportunities to interact in different cross-cultural groups and forge strong bonds with each other throughout the Forum. Activities are designed to promote mutual cooperation, understanding and appreciation of each other's diverse cultures while sharing a common passion in science, technology and research.

## **Build Capacities of Science Educators**

Through professional sharing and discussions among Science educators, ISYF helps build the competencies of teachers who are navigating an evolving educational landscape.

# Theme

The theme “Science and Technology for Humanity: Building a Sustainable Future” highlights the important role of science and technology in driving sustainable and inclusive development. It reflects the need for a holistic approach to science and technology, considering their benefits for humanity and their accompanying ethical considerations in addressing societal challenges.

Responsible and ethical use of science and technology is essential to resolve pressing global challenges such as climate change, inequality and health disparities. At the same time, science and technology have the role of enhancing productivity in order to induce a dynamic transformation of the economy and increase growth rates. It is also important to consider the social, cultural, and ethical implications of scientific and technological advancements, and encourage discussions on how to mitigate potential negative impact and foster positive change through responsible innovation. The possibility of moving towards the free provision of technologies that contribute to meeting human challenges, making them accessible to all can be explored. In schools, the acquisition and dissemination of scientific knowledge, the building of innovation capabilities, and the push towards the collective goal of building a better world for future generations can be promoted. There is a pressing need for more conversations on the reform of policies and existing measures which can promote public interests in our pursuit of sustainability. If we are able to move forward and each adopt a more sustainable lifestyle, we definitely can make the change and create an impact in not just our own country, but the world.

# **Message from Guest-of-Honour**



**Professor Ng  
Huck Hui**

**Assistant Chief  
Executive, Research  
and Talent  
Development, A\*STAR**

# **Message from Organiser**



**Mr Pang Choon  
How**

**Principal  
Hwa Chong Institution**

# Message from Student Organisers



Dear Student Delegates and Educators,

Welcome to the 16th International Science Youth Forum (ISYF) @ Singapore, held from 8 to 12 January 2024!

ISYF provides a platform for student delegates from around the world to share their passion for science, technology and research whilst building long-lasting friendships. We hope that you will enjoy the lineup of activities meticulously planned by our Organising Committee!

The theme for this year's ISYF is: "Science and Technology for is  
year's ISYF is: "Science and Technology for Humanity: Building a

