Science Education Key Learning Area: Biology
Curriculum Framework of National Security Education (2025)

Introduction

This Curriculum Framework[1] illustrates in tabular form how learning in Biology can be connected to related learning elements of national security education, facilitating schools in planning the learning content of national security education. Schools should integrate national security education into the curriculum planning and learning and teaching of this subject through "organic integration", "natural connection", "diversified strategies", "mutual coordination", "learning within and beyond the classroom" and "whole-school participation". In addition to this Curriculum Framework, schools should also refer to the *Curriculum Framework of National Security Education in Hong Kong (2025)* and other relevant curriculum documents to implement national security education more effectively.

1. Overall Teaching Foci

1.1 The Biology curriculum includes studies on ecosystems, genetics, health and disease, microbiology, biotechnology, etc. When studying these topics, examples from both our country and Hong Kong can be used to integrate elements of national security education. This will enhance students' understanding of our country and foster a sense of belonging to our country, enabling them to recognise the necessity of safeguarding ecological security, resource security, food security and biosecurity.

1.2 By studying related topics such as ecosystems, pollution control and conservation, students should understand the impact of human activities on the environment, recognise the importance of sustainable development and appreciate the significance of safeguarding

[1] The content of this framework is set out in the form of examples. Schools should adopt or adapt the relevant suggestions based on students' learning needs and abilities.

ecological security, resource security and food security for national development. They should also gain an understanding of our country's efforts and achievements in these areas, thereby deepening their understanding of national development.

1.3 By studying related topics such as genetics, disease, microbiology and biotechnology, students should understand the impact of radiation on genetic materials and human health, the potential hazards of microorganisms and their connection with infectious diseases, and the applications of biotechnology and its impact on society, economy, and the environment. This will help them understand the importance of safeguarding nuclear security, biosecurity and ecological security, as well as our country's developments in areas such as infectious disease prevention and control and biotechnology, thereby raising their awareness of national security-related issues.

1.4 By studying topics related to biological resource management, global issues, and disease prevention and control, students should recognise the importance our country places on the conservation of ecological environment and public health. This will help them understand that national security is the cornerstone of national development, strengthen their sense of mission to consciously safeguard national security, and nurture them to become responsible citizens.

2. Learning Foci

Science Education Key Learning Area: Biology [Key Stage 4 (Senior Secondary)]		Curriculum Framework of National Security Education in Hong Kong (2025)
Learning Areas (Examples)	**Learning Elements (Examples)**	**Related Learning Elements / Major Fields of National Security (Examples)**
Genetics and Evolution • Mutation	• Recognise the causes of mutation (e.g. radiation and chemical) ➢ When teaching "causes of mutation", teachers can ask students to search for information about the impact of radiation on genetic materials and human health, so as to help them recognise the necessity of safeguarding nuclear security	• 4.8 Further understand the challenges and opportunities faced by our country in the process of development, thereby strengthening the sense of vigilance against potential danger in times of peace • Related major field of national security: Nuclear Security
Ecosystems • Functioning of an ecosystem	• Understand the efficiency of energy transfer in an ecosystem • Understand the cycling of materials in an ecosystem ➢ When teaching "Functioning of an ecosystem", teachers can ask students to discuss the efficiency of food production, ways to increase food yield, and ways to	• 4.8 Further understand the challenges and opportunities faced by our country in the process of development, thereby strengthening the sense of

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	practise the civilised spirit of cherishing food. This will help students recognise that food security is an important cornerstone of national security and a crucial livelihood issue	vigilance against potential danger in times of peace • Related major field of national security: Food Security
• Conservation of ecosystem	• Recognise the need for conservation ➢ When teaching "conservation of ecosystem", teachers can ask students to discuss the impact of human activities on the ecological environment, and how to balance the needs of social development and ecological conservation. This will help students understand the responsibility of humans towards the ecological environment	• 4.8 Further understand the challenges and opportunities faced by our country in the process of development, thereby strengthening the sense of vigilance against potential danger in times of peace • Related major field of national security: Ecological Security

