



# Green Chemistry Education and Promotion in Taiwan

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# 1.1 History of the TCSB



2016.12.28

TCSB establishment



<https://www.tcsb.gov.tw/mp-2.html>

## 1.2 Organization and Business

The TCSB serve as an **integrating platform** among various ministries and government agencies. **Manage the sources of toxic and chemical substances.**



Director General  
Yein-Rui Hsieh

Hazard Control  
Division

Comprehensive  
Planning  
Division

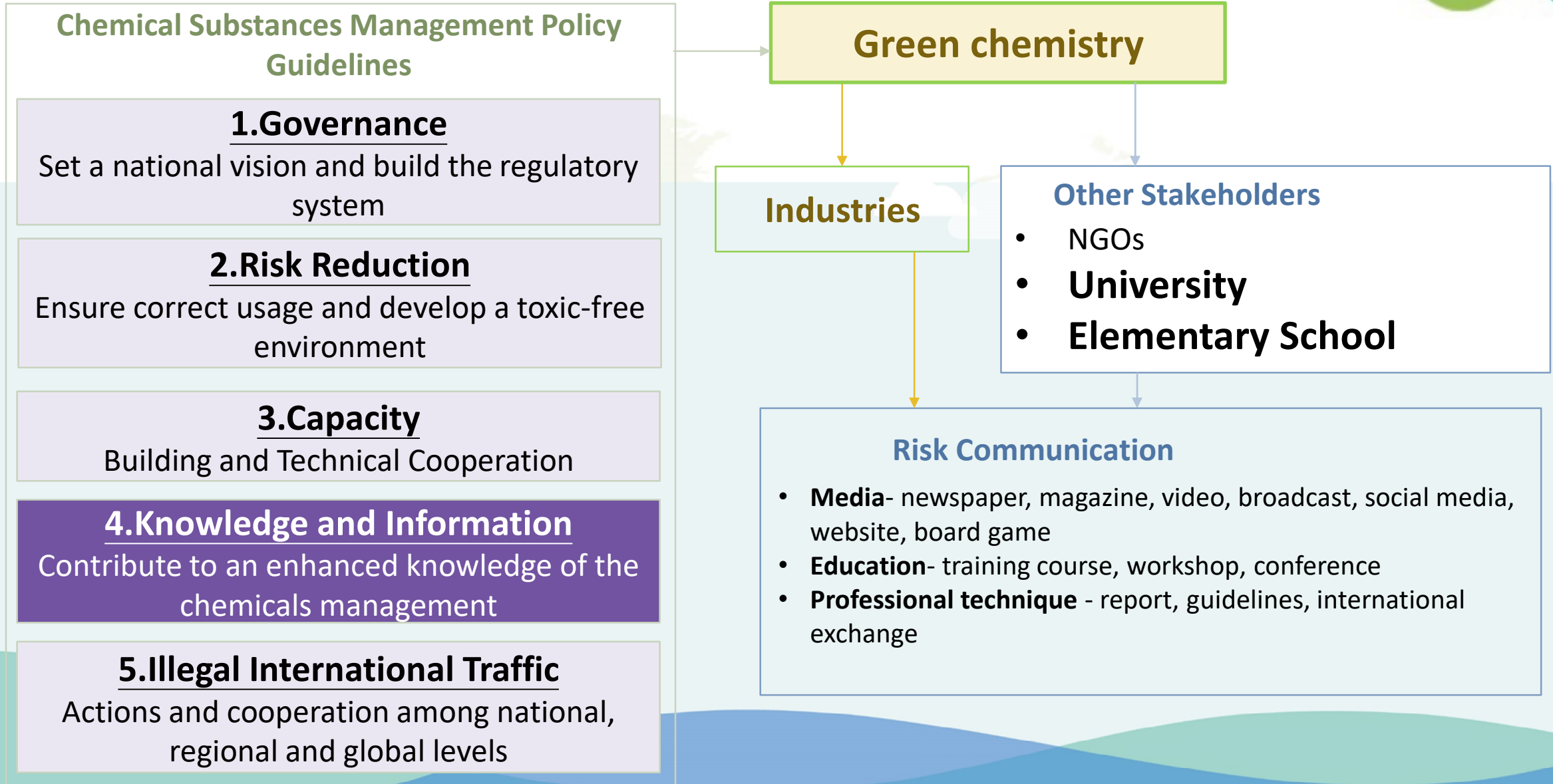
Evaluation  
Management  
Division

## 1.3 Goals of the TCSB

- (1) **Source management** of chemicals
- (2) **Improve cooperation** among government departments
- (3) **Integrated** inspection
- (4) **Gear international chemical** substance management



