

Schedule of Junior Science Institute 2018-19

Code	Workshop	Spring Session (Mar 23, 2019)	Summer Session (July 10, 2019)	F.4	F.5	F.6	About the workshop
Biological Sciences							
JSI0056	Check your Health		✓	✓	✓		Are you healthy or not? A balanced diet and exercise are important combination for a healthy body. With the increase of western diet such as burgers, pizzas and a variety of fast food, the health status of youth is declining and becoming a global problem. In this workshop, students will learn the use of simple physiological assessments to identify their health status. Students can self-check if they have healthy hearts or strong bones. From these measurements, students will learn to interpret and improve their health status.
JSI0027	Evaluate your Meat	✓		✓	✓		How do you decide which package of meat and meat products to buy in a supermarket? You probably use your senses to determine the quality of meat. Attributes of meat quality include colour, juiciness, texture and flavour. In this workshop, students will learn how to apply direct sensory evaluation and instrumental analysis to assess the quality of meat.
JSI0063	Mark-recapture: How we Learn about Wildlife Populations?	✓		✓	✓	✓	Hong Kong runs a census every ten years to learn about its population, but how do you learn about wildlife populations when animals are good at hiding? The most accurate tool for this is mark-recapture. Students will learn how mark-recapture works, then design their own mark-recapture study to learn about wildlife populations at HKU.
JSI0049	Miniature Life in Huge Numbers	✓			✓	✓	The vast majority of life on the planet is just a few millimeters long. Join this miniature odyssey to observe the behaviours of tiny grazers, predators and alien-like organisms. Students will first collect their own specimens, then observe them living and interacting under microscopes, and run some chemical communication experiments with two major groups of social insects: termites and ants.
JSI0002	Molecular Analysis of Genetically Modified (GM) Plants	✓		✓	✓	✓	Genetically modified (GM) plants are successful examples of agricultural biotechnology. In this workshop, students will learn the concepts of GM plant production and debate their benefits and risks based on scientific arguments. They will also gain hands-on experience on the use of polymerase chain reaction (PCR) to detect gene modifications in plant materials.
JSI0051	Native or Not? Invasive and Native Species in Hong Kong's Nature Reserves		✓	✓	✓	✓	The flora and fauna of Hong Kong are made up of unique native species. In this workshop, students will see some of these plants and animals that live in the forests of Hong Kong and learn to identify them including birds, reptiles, amphibians, mammals and plants. The afternoon will be spent looking at plants and birds whilst the night time will be spent looking for the nocturnal reptiles, amphibians and mammals. Students will learn how and why exotic species are introduced and why they become such a problem for the native flora and fauna. Remarks: The workshop consists of two field sessions (pre- and postsunset) at Pok Fu Lam Reservoir and a tutorial.
JSI0048	Ocean Odyssey		✓	✓	✓		Do you know that Hong Kong has more species of corals than the entire Caribbean Sea? Do you know why coral biodiversity is so important? Will Hong Kong always have so many coral species? You can find the answers from this workshop. In this workshop, students will embark on an exploration of Hong Kong's rich marine habitats and coral biology at the Swire Institute of Marine Science. Students will have an opportunity to participate in coral propagation while learning some of the scientific tools used to understand the effects of human activities on coral health.
Chemistry							
JSI0044	Amazing Materials		✓	✓	✓		Are you ready for an encounter with the amazing world of modern materials? High-tech fields use advanced materials but these materials have also found their way into the stuff of everyday life. This workshop provides an opportunity for students to explore the bizarre world of modern materials and provides a glimpse of where the future of materials research might take us.
JSI0067	Chemistry Explored at Fingertips		✓	✓	✓	✓	Let's move chemistry from a lab to a computer. In this workshop, we will take students to adventure a brand-new experience in chemistry. Interactive computer experiments will be provided to inspire and reshape the perspectives of students to look at chemistry. Students will participate in three activities: to build and manipulate molecules in 3D virtual reality, to zoom through the molecular quantum simulations, and to play Python for solving chemistry problems.
JSI0003	Colourful Food	✓		✓	✓	✓	Colour is an important aspect in our enjoyment of food. The objective of this workshop is to guide students to research the chemicals embedded in food and beverages that are responsible for the colours. Through the understanding of a variety of molecular structures, chemical separations and analyses of some colourants, students can get a taste of modern scientific research.