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Diseases • Infectious diseases (causes, ways of transmission, treatment) • Prevention of diseases	• Understand how infectious diseases are transmitted • Discuss how to reduce the spread of some common infectious diseases ➢ By having students search for information on the policies and measures implemented by our country and Hong Kong for infectious disease prevention and control (e.g. the prevention and control of COVID-19 pandemic and the development of related vaccines) from reliable websites, students can recognise individual's responsibilities in maintaining community health (including abiding by and following the government's directives and advice on public health and hygiene, and maintaining good personal hygiene and precautionary measures). They can also develop an understanding of	• 4.8 Further understand the challenges and opportunities faced by our country in the process of development, thereby strengthening the sense of vigilance against potential danger in times of peace • 4.19 Learn about the potential security risks that people in our country and even the world may face in the fields of society, morality, economy, environment, science and technology, etc.; and be able to make wise decisions

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	the importance our country places on people's health, and recognise the necessity of safeguarding biosecurity for our country's sustainable development	and judgments on relevant issues that are in line with the national interests • Related major field of national security: Biosecurity
Applied Ecology • Human impact on the environment	• Recognise the effects of air and water pollution on the environment and human health • Recognise the strategies for pollution control ➢ Through project learning, students can understand successful cases in our country regarding pollution control, which illustrate the importance of science and innovative technology industries (e.g. air pollution control in the Beijing-Tianjin-Hebei region) in safeguarding national ecological security and sustainable	• 4.5 Further understand and care about the achievements of our country in various aspects (e.g. society, economy, national defence, environment, diplomacy, technology, healthcare, transportation and infrastructure), and have pride in our country's achievements

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	development. Students can also learn about the strategies implemented by the Hong Kong SAR Government to tackle related pollution issues (e.g. the "Clean Air Plan for Hong Kong 2035") and their effectiveness ➢ When studying related topics, students can explore the environmental issues currently facing Hong Kong (e.g. waste disposal). They can also acquire knowledge and develop an understanding of the environmental challenges (e.g. air pollution) and opportunities (e.g. the rapid development of the electric vehicle industry) that our country faces during its development. This can help students recognise the importance of safeguarding national security and promoting sustainable development,	• 4.8 Further understand the challenges and opportunities faced by our country in the process of development, thereby strengthening the sense of vigilance against potential danger in times of peace • 4.9 Have a deeper understanding of the importance of the science and innovation and technology industries in our country and Hong Kong in safeguarding national security and promoting sustainable development

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	thereby strengthening their sense of vigilance against potential dangers in times of peace	• Related major fields of national security: Ecological Security, Resource Security
Applied Ecology • Conservation	• Understand the need for conservation • Recognise the measures to preserve biodiversity ➢ Through sharing our country's achievements in protecting the ecological environment (e.g. the decades-long "Three-North Shelter Forest Program" has effectively prevented wind and stabilised sand, improving the ecological environment in the northern regions; and the "Yangtze River Ten-Year Fishing Ban" has gradually restored fishery resources), teachers can help students understand and appreciate our country's achievements in safeguarding resource security and environmental	• 4.5 Further understand and care about the achievements of our country in various aspects (e.g. society, economy, national defence, environment, diplomacy, technology, healthcare, transportation and infrastructure), and have pride in our country's achievements • 4.9 Have a deeper understanding of the importance of the science

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	conservation, as well as deepen their understanding of the importance of our country's science and innovative technology industries in safeguarding national security and sustainable development ➢ Teachers can arrange for students to visit our country's ecological conservation areas (e.g. the Sichuan Giant Panda Sanctuaries, to understand how our country has established nature reserves, carried out ecological restoration work, and conducted rewilding training for giant pandas. This has led to a steady increase in the giant panda population, and their threat level being downgraded from "endangered" to "vulnerable" on the International Union for Conservation of Nature's (IUCN) global list of species at risk of extinction). This can help them	and innovation and technology industries in our country and Hong Kong in safeguarding national security and promoting sustainable development • Related major fields of national security: Ecological Security, Resource Security