# 1.4 Strategies



## 2-2 for Elementary school

Dyes in life

Plastic

Water quality and  
life

Energy, heat, combustion,  
global warming

**Textbook  
Compilation**

Soil pollution

Food coloring view

How much do you know  
about acid rain

How much do you know  
about water resources

## 2-3 Trial teaching and promotion of elementary school textbooks

step1

- **Teacher evokes motivation and explains the implementation precautions**

step2

- **Teacher guides students to discuss and operate**

step3

- **Student group discussion and operation**

Step4

- **The teacher integrates the results of the students' discussion and let student share their finding and learning**

## 2-3 Trial teaching and promotion of elementary school textbooks (1/5)

### Course Title: Dyes in Life

Location: Lishan Elementary School, Taipei City



- Teacher evokes motivation



- Teacher guides students to discuss



- The teacher integrates the results of the students' discussion



- Student sharing

### Course Title: Dyes in Life (Blue Dyeing)

Location: Hushan Elementary School, Taipei City



- The teacher explains the implementation precautions



- Students operate blue dye



- Students operate blue dye



- Works display



## 2-3 Trial teaching and promotion of elementary school textbooks (2/5)

### Course Title: Water Quality and Life

Location: Anhe Elementary School, New Taipei City



- Teacher guides students to discuss



- Students inquire about information by themselves



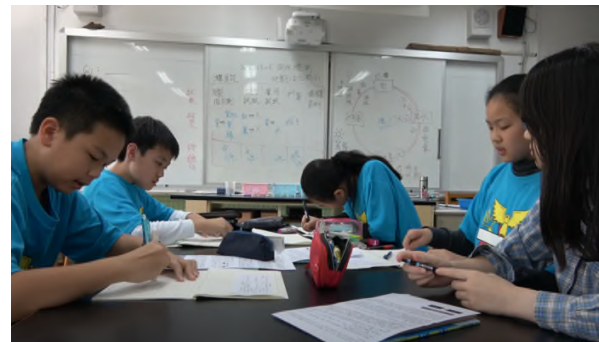
- Student group discussion



- Student sharing

### Course Title : How much do you know about acid rain

Location: Taipei Cultural Elementary School



- Students fill out the study sheet



- Teacher guides students to discuss in groups



- Teacher explains the water cycle



- Teacher Summary

## 2-3 Trial teaching and promotion of elementary school textbooks (3/5)

### Course Title: Food Color Show

Location: Xinyi Elementary School, New Taipei City



- Teacher evokes motivation



- Teacher guides students to discuss



- The teacher integrates the results of the students' discussion



- Students take group assessments carefully

### Course Title : Green and Sustainable Water Resources

Location: Xikou Elementary School, Taipei City



- Teacher arouse motivation



- Teacher guides students to discuss



- Teacher unified  
Students discuss  
results



- students doing experiments

## 2-3 Trial teaching and promotion of elementary school textbooks (4/5)

**Course name: Plastic Reduction Team**  
Location: Taipei Wugong Elementary School



- Teacher leads group discussion



- Student group sharing



- Student group sharing



- Student group sharing

**Course Title: Chemistry in Soil**  
Location: Keelung Xinyi Elementary School



- Teacher evokes motivation



- Teachers introduce SDGs



- Teacher guides students to prepare for the experiment



- Practical operation by students

## 2-3 Trial teaching and promotion of elementary school textbooks (5/5)

**Course Title: Dyes in Life**  
Location: Taipei Nanmen Elementary School



- Instructor elicited motivation



- Students prepare for the lab



- Teacher guides students to prepare for the experiment



- Teaching assistants assist in experimental operations

**Course Title: Dyes in Life**  
Location: Jinhua Elementary School, Taipei City



- Instructor elicited motivation



- Students speak up



- Teacher guides students to conduct experiments



- Student sharing

## 2-4 Organize the green chemical seed training camp for elementary school teachers(1/4)

Build a theme structure

Looking for a partner

Handle primary school teachers

Output theme structure

- Elementary school green chemistry is integrated into textbooks and needs the assistance of on-site teachers
- The teachers at the teaching site have not yet grasped green chemistry, especially green chemistry which is closely related to life.