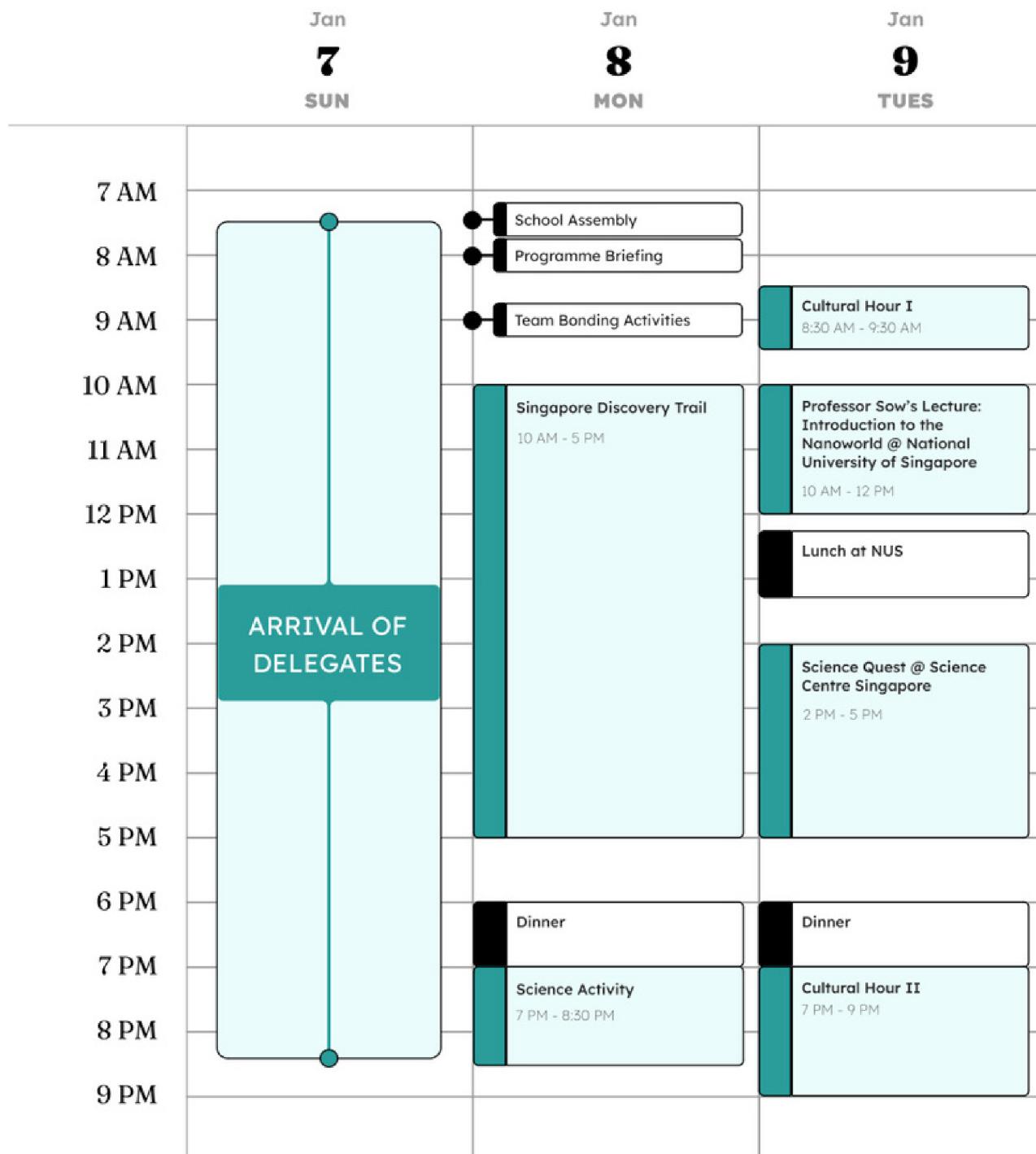
# **Message from Student Organisers**

Sustainable Future". In a world challenged by climate change and worsening disparities, mankind looks to the potential of science and technology in resolving pressing global issues. Through ISYF, we hope that delegates will consider the role of science and technology in driving sustainable and inclusive development, and be inspired to be the change they want to see.

The Organising Committee of ISYF 2024 looks forward to meeting you and we hope that you will have a fruitful time in Singapore!

Warmest regards,  
Ling Jun Quan and Nguyen Chi Mai  
Co-Chairpersons  
ISYF 2024 Student Organising Committee

# ISYF Programme



# ISYF Programme

	Jan <b>10</b> WED	Jan <b>11</b> THURS	Jan <b>12</b> FRI
7 AM			
8 AM			
9 AM	Preparation for Masterclasses	Preparation for Masterclasses	Science Activity Solutions 8 AM - 10 AM
10 AM	Masterclasses I 9:30 AM - 11 AM	Masterclasses II 9:30 AM - 11 AM	
11 AM	Cultural Exhibition 11 AM - 12:30 PM	Lunch	
12 PM	Lunch		
1 PM		ISYF Keynote Lecture 1 PM - 2:30 PM	Closing Lunch & Farewell 12 AM - 3 PM
2 PM		Poster Exhibition 2:30 PM - 3:30 PM	
3 PM	Unlocking the Wonders Excursion @ Bird Paradise 2 PM - 5:30 PM		
4 PM			
5 PM			
6 PM	Dinner	Team Bonding Outing	
7 PM	Cultural Hour III 7 PM - 8 PM		
8 PM	Science Quest Reflections 8 PM - 9 PM		
9 PM			GOODBYE! We hope you had a good time!

