Special Lecture Course by Visiting Researcher

Comparative Agricultural Studies 10, 比較農業論特論 10

Applications of Spectral Sensing to Smart Agriculture

by Visiting Professor **Suming Chen**

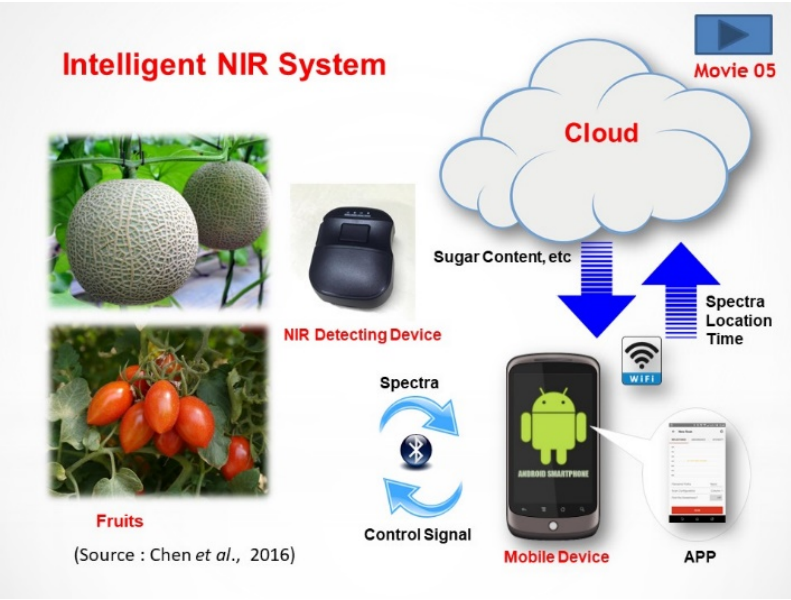
from National Taiwan University, Taiwan

hosted at Lab. of Bio-sensing Engineering

Division of Environmental Science and Technology

E-mail address: schen@ntu.edu.tw

Every Tuesday 10:30 am - 12:00 pm from Apr. 12 - Jul. 19 @W514



Course Overview:

It is a serious problem of labor shortage in agriculture in many countries such as Japan and Taiwan due to population aging, low birth rate, and population migration from rural to urban. In addition, there is an increasing demand of high quality and safe agricultural products from consumers. Artificial Intelligence (AI) and Information and Communication (ICT) technologies can help us to overcome these challenges; and it opens the era of smart agriculture. Among all the technologies of AI, sensing is the essential and necessary for the further development of decision support and action systems. The purpose of this course is to let students learn the knowledge of spectral sensing and imaging technologies and how they can be applied to different sectors of smart agriculture. Fundamentals of spectral sensing and imaging, precision agriculture, and smart agriculture will be covered. Quality evaluation of agro-products, degree of tea fermentation, rice freshness, fruit browning will be introduced. Nitrate contents in leafy vegetables, detecting of *escherichia coli* on lettuce, water stress evaluation, crop growth status monitoring will be also elaborated.

This course is open to all students in the graduate school.
すべての専攻の院生対象

Contact: International Exchange Section
075 753 6320 / agri-ies@mail2.adm.kyoto-u.ac.jp

(Course Title) Special Lecture on Comparative Agricultural Studies 10	**(Group)** M1 students or above **(Number of credits)** 2 **(Course offered period)** 2022/Spring Semester (April – Aug.) **(Class style)** Lecture **(Language)** English **(Day/period)** **(Room)**
(Affiliated department) Graduate School of Agriculture **(Job title)** Associate Professor **(Name)** Katayama	

(Outline and Purpose of the Course)※

Applications of Spectral Sensing to Smart Agriculture

It is a serious problem of labor shortage in agriculture in many countries such as Japan and Taiwan due to population aging, low birth rate, and population migration from rural to urban. In addition, there is an increasing demand of high quality and safe agricultural products from consumers. Artificial Intelligence (AI) and Information and Communication (ICT) technologies can help us to overcome these challenges; and it opens the era of smart agriculture. Among all the technologies of AI, sensing is the essential and necessary for the further development of decision support and action systems. The purpose of this course is to let students learn the knowledge of spectral sensing and imaging technologies and how they can be applied to different sectors of smart agriculture. Fundamentals of spectral sensing and imaging, precision agriculture, and smart agriculture will be covered. Quality evaluation of agro-products, degree of tea fermentation, rice freshness, fruit browning will be introduced. Nitrate contents in leafy vegetables, detecting of *escherichia coli* on lettuce, water stress evaluation, crop growth status monitoring will be also elaborated.

(Course Goals) ※

1. Students can understand the scopes of spectral sensing and imaging, precision agriculture, and smart agriculture.
2. Students can learn the different approaches of spectral sensing and their applications in both agro-product quality evaluation and crop growth status monitoring.
3. Students can discuss and manage on sensing-decision-action algorithm in smart agriculture.

(Course schedule and Contents)※

1. Basic Concepts of Spectral Sensing and Imaging
2. Precision Agriculture
3. Smart Agriculture in Taiwan
4. Spectral Imaging to Evaluate Tea Fermentation
5. Near Infrared Analysis of Rice Freshness
6. Water Stress Evaluation of Cabbage Seedlings
7. Spectral Prediction of *Phalaenopsis* Flowering Quality
8. Interpolating Approach to Spectral Data Analysis
9. Spectral Sensing in Quality Evaluation of Agro-Products

10. Contamination Detecting of *Escherichia coli* on Lettuce
11. Fluorescence Inspection of Fruit Browning
12. Precise Control of Nitrate Contents in Leafy Vegetables
13. Cloud and NIR Based Fruit Sugar Detection
14. Spectral Sensing of Crop Growth Status in Greenhouses

(Method, Point of view, and Attainment levels of Evaluation) ※

Tests in class and reports are evaluated

Refer to current year's 'Guide to Degree Programs' for attainment levels of evaluation.

(Regarding studies out of class (preparation and review)) ※

Some assignments and homework will be given, and should be submitted by the next class.

(Others (office hour, etc.))

1. The lecture is given in English by a visiting professor, Suming Chen (National Taiwan University, Taiwan)
2. Office hours: to be announced

(Requirements for taking courses) ※

It is desirable to take undergraduate course "Physical and Biological Properties of Agricultural Products"

Students who have already received credit for "Special Lecture on Comparative Agriculture 4" are not eligible to take this lecture.

(Textbook) ※

No textbook, some handouts will be distributed.

(References)

(Related URL)

※【mandatory】