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	understand our country's efforts in ecological security and resource security	
Applied Ecology • Global issues	• Recognise the causes and problems of global issues • Illustrate how resources are managed ➢ When teaching "management of resources", teachers can ask students to search for information about the "South China Sea fishing moratorium", so that they can recognise the importance of sustainable development and resource management, and gain a deeper understanding of our country's work in protecting the ecological environment, ensuring food supply and resource supply ➢ When teaching "global warming", "acid rain" and "eutrophication and algal bloom", teachers can ask students to conduct project learning to understand the	• 4.8 Further understand the challenges and opportunities faced by our country in the process of development, thereby strengthening the sense of vigilance against potential danger in times of peace • 4.19 Learn about the potential security risks that people in our country and even the world may face in the fields of society, morality, economy, environment,

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	impact of global warming, acid rain, eutrophication and algal bloom on the ecological environment, and recognise the necessity of safeguarding ecological security	science and technology, etc.; and be able to make wise decisions and judgments on relevant issues that are in line with the national interests • Related major fields of national security: Ecological Security, Resource Security, Food Security
Microbial genetics • Genetically modified microorganisms	• Be aware of the significance and potential hazards of the application of genetically modified microorganisms ➢ By discussing with students the uses of genetically modified microorganisms and the potential risks of related technologies, as well as equipping them with knowledge about how our country effectively prevents	• 4.8 Further understand the challenges and opportunities faced by our country in the process of development, thereby strengthening the sense of

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	and responds to the threats posed by hazardous biotics and related factors, students can understand that only through the appropriate application of bioengineering-related technologies can people's lives and health be protected and the balance of the ecosystem be maintained. They can also appreciate the necessity of safeguarding biosecurity	vigilance against potential danger in times of peace • 4.19 Learn about the potential security risks that people in our country and even the world may face in the fields of society, morality, economy, environment, science and technology, etc.; and be able to make wise decisions and judgments on relevant issues that are in line with the national interests

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		• Related major fields of national security: Biosecurity, Ecological Security
Biotechnology • Applications in biotechnology • Bioethics	• Recognise the potential benefits and hazards of various applications in biotechnology • Be aware of the potential impact of biotechnology on society ➢ When teaching "applications in biotechnology", teacher can share information on our country's development and relevant regulations in related areas (e.g. the production of pharmaceutical products, transgenic animals and plants) to help students recognise the necessity of safeguarding biosecurity ➢ By discussing the benefits, potential risks and ethical issues raised by biotechnology, as well as understanding	• 4.8 Further understand the challenges and opportunities faced by our country in the process of development, thereby strengthening the sense of vigilance against potential danger in times of peace • 4.9 Have a deeper understanding of the importance of the science and innovation and technology industries in our country and

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	how our country effectively prevents and responds to the threats posed by hazardous biotics and related factors, students can understand that only through the appropriate application of bioengineering-related technologies can people's lives and health be protected and the balance of the ecosystem be maintained. They can also appreciate the necessity of safeguarding biosecurity	Hong Kong in safeguarding national security and promoting sustainable development • 4.19 Learn about the potential security risks that people in our country and even the world may face in the fields of society, morality, economy, environment, science and technology, etc.; and be able to make wise decisions and judgments on relevant issues that are in line with the national interests

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		• Related major fields of national security: Biosecurity, Ecological Security

3. Suggested Learning and Teaching Activities (Examples) (Senior Secondary)

The following are merely examples. Teachers can design appropriate activities according to their school contexts and subject characteristics to promote national security education.