# Keynote Programme

<b>1245h</b>	Guests to be seated
<b>1300h</b>	Entrance of Guest-of-Honour, Professor Ng Huck Hui Welcome Address by Mr Ling Jun Quan, Co- Chairperson, Student Organising Committee
<b>1305h</b>	Guest-of-Honour's Address
<b>1315h</b>	Professor Duncan Haldane's Keynote Lecture
<b>1400h</b>	Q&A
<b>1425h</b>	Presentation of token of appreciation
<b>1430h</b>	End of Keynote Lecture
<b>1435h</b>	Reception and Poster Exhibition

# Guest-of-Honour



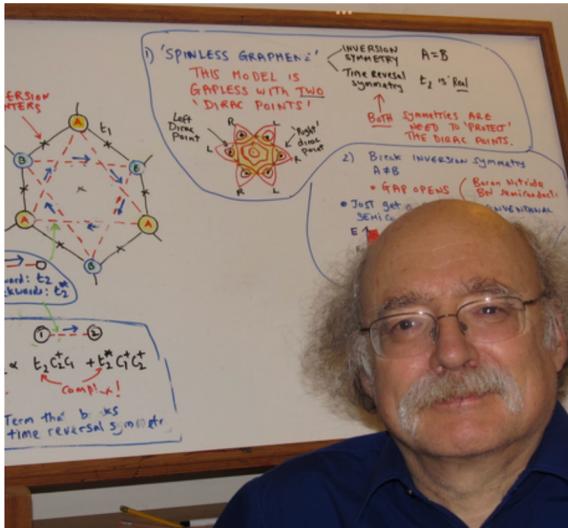
## Professor Ng Huck Hui

Assistant Chief  
Executive, Research  
and Talent  
Development, A\*STAR

Professor Huck-Hui NG is the Assistant Chief Executive of Research and Talent Development (R&TD), under the Agency for Science, Technology and Research. Professor Ng helped to set up and implement several national funding initiatives such as the Singapore Food Story, Prenatal and Early Childhood for Human Potential and Nucleic Acids Therapeutics.

Professor Ng is active in research and sits on several boards such as Science Center Singapore and NUS High School, and R&D funding steering committees. In recognition of his scientific contributions, Professor Ng has received numerous local and international honours and awards.

# Keynote Speaker



## Professor Duncan Haldane

The Nobel Prize in  
Physics 2016

Professor Duncan Haldane, who shared the 2016 Nobel Prize in Physics with David Thouless and Michael Kosterlitz, is the Sherman Fairchild University Professor of Physics at Princeton University, as well as a Fellow of the Royal Society of London, the U.S. National Academy of Sciences, and the Slovenian Academy of Sciences and Arts (as a Foreign Fellow). He was awarded a share of the Nobel Prize for his theoretical work on topological states of matter, including pioneering work on unexpected (and initially controversial) topological quantum states of one-dimensional systems of magnetic atoms (for which he had previously received the 1993 Oliver Buckley Prize of the American Physical Society), and on the theoretical prediction of topological insulators, for which he had shared the 2012 Dirac medal of the International Center for Theoretical Physics (Trieste) with Charles Kane and Shou-Cheng Zhang. He currently works on quantum geometry in the fractional quantum Hall effect.

# Masterclass Speakers

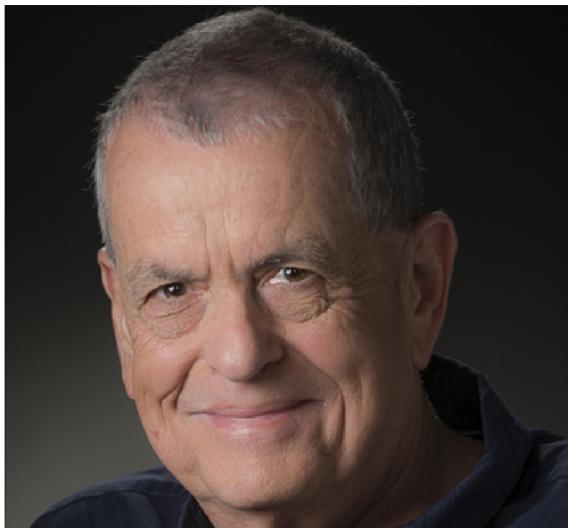


## Professor Dame Sue Black

President, St John's  
College, Oxford

Professor Dame Sue Black is President of St John's College, Oxford. She is a leading forensic anthropologist who has been involved in many mass fatality events and war crimes investigations

