

SEA-ABT: SOUTH EAST ASIA ACADEMY FOR BEVERAGE TECHNOLOGY

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Specifications for all modules, courses and educational products

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Dissemination Level		
PU	Public	
PP	Restricted to other programme participants (including Commission services and projects reviewers)	X
CO	Confidential, only for members of the consortium (including EACEA and Commission services and projects reviewers)	

Summary:

Teaching modules for HE and training courses for CPD are selected and specified, based on the survey results of existing curriculum related to beverage technology and the needs from industrial survey.

The HE curriculum is developed using the Diploma degree format of Kasetsart University. It is designed as a multidisciplinary curriculum including science, technology and management modules.

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1 Curriculum of Graduate Diploma in Beverage Technology

This curriculum is designed as a multidisciplinary curriculum including science, technology and management modules. Teaching modules for HE are selected based on the survey results of existing curriculum related to beverage technology, being taught in Thailand, and the needs from industrial survey. HE curriculum is developed using the Diploma degree format of Kasetsart University, Faculty of Agroindustry. According to the results of the survey, a face-to-face over on Saturday or Sunday is suitable time for the curriculum. However, some of topic/courses may be offered through an online platform. Target groups for this curriculum are working staffs in food industry, especially beverage industry, who wants to obtain in-depth knowledges on beverage technology though diploma program in order to develop their career path.

1.1 Program name: Graduate Diploma Program in Beverage Technology

1.2 Degree

Graduate Diploma (Beverage Technology)

Grad. Dip. (Beverage Technology)

1.3 Curriculum structure

Seminar		2 credits
Required course		23 credits
Total	Not less than	25 credits

1.4 Format of program

Language	Thai and English
Admission	Applicant must have minimum degree in (a) or (b) (a) Bachelor of Science in food Science, product development, biotechnology, chemistry, microbiology, or related field (b) Bachelor of Engineer in food engineering, chemical engineering, environmental engineering or related field
Admission procedure:	Evaluation of CV and Interview
Co-operative institutes	Kasetsart University, Thailand Chulalongkorn University, Thailand King Mongkut's Institute of Technology Ladkrabang, Thailand University of Natural Resources and Life Sciences Vienna, Austria Hochschule Geisenheim, Germany

University, University of Teramo, Italy

ISEKI-Food Association, Austria

Habla-Chemie GmbH, Germany

Patkol Public Company Limited, Thailand

1.5 Program overview

First year, 1st semester **Credit** (lecture hour, lab hour, self study hour)

Non Alcoholic Beverage Technology 2 (2-0-4)

Target marketing and strategic pricing for beverage industry 2 (2-0-4)

Supply chain management for beverage industry 2 (2-0-4)

Beverage Chemistry and microbiology 2 (2-0-4)

Food law and regulation 1 (1-0-2)

Practical LAB in beverage industry 1 (0-1-2)

Seminar 1 (1-0-0)

Total 11

First year, 2nd semester **Credit** (lecture hour, lab hour, self study hour)

Alcoholic Beverage Technology 2 (2-0-4)

Planning and project management for beverage industry 2 (2-0-4)

Product and Process Development 2(2-0-4)

Hygienic Engineering and Design 2 (2-0-4)

QC and QA 2 (3-0-4)

Special problem 3 (0-1-6)

Seminar 1 (1-0-0)

Total 14

1.6 Course Description and learning out come

Course	Course Description	Outcome
Food Law & Regulations	<i>Domestic & International Food Law and Regulations related to food additives, Beverage manufacturing and packaging</i>	<ul style="list-style-type: none"> - Understanding both domestic and international laws and regulations related beverages. - Achieve the way to search related websites and documents to locate information correlated to laws, standards and regulations related to beverages. -Apply knowledge of regulation while developing new beverage products or seeking the approval of new beverage products
Non Alcoholic Beverage Technology	<i>Principle of non-alcohol beverage processing</i>	-Understand principle of non-alcohol beverage processing, including juices, dairy-based beverages, energy drinks , coffee, tea, and etc.
Alcoholic Beverage Technology	<i>Principle of alcoholic beverage processing</i>	-Understand principle of alcohol beverage processing, including wine, beer, spirits etc.
Product and Process Development	<i>New Product Development, packaging, Waste management</i>	<ul style="list-style-type: none"> • Understand new product development concept for creation of new beverage product. • Manage waste utilization for beverage factory • understand the use of new technologies • understand the use of packaging materials and technologies for beverages
Hygienic Engineering and Design	<i>Law & Regulations for food machinery design, Material of construction for equipment in contact with food, Measurement and Instrumentation, Hygienic equipment design criteria, Hygienic design of piping, Air handling system, and Steam quality</i>	<ul style="list-style-type: none"> -Understand law & regulations for food machinery design, Material of construction for equipment in contact with food -Design and specify the specifications of factory building, piping system, valves and accessories, pumps, water treatment and other equipment related to beverage factory. -Design the processing lines and plant layout of beverage factory. -Understand principle measurement, instrumentation and automation used in beverage industry
QA & QC	<i>Statistics for Quality Control, Quality measurement and analysis, sensory analysis, Food Safety Management system e.g. HACCP BRC ISO22000</i>	<ul style="list-style-type: none"> • Understand how to evaluate quality of beverage products • Understand how to apply various statistic tools and techniques used in quality control and quality improvement system • Understand how to use of sensory analysis methods • Understand different food safety management system e.g. HACCP BRC ISO22000
Beverage chemistry & microbiology	<i>Principle of chemistry for beverage e.g. colloid, additives, preservatives, Principle of microbiology for beverage, Shelf-life study)</i>	<ul style="list-style-type: none"> • Understand the chemistry of different beverages • Understand the microbiology of different beverages • Understand the basics of shelf life prediction