JSI0031	Gases Everywhere	✓		✓	✓		Gases are everywhere. They are also very important — many natural processes would not occur without them. Students, however, generally hold alternative conceptions with respect to gases. In this workshop, students will engage in some hands-on, minds-on and exciting approaches in reconsidering their conceptions of gases. Questions to answer include: Are gases matter? Are all gases alike? How do they generally behave? How can we make and use some of them?
JSI0037	Molecular Gastronomy		✓	✓	✓	✓	There are many chemical and physical changes during a cooking process with impart each dish with its own characteristic taste and aroma. Through some simple science concepts, we can account for some observations or rationale behind the recipes and cooking myths. In this workshop, students will gain insights of the science behind the scenes of cooking and some common cooking techniques such as gelation and spherification in molecular gastronomy.
JSI0047	What's the "Matter" ?	✓		✓	✓	✓	Everything has to be made of some matter. Why is a particular matter or material used to make something functional? Why do different types of materials behave differently? In this workshop, students will explore the multidisciplinary field of materials science. Through hands-on activities, students will learn more about the structure-property relationships of materials and scientific methods to characterise materials.
JSI0060	You can Help Crack the Case – A Touch of Forensic Science		✓	✓	✓	✓	Come learn about the science behind real-life crime scene investigation. Become a crime scene investigator to solve a murder mystery. In a mock crime scene, students will need to gather the evidence, analyse the facts and carry out experiments to establish when, where and how the victim died.
Earth Sciences							
JSI0021	Geology and Landscapes of Hong Kong	✓		✓	✓	✓	Hong Kong is a densely populated city famous for its skyscrapers and frantic life. Yet within a few kilometers of the urban areas are rugged mountains, secluded valleys, spectacular rock formations and breathtaking vistas. Students will learn through a field trip about the geology and landscapes of Hong Kong. Remarks: The workshop will take place in outlying islands of Hong Kong.

Environmental Science								
JSI0066	Conservation Forensics: Using Genetic and Chemical Analysis to help solve wildlife crimes		✓			✓	✓	Hong Kong is a centre for global wildlife trade, which exposes a variety of species to risks of over-exploitation. Learn how a range of animals are traded as ornaments, specialty cuisine, medicine, pets and more - right here in our city - and the mass scale of these trades. Join the morning information session to increase your knowledge on the laws and loopholes in wildlife trade, and then learn how to apply forensic tools (e.g. DNA analysis) to combat wildlife crime in the lab. In the second part, we take a trip through the dried seafood street in Sai Ying Pun, to identify some rare and endangered species on sales there. By the end of the workshop, you will have a good understanding of how science can help in the fight against this trade and to aid the conservation of many species under threat of poaching.
JSI0035	Urban Ecology and Conservation		✓			✓	✓	Although Hong Kong is one of the most densely populated cities in the world, the city is also home to a remarkable diversity of wildlife and ecosystems. In this workshop, students will visit one of Hong Kong's Country Parks to learn about the many species that live in Hong Kong. Students will have the opportunity to learn skills in wildlife observation, including learning techniques for species identification in the field, particularly focusing on birds and butterflies. After participating in this workshop, students will have gained a deeper knowledge of the species we share this city with, be able to identify species, and understand how having basic ecological knowledge can help us to design our cities to make sure that we conserve and protect these species.
Mathematics								
JSI0064	Calculus: Why should we Care?		✓			✓	✓	Calculus plays a significant role in scientific understanding and applications — from internet search engines to radio waves to modelling how diseases spread. In this workshop, students will learn some basic calculus concepts and understand why calculus is so crucial in the development of humankind. Remarks: Students without prior calculus knowledge can also join the workshop
JSI0054	Cryptography: How can I Write my Secret Codes and Crack the others?		✓			✓	✓	Our desire to secure information from the access of the others is not new: the Roman King Caesar might not prefer to have their military strategies revealed to their enemies. In this workshop, students will learn some general principles in making secret codes. They will also develop their own coding methods and crack others using the principles that they learn.