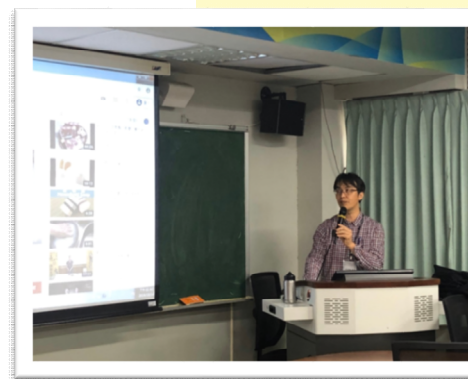
- The training camp is organized in the form of workshops, hoping that teachers who participate in the teaching material planning can further master the scope of green chemistry.
- Opportunities to promote mutual cooperation and exchanges

Themes

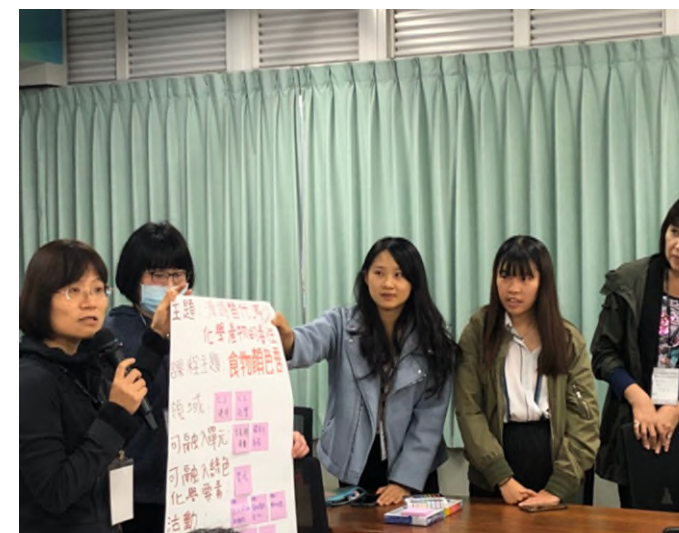
1. Green chemistry in life
2. Integration of Environmental Education Issues in the Curriculum

Themes

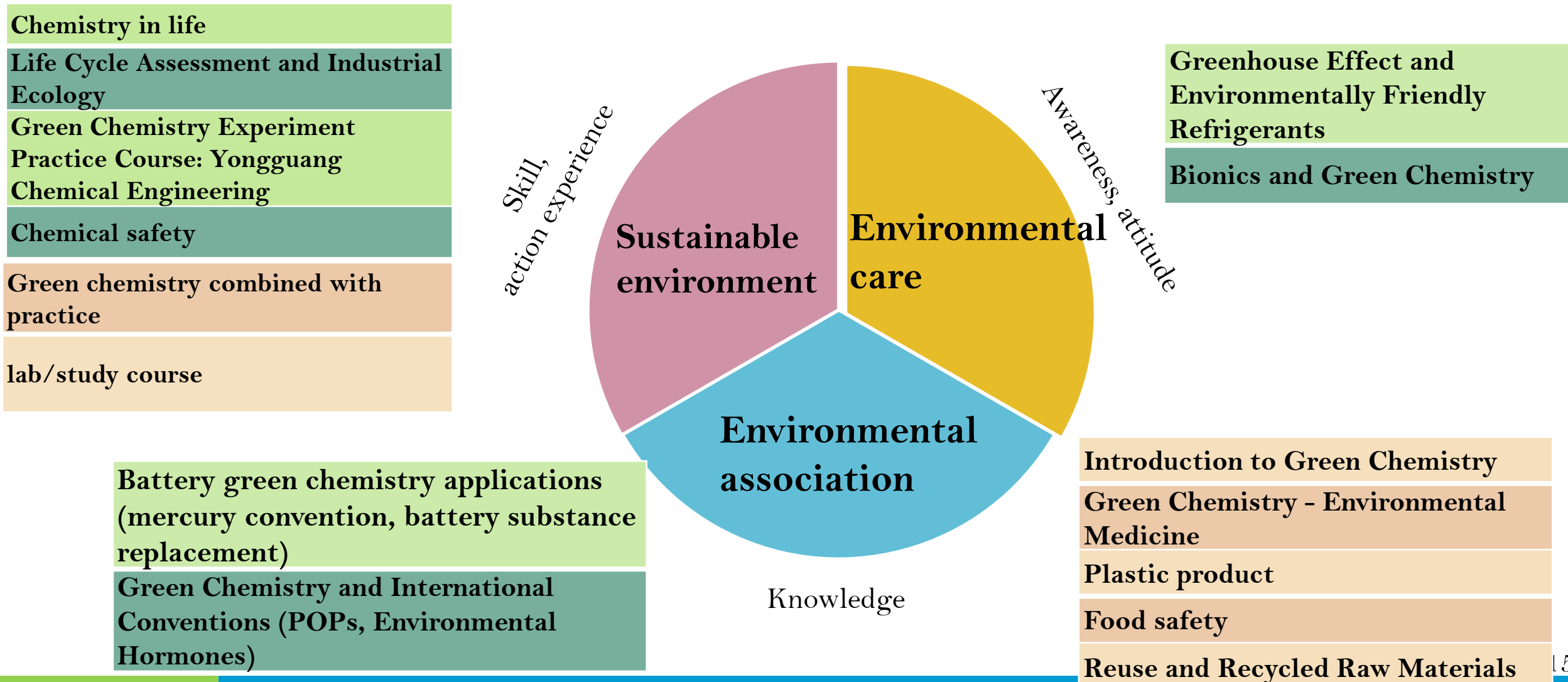
1. Development of Green Chemistry Inter-class Activities Program
2. Implementation of cross-disciplinary green chemistry solutions