✧ **Project learning**

- [Human impacts on the environment] Study the impact of human population growth on the environment and quality of life. This can allow students to understand the responsibility of humans for the ecological environment and recognise the necessity of safeguarding ecological security and biosecurity
- [Conservation] Study the current policies of Chinese Mainland government departments and the Hong Kong SAR Government on environmental conservation. This can allow students to understand the conservation policies and measures implemented in

the Chinese Mainland and Hong Kong, and recognise our country's emphasis on ecological security. Students can also understand our country's achievements in ecological conservation by studying practical examples of national ecological conservation (e.g. the ecological conservation at Sanjiangyuan)

- [Conservation] Study our country's approaches to the conservation of endangered species. This can allow students to understand our country's measures and achievements in protecting endangered species (e.g. wild South China tigers, giant pandas, Tibetan antelopes, elks and Hainan gibbons), as well as recognising the importance of safeguarding ecological security and biosecurity
- [Pollution control] Study the approaches of pollution control in the Chinese Mainland and Hong Kong (e.g. air pollution control in the Beijing-Tianjin-Hebei region). This can allow students to understand our country's efforts and achievements in pollution control and environmental conservation, as well as the importance of our country's science and innovative technology industries in safeguarding national security and sustainable development
- [Global issues] Study our country's planning for the sustainable development of the food system/agriculture. This can allow students to recognise our country's efforts and achievements in maintaining a stable food supply, as well as recognise the necessity of safeguarding resource security and food security
- [Global issues] Study related issues such as global warming and acid rain. This can allow students to recognise the global concern in regard to these issues and recognise the necessity to safeguard ecological security and resource security
- [Applications in biotechnology] Study the application of biotechnology in various fields, as well as the development and related regulations in the Chinese Mainland and Hong Kong. This can help students understand our country's focus on biosecurity and recognise the necessity to safeguard biosecurity
- [Bioethics] Study the benefits, potential risks, as well as the moral and ethical issues arising from biotechnology. This can allow students to recognise the importance of appropriate applications of bioengineering-related technologies and safeguarding

biosecurity

✧ **Visits to and exchanges with the Chinese Mainland**

- [Conservation] Visit ecological reserves in the Chinese Mainland (e.g. nature reserves in Guangdong Province, Sichuan Giant Panda Sanctuaries) to recognise the efforts and achievements of our country in ecological conservation
- [Applications in biotechnology] Visit the China National GeneBank in Shenzhen. This can allow students to understand our country's progress in protecting, developing and utilising genetic resources, as well as its achievements in life science research and innovative bioindustry development

✧ **Cross-curricular collaboration**

- [Human impacts on the environment, pollution control, conservation] Collaborate with the panel of Geography to arrange a field study to the Guangdong-Hong Kong-Macao Greater Bay Area. This can allow students to understand the impact of population growth and economic development on the environment, as well as the efforts of our country in ecological conservation, pollution control and sustainable development

✧ **Local visits**

- [Pollution control] Visit sewage treatment works, T·PARK or the O·PARK1 organic resource recovery centre. This can allow students to understand the methods and measures of pollution control and environmental protection, as well as recognising the importance of science and innovative technology in safeguarding ecological security, resource security and sustainable development

- [Conservation] Visit ecological reserves in Hong Kong (e.g. Sites of Special Scientific Interest, country parks, marine parks and the Ramsar site). This can allow students to understand Hong Kong's conservation measures, government's emphasis on the ecological environment, and recognise the necessity to safeguard ecological security

✧ **Educational talks, workshops or exhibitions at schools**

- In alignment with the curriculum aims and objectives, arrange for relevant institutions or organisations to conduct educational talks, workshops or exhibitions at schools. This can allow students to understand the attention and importance placed on issues related to biological and ecological conservation by the Chinese Mainland and Hong Kong

✧ **Online and self-directed learning activities**

- [Pollution control] With reference to information provided by the Environmental Protection Department, analyse Hong Kong's air pollution situation and explore its impact on health. This can allow students to understand the necessity of safeguarding ecological security
- [Biosecurity] Conduct online research to learn about the eight key risk areas covered by our country's Biosecurity Law. This can allow students to recognise that preventing and responding to these biosecurity threats can safeguard people's lives and health, protect biological resources and the ecological environment, and promote the healthy development of bioengineering-related technologies
- In alignment with the curriculum aims and objectives, design appropriate self-learning activities to help students understand the attention and emphasis placed by the Chinese Mainland and Hong Kong on issues related to biological and ecological conservation

Disclaimer:

- *In case of any discrepancy in the meaning of wording between the English text and the Chinese text, the Chinese text shall prevail.*