JSI0014	Mathematics – An Octopus III		✓			✓	✓	This is one of the two enrichment courses in mathematics in the second semester offered to students of Form 4 and Form 5. Students are encouraged to tap into our interactive activities to discover the mathematical world of their own. The three topics for this course are: 'Groups and Symmetry', 'Matching Theory' and 'Probability'. Remarks: The teaching medium for this course is English. The topics are subject to change. There will be 3 meetings in this workshop: Mar 23 and 30 and Apr 6, 2019
JSI0015	Mathematics – An Octopus IV		✓			✓	✓	This is one of the two enrichment courses in mathematics in the second semester offered to students of Form 4 and Form 5. In this course, we intend to uncover the mathematics buried in our daily life. It would be quite a surprise how so many things are related to mathematics. The three topics for this course are: 'Numbers in Daily Life', 'Simplify Complexity' and 'The Art of Mathematics'. Remarks: Cantonese will be used accompanied with English terminologies. The topics are subject to change. There will be 3 meetings in this workshop: Mar 23 and 30 and Apr 6, 2019
JSI0068	Mathematics – An Octopus S1		✓			✓	✓	This is one of the two enrichment courses in mathematics in the summer semester offered to high school students. In this one-day workshop, we intend to uncover the mathematics buried in our daily life. It would be quite a surprise how so many things are related to mathematics. The two topics for this course are: 'Ramanujan, a new kind of counting' and 'How Math improves our life?'. Remarks: The teaching medium for this course is English. The topics are subject to change.
JSI0069	Mathematics – An Octopus S2		✓			✓	✓	This is one of the two enrichment courses in mathematics in the summer semester offered to high school students. In this one-day workshop, we intend to uncover the mathematics buried in our daily life. It would be quite a surprise how so many things are related to mathematics. The topic for this course is: 'Cryptography'. Remarks: The teaching medium for this course is English. The topics are subject to change.
JSI0065	Where Mathematics and Biology Intersect		✓			✓	✓	As the world is getting more and more interconnected, understanding science in our day to day lives requires interdisciplinary knowledge. In this workshop, students will learn how mathematics and statistics are used in understanding biology through examples such as cancer and evolution. Students will also examine how ideas in biology have influenced mathematics such as in optimization.
Physics								
JSI0061	Discovering Einstein's Special Relativity		✓			✓	✓	Special Relativity was developed by Albert Einstein in 1905. What is Special Relativity? Why is it important in understanding our physical world? In this workshop, we will investigate these questions. We will explore the effects of Special Relativity via different activities and some concrete calculations. Remarks: Participants will need to bring a computer to join this workshop.
JSI0032	Magnetism and Motion		✓			✓	✓	This workshop will explore uses of magnets around us from simple motors in our household appliances to maglev trains and roller coaster launch systems. Topics include magnetic attraction and repulsion, electromagnets, magnetic induction, motional EMF, and the Hall effect. Students will build their own electromagnet for a jumping ring demonstration.
JSI0057	Nuclear Physics - Fundamental to Applied Science		✓			✓	✓	This workshop will introduce the wonder of nuclear and high energy physics from fundamental science (origin of elements in universe) to practical application (environmental radiation detection).
JSI0058	Observational Astrophysics		✓	✓		✓	✓	In this workshop student will learn about new discoveries in astronomy and gain hands-on experience in operating small telescopes. If weather permits, we will observe the Sun using the 16-inch telescope in the Physics Department
JSI0059	The Wonderful World of the Quantum		✓			✓	✓	This workshop tries to showcase a few extraordinary macroscopic phenomena of quantum origin, in particular the effects associated with superfluidity and superconductivity.
JSI0062	What can you do with UV Light and Glue?		✓			✓	✓	Ultra-Violet (UV) glass glue is a liquid photopolymer that solidifies when UV light is being shined on it. There is virtually no limitation on the shapes when making objects with UV glass glue. Come and learn more about the physics and chemistry behind and make your own photopolymer ornaments.
Statistics and Actuarial Science								
JSI0046	Introduction to Data Visualization		✓			✓	✓	This workshop will focus on how to work with infographics to communicate and analyse data. Students will learn how to design simple but compelling infographics, and how to apply them to tell a story. Students will work in groups to create their own infographics.
JSI0024	Probabilities and Statistics in Daily Life		✓			✓	✓	This workshop will introduce and explain some basic concepts of probability and statistics and their applications using some simple, interesting examples, such as: <ul style="list-style-type: none"> • How to choose the "best" boyfriend or girlfriend? • Is there any sure-win strategy in the finance world? • Do you believe in fate? Can your fate be predicted by palm-reading or facial reading? There will be some experiments and games in the workshop.