# Masterclass Speakers



## Professor Aaron Ciechanover

The Nobel Prize in  
Chemistry 2004

Professor Ciechanover is a Distinguished Research Professor in the Faculty of Medicine at Technion-Israel Institute of Technology. He is a member of many scientific academies, including the Israel National Academy of Sciences and Humanities, European Molecular Biology Organisation, American Academy of Arts and Sciences (as a Foreign Fellow), Chinese Academy of Sciences (as a Foreign Member) and Pontifical Academy of Sciences at the Vatican. Apart from the Nobel Prize, his awards include the 2000 Albert Lasker Award, the 2002 EMET Prize, the 2003 Israel Prize for Biology and the 2006 Sir Hans Krebs Medal.

# Masterclass Speakers



## Sir Tim Hunt

**The Nobel Prize in  
Physiology or Medicine  
2001**

In 1982, Sir Tim Hunt performed the experiment that led to the discovery of cyclins and subsequent research on the control of the cell cycle. In 1990, Tim joined ICRF (now The Francis Crick Institute) in London. He became a fellow of the Royal Society in 1991, a foreign associate of the US National Academy of Sciences in 1999 and shared the Nobel Prize in Physiology or Medicine with Lee Hartwell and Paul Nurse in 2001.

# Masterclass Speakers



## Professor Takaaki Kajita

The Nobel Prize in  
Physics 2015

Professor Takaaki Kajita is the Special University Professor at The University of Tokyo, and also the professor at the Institute for Cosmic Ray Research (ICRR) of The University of Tokyo.

In 2015 he shared the Nobel Prize in Physics for his role in discovering atmospheric neutrino oscillations.

Currently, he is the project leader for KAGRA Project, aiming to explore the gravitational wave astronomy.

# Masterclass Speakers



## Sir Richard Roberts

The Nobel Prize in  
Physiology or Medicine  
1993

Dr. Richard J. Roberts is the Chief Scientific Officer at New England Biolabs, Ipswich, Massachusetts. He received a Ph.D. in Organic Chemistry in 1968 from Sheffield University and then moved as a postdoctoral fellow to Harvard. He began work on the newly discovered Type II restriction enzymes in 1972 at Cold Spring Harbor Laboratory, with his laboratory discovering more than 70% of the first 100 enzymes described. His study of transcription in Adenovirus-2 led to the discovery of split genes and mRNA splicing in 1977, for which he received the Nobel Prize in Physiology or Medicine in 1993.

Since winning the Nobel Prize, Dr. Roberts has been involved in organizing a number of Nobel initiatives to correct scientific misunderstandings and promote humanitarian causes. His most recent campaign has been on the issue of GMOs, where 160 Nobel Laureates have supported the use of GMO techniques to improve plant breeding practices that could greatly help the developing world.

# Masterclass Speakers

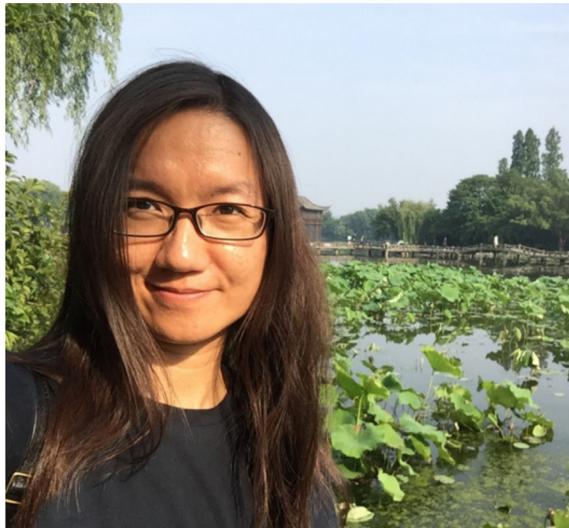


## Dr Gregory Goh

Executive Director of  
the National  
Metrology Centre at  
A\*STAR.

Dr Goh is the Executive Director of the National Metrology Centre at A\*STAR. Before this appointment, he was Deputy Executive Director of the Institute of Materials Research and Engineering at A\*STAR and had held appointments such as Director of the Strategic Research Office and also Head of the Ceramics Materials department. Prof. Goh is the Covering Focal Point for the Sub Committee on Materials Science and Technology that is part of the ASEAN Committee on Science, Technology and Innovation. He has also held an adjunct position in the Materials Science and Engineering department at the Nanyang Technological University since 2005.