## 2-4 Organize the green chemical seed training camp for primary school teachers(2/4)



# 5-1 Establishment of applicable teaching materials for green chemistry colleges and universities Teaching material theme planning



## 5-1 Establishment of applicable teaching materials for green chemistry colleges and universities Teaching demonstration of teaching materials

In response to the impact of the epidemic, this annual textbook teaching demonstration was changed to "mixed on-site and remote management"

on site

long distance

Item No.	Textbook Title	Demonstration teacher or lecturer	Working unit	Expertise, Field Category	Number of feedback questionnaires
1	Bionic and green Chemistry	Yang Youjuan (Editor-in-Chief)	National Dong Hwa University Department of Natural Resources and Environment	Environmental Chemistry/Green Chemistry, Bionic Structure/Bionic Design, Bionics and Sustainable Environmental Education, Scientific Practice and Exploration	40
2	Greenhouse effect and Environmentally friendly refrigerant	Xue Renwei (Editor-in-Chief)	Department of Energy and Refrigeration and Air Conditioning Engineering, National Taipei University of Technology	Green chemistry and cleaner production, covering green chemistry and green processes, various energy and environmental projects (including energy conservation and carbon reduction and related ISO)	9
3	petrochemical industry Green chemistry transition	Lin Daqin (Editor-in-Chief)	Department of Chemical Engineering and Materials Engineering, Tokai University	Biochemical program integration and optimization, biochemical program identification and control	9
4	green chemistry and International Convention (persistent organic pollutants, environmental hormones)	Jiang Jheng-Jie (lecturer)	Department of Environmental Engineering, Chung Yuan University	Fate and transport distribution of emerging pollutants, ultra-trace analysis of emerging organic pollutants, environmental identification	18



## 5-1 Establishment of applicable teaching materials for green chemistry colleges and universities (5/10) teaching material demonstration

on site

long  
distance

Item No.	Textbook name	Demonstration Teacher or Lecturer	Working unit	Expertise, Field Category	Number of feedback questionnaires
5	Battery green chemistry applications (mercury convention, battery substance replacement)	Wang Libang (Editor-in-Chief)	National Taipei University of Technology Institute of Environmental Engineering and Management	Resource recovery and regeneration, environmental purification, mineral processing	38
6	Life Cycle and Industrial Ecology	Wang Binchi (lecturer)	Taiwan Sustainable Energy Research Foundation/Taiwan Corporate Sustainability Training Center	Life cycle assessment, sustainability assessment, material flow analysis, environmental management system, environmental education, corporate sustainability/corporate social responsibility/corporate sustainability reporting, etc.	48
7	in life Chemical	Huang Qinfei (Editor-in-Chief)	National Kaohsiung Normal University Institute of Science Education and Environmental Education	Environmental Education, Science Education	27
8	Green Chemistry Experiment/Practice Course: Yongguang Chemistry	Zhang Tingrui (Editor-in-Chief)	Taiwan Yongguang Chemical Industry Co., Ltd.	fiber and polymer, Organic Synthesis	48
<b>The total number of feedback questionnaires: 237</b>					

# 5-1 Establishment of applicable teaching materials for green chemistry colleges and universities Teaching material theme planning



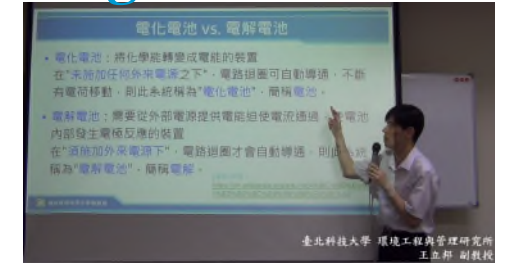
Greenhouse Effect and Environmentally Friendly Refrigerants



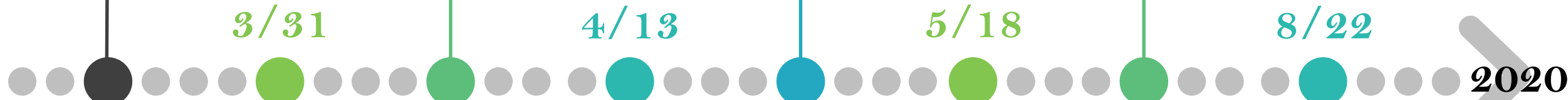
life cycle assessment and Industrial ecology



Green Chemistry and International Conventions



Battery Green Chemistry Applications



3/13

3/31

4/8

4/13

5/8

5/18

5/19

8/22

2020

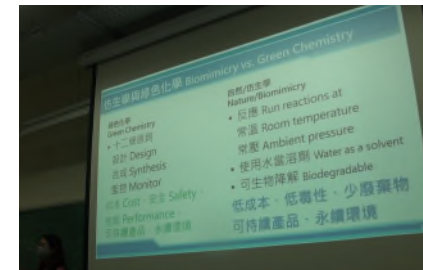
Chemistry in life



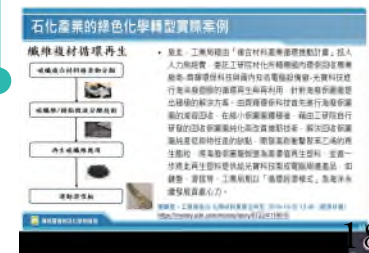
Experimental Internship Course: Yongguang Chemical



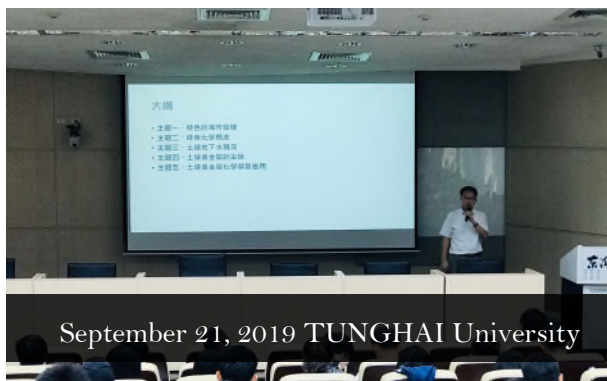
Bionics and Green Chemistry



Petrochemical industry Green chemistry transition



# Assist in the establishment of green chemistry-related courses in colleges and universities



September 21, 2019 TUNGHAI University



17 Oct. 2019 University of Taipei



28 Oct. 2019 Providence University



22 Oct. 2019 Kaohsiung Normal University

## ✓ China-Asia Environmental and Ecological Protection and Education Exchange Association



On November 7, 108, visiting CHUNGTAI RESOURCE TECHNOLOGY CORP.



On November 12, 108, DuPont

Supplementary (Donation) Subsidy Program		
Screenings	Processing date	Number of returned questionnaires (copies)
TUNGHAI University	21 September 2019	82
University of Taipei	17 October 2019	52
Providence University	28 October 2019	39
Kaohsiung Normal University	22 October 2019	39
CHUNGTAI CORP.	07 November 2019	12
DuPont	12 November 2019	34
Executive team self-promotion		
open a course	open object	Number of returned questionnaires (copies)
Introduction to Green Chemistry	Sophomore	66
	Sophomore	37
	graduate School	71
chemical safety	Sophomore	30
green Chemistry-Environmental Medicine	Sophomore	13
<b>The total number of questionnaires returned</b>		<b>510</b>

# 5-4 Handle the 109 College Green Chemistry Creative Competition(3/5)

## Final election and final selection review meeting

03 November 2020 Handle the final selection activities of the competition and hold the final selection review meeting of the college group and research group simultaneously on the same day



01 Scoring consensus meeting



02 Exhibition of final selection works of college group



03 The final selection review meeting of the college group



04 Research group finalists show



05 Research group final selection review meeting

- ✓ Gold, Silver, Bronze, Excellent Works and Special Awards of the Tertiary and Research Groups have been selected
- ✓ The Experimental Safety Award

# Conclusion

- TCSB strives to manage chemicals well and safeguard human health.
- **Education is the most important tool to change life and the environment better.**





**Thank You for Your Attention**