# Masterclass Speakers



## Associate Professor Huang Shao Ying

Singapore University of  
Technology & Design

Dr Huang Shao Ying is an Associate Professor in the pillar of Engineering Product Development, Singapore University of Technology and Design. She received her B.Eng., M. Eng., and Ph.D. degree from Nanyang Technological University, Singapore in 2003, 2006, and 2011, respectively. Her research interests include low-field portable MRI (magnets and coils), non-linear MRI image reconstructions, RF aspects of MRI, MR electrical property tomography, radiofrequency (RF) / microwave noninvasive / contactless sensing, wireless power transfer, and wideband RF/microwave components. She owns 10 patents and 6 technology disclosures. She has authored and coauthored more than 60 papers in refereed journals, 1 book chapter, and more than 200 international conference papers.

# Masterclass Speakers



## Dr Lee Hwee Kuan

Head of the Imaging Informatics Division,  
A\*STAR

Dr. Lee Hwee Kuan earned his Ph.D. from Carnegie Mellon University in Pittsburgh, PA, USA, in theoretical physics. Currently, he serves as the Head of the Imaging Informatics Division as well as the Deputy Director for Training and Talent development at the Bioinformatics Institute, A\*STAR in Singapore. Dr. Lee's expertise lies in the development and deployment of machine learning and deep learning algorithms.

At present, Dr. Lee Hwee Kuan leads a laboratory dedicated to the advancement of Artificial Intelligence (AI) research for clinical and biological purposes. Beyond his role at the Bioinformatics Institute, Dr. Lee holds significant appointments in various local universities and research institutions.

# Masterclass Speakers



Associate  
Professor  
Sierin Lim

Nanyang Technological  
University, Singapore

Dr Sierin Lim is an Associate Professor of Bioengineering at the School of Chemistry, Chemical Engineering and Biotechnology at Nanyang Technological University, Singapore (NTU). Her research group focuses on the design and engineering of hybrid nano/microscale biodevices using proteins for applications in health and the environment.

She is currently serving as the Associate Dean of Global Partnerships at the NTU Graduate College. She earned her B.S. in Chemical Engineering and Ph.D. in Biomedical Engineering from University of California Los Angeles (UCLA).

# Masterclass Speakers



## Professor Bin Liu

**Tan Chin Tuan**  
**Centennial Professor,**  
**National University of**  
**Singapore**

Professor Bin Liu is Tan Chin Tuan Centennial Professor and Deputy Provost (Research and Technology) at the National University of Singapore (NUS). She is a leader in the field of organic functional materials, and has been well-recognized for her contributions to polymer chemistry and organic nanomaterials for energy and biomedical applications. She is named among the World's Most Influential Scientific Minds and the Top 1% Highly Cited Researchers by Clarivate since 2014.

Bin has received many awards, including the National Science and Technology Young Scientist Award (2008), the President's Technology Award (2016), the American Chemical Society ACS Nano Lectureship Award (2019), the Royal Society of Chemistry's Centenary Prize (2021), Kabiller's Young Investigator Award (2021) and the IUPAC Distinguished Women in Chemistry or Chemical Engineer Award (2023).

# Masterclass Speakers



Associate  
Professor Soo  
Han Sen

Nanyang Technological  
University, Singapore

Dr. Soo Han Sen is an Associate Professor at the School of Chemistry, Chemical Engineering and Biotechnology in Nanyang Technological University (NTU) Singapore. He graduated from MIT with Bachelor's and Master's degrees and completed his Ph.D. work at U.C. Berkeley. Subsequently, he joined the Lawrence Berkeley National Laboratory as a postdoctoral fellow, working on materials and nanotechnology for artificial photosynthesis.

# Masterclass Speakers



## Professor Sow Chorng Haur

Vice Dean of the Faculty  
of Science

Professor Sow Chorng Haur received his Bachelor of Science Degree (1st Class) in Physics from the National University of Singapore (NUS) in 1991. He received his Master of Science degree in Physics after spending two more years in NUS for research. Prof Sow then completed his PhD degree in the University of Chicago in 1998. For the next two years, he worked as a postdoctoral fellow at Bell Laboratory, Lucent Technologies. He then returned and joined the Department of Physics, NUS in 2001. He is now the Vice Dean (Outreach and Admissions) of the Faculty of Science and the Vice President of the Singapore National Academy of Science.

# Masterclass Speakers



## Professor Tang Kok Zuea

College of Design &  
Engineering, National  
University of Singapore

Professor Tang Kok Zuea is presently a senior lecturer in the Innovation and Design Programme (iDP), College of Design and Engineering, National University of Singapore since 2010. He received his Bachelor of Electrical Engineering (1998), Masters in Electrical and Computer Engineering (2000) and Doctor of Philosophy in Electrical and Computer Engineering (2005) from the National University of Singapore.

# Masterclass Speakers



## Professor Wu Wei

Nanyang Technological  
University, Singapore

Professor Wu Wei received his PhD degree at Swiss Federal Institute of Technology in Lausanne (EPFL), Switzerland. He is currently an Associate Professor at Nanyang Technological University (NTU), Singapore, and serves as the Honorary Secretary of Society for Rock Mechanics & Engineering Geology (SRMEG), the Associate Editor for International Journal of Rock Mechanics and Mining Sciences, and the Assistant Chair for Research in School of Civil and Environmental Engineering (CEE) at NTU.

Prof Wu's research focuses on experimental geophysics and energy geomechanics. He has received numerous awards, such as NTU CEE Research Award in 2023, SRMEG Outstanding Paper Award in 2017, and Swiss Perspective Researcher Fellowship in 2013.

# About HCI



**Hwa Chong Institution (HCI)** is Singapore's independent school with a rich history of over 100 years. The Institution is the culmination of the watershed merger in 2005 between the former Chinese High School (TCHS) and Hwa Chong Junior College (HCJC).

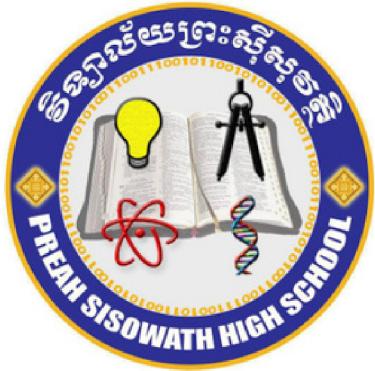
Offering a seamless and broad-based six-year Integrated Programme (IP), Hwa Chong caters to the needs of the top students from Singapore and the region. The strength of Hwa Chong's IP is in our ability to combine academic excellence with a range of learning opportunities beyond the classroom.

Hwa Chong is more than a school that produces scholars and world champions. We strive to empower our high-ability students to achieve their potential and live their aspirations, while embracing the values of passion, innovation, integrity, empathy and responsibility.

# Overseas Schools



**The Angkor  
Intellectual Academy**  
*Cambodia*



**New Generation School  
Preah Sisowath High  
School**  
*Cambodia*



**Taipei Municipal Chien  
Kuo High School**  
*Chinese, Taipei*



**Taipei First Girl's  
High School**  
*Chinese, Taipei*



**The High School  
Affiliated to SUSTech**  
*China*



**Diocesan Girls'  
School**  
*Hong Kong*



**SMA Negeri 4  
Denpasar High  
School**  
*Indonesia*



**SANTA LAURENSIA**  
*Alam Sutera*

**SMA Santa Laurensia  
Alam Sutera**  
*Indonesia*



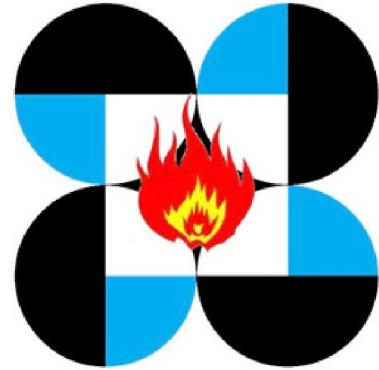
**Toyama Prefectural  
Toyama Chubu Senior  
High School**  
*Japan*



**Chung Ling High School  
Penang**  
*Malaysia*



**Sekolah Sultan  
Alam Shah**  
*Malaysia*



**Philippine Science High  
School Main Campus**  
*Philippines*



**Kamnoetvidya  
Science Academy**  
*Thailand*



**Camborne Science  
International  
Academy**  
*United Kingdom*



**Staples High  
School**  
*United States of  
America*



**VIETNAM**  
**Reigate Grammar  
School of Vietnam**  
*Vietnam*

# Local Schools



**Anglican High  
School**  
*Singapore*



**CHIJ Saint Nicholas  
Girls' School**  
*Singapore*



**CHIJ Saint  
Theresa Convent**  
*Singapore*



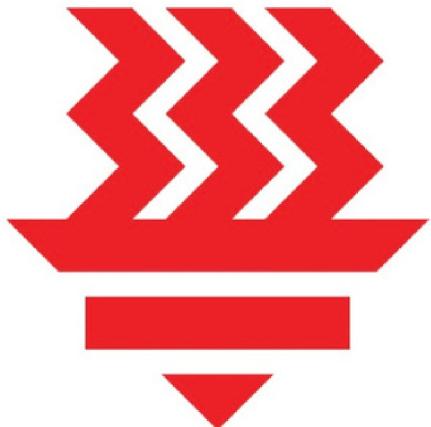
**Clementi Town  
Secondary School**  
*Singapore*



**Crescent Girls'**  
**School**  
*Singapore*



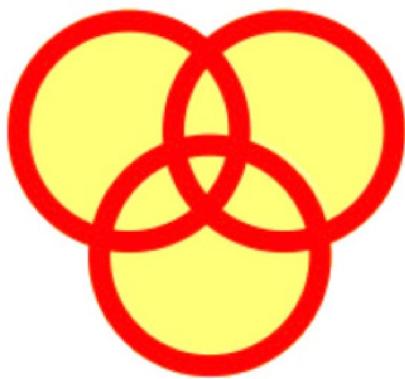
**Dunman High**  
**School**  
*Singapore*



**Hwa Chong**  
**Institution**  
*Singapore*



**Methodist Girls'**  
**School**  
*Singapore*



**Nan Chiau High**  
**School**  
*Singapore*



**Nanyang Girl's**  
**High**  
*Singapore*



**Saint Joseph  
Institution**  
*Singapore*



**Saint Margaret's  
Secondary School**  
*Singapore*



**Tanjong Katong  
Secondary School**  
*Singapore*



**TEMASEK  
JUNIOR COLLEGE**  
**Temasek Junior  
College**  
*Singapore*



**Victoria Junior  
College**  
*Singapore*



**Xinmin Secondary  
School**  
*Singapore*



**Zhong Hua  
Secondary School**  
*Singapore*

# Acknowledgments

## GUEST-OF-HONOUR

**Professor Ng Huck Hui**  
Assistant Chief Executive  
Research and Talent Development  
Agency for Science, Technology and Research

## KEYNOTE SPEAKER

**Professor Duncan Haldane**  
The Nobel Prize in Physics 2016

## NOBEL LAUREATES

**Professor Aaron Ciechanover**  
The Nobel Prize in Chemistry 2004  
**Sir Tim Hunt**  
The Nobel Prize in Physiology or Medicine 2001  
**Professor Takaaki Kajita**  
The Nobel Prize in Physics 2015  
**Sir Richard Roberts**  
The Nobel Prize in Physiology or Medicine 1993

## SPONSOR

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Nanyang Technological University (NTU)  
National University of Singapore (NUS)  
Singapore University of Technology And Design (SUTD)  
Agency for Science, Technology and Research (A\*STAR)  
National Research Foundation (NRF)  
Science Centre Singapore

A green-tinted globe is centered in the image, showing a map of the world. Overlaid on the globe is a large, white, stylized logo consisting of the lowercase letters "isyfi". The "i" has a small leaf-like flourish at its top. The "s" is a long, sweeping curve. The "y" is a vertical line with a diagonal stroke. The "f" is a vertical line with a horizontal stroke at the top. The entire logo is white against the green globe.

isyfi