Course	Course Description	Outcome
Target marketing and strategic pricing for beverage industry	<i>A target marketing or STP strategy for beverage business. The profit function, willingness to pay and pricing strategy are provided to comply with the target consumers and become a positioning strategy.</i>	<ul style="list-style-type: none"> • Understand concept of A target marketing or STP strategy for beverage business. • Understand pricing strategy for beverage business
Supply chain management for beverage industry	<i>Integration of procurement, logistics network distribution, operations, inventory management, transportation and distribution of beverages from raw materials to consumers. Supply chain operations reference model and supply chain performance measurement. Strategies and tactics in supply chain and logistics management for sustainable development.</i>	<ul style="list-style-type: none"> • Understand supply chain and logistics management for beverage industry
Planning and project management for beverage industry	<i>Management concepts for beverage operations. Operational strategy, planning and decisions. Process and work-force management. Techniques in site selecting and plant layout, capacity planning, production planning, inventory control and project management for beverage-industry.</i>	<ul style="list-style-type: none"> • Understand management concepts for beverage operations. • Understand planning and operational strategy for beverage industry.
Practical Laboratory in Beverage Industry	<i>e.g. UHT Evaporator Filter Heat exchanger</i>	Hands-on Laboratory related to beverage industry

Seminar	<i>Presentation technique, Scientific communication skill, Connectivity, Creativity, Personality, Guest speaker</i>	<ul style="list-style-type: none"> • Be able to analyze and comprehend the scientific research papers. • Use scientific database to update or follow the research • Be able to give oral scientific presentation effectively • Write a seminar report as the scientific review paper
Special Problem	<i>Information literacy, Study of any topic related to Beverage Technology</i>	<ul style="list-style-type: none"> • Problem solving skills related to beverage industry.

1.7 Graduation

1. Student must study all subjects and earn at least 24 credits
2. Average grade must be higher than 3.0 of 4 levels grading system

1.8 Learning Output

Output	Strategy
1) improvement of scientific, technological and professional skills	Learning and Practice on site
2) problem identification and solving ability	Discussion and hands on
3) improvement of quality and safety management in the beverage production	Learning and Practice on site

2 CPD Modules

CPD modules are selected based on the results of the industrial needs survey and the inventory of existing training modules, being taught in Thailand. Modules can be categorized into Quality Assurance and Quality Control, Product development, Technology, Engineering, Management (Soft skill), and other. According to the survey, length of modules could be range from 1 to 5 days depending on the content. Target of this CPD modules are those who wants to obtain specific knowledge in a short period of time.

2.1 Overview of CPD training

Subject	format				target groups			Language	Institution	responsible
	flash presentation (youtube)	webinars	e-learning course	workshop	teacher	students	food professionals			Name
Shelf-life of beverages				x	x	x	x	EN	UNITE	Paola Pittia
Sugars in foods		x			x	x	x	EN	UNITE	Paola Pittia
Hygienic design		x	x	x	x		x	EN/TH	BOKU/ KMITL	Gerhard Schleining, Navaphattra Nunak
Lean business plan development				x	x	x	x	EN	BOKU	Rainer Svacinka
Selected topics of food safety for less educated professionals	x						x	EN/TH	BOKU	Gerhard Schleining
Food Law & Regulations for beverage				x	x	x	x	EN/TH	KU	Kriskamol Na Jom
New Product Development (NPD)				x	x	x	x	EN/TH	KU	Kriskamol Na Jom
Innovative Technology				x	x	x	x	EN/TH	KU	Sasitorn Tongchitpakdee
Project Management				x	x	x	x	EN	BOKU	Rainer Svacinka
Fruits & Vegetables Drink				x	x	x	x	EN	HGU	Frank Will
Food Safety Management for SMEs				x	x	x	x	EN/TH	KU	Warapa Mahakanjanakul

3 Annex 1: Details of HE modules

3.1 Food Law & Regulations

Module	Food Law & Regulations
Semester	1st
Person responsible	Kriskamol Na Jom
Lecturer	Kriskamol Na Jom Guest lecturers
Language	Thai/English
Course (weekly contact hours)	2
Weekly self-study hours	4
Credit points	2
Recommended preconditions	None
Learning outcomes	<ul style="list-style-type: none"> • Understanding both domestic and international laws and regulations related beverages. • Achieve the way to search related websites and documents to locate information correlated to laws, standards and regulations related to beverages. • Apply knowledge of regulation while developing new beverage products or seeking the approval of new beverage products
Teaching contents	Domestic & International Food Law and Regulations related to food additives, Beverage manufacturing and packaging
Assessment of achievements	Written examination and oral presentation of assignment
Media	Power point, video, internet
Literature	Gabriela Steier and Kiran Patel. 2016. International Food Law and Policy. Springer.

3.2 Non Alcoholic Beverage Technology

Module	Non Alcoholic Beverage Technology
Semester	1 st
Person responsible	Sasitorn Tongchitpakdee (KU)
Lecturer	Sasitorn Tongchitpakdee (KU) Kriskamol Na Jom (KU) Sarn Settachaimongkol (CU)
Language	Thai/English
Course (weekly contact hours)	2
Weekly self-study hours	4
Credit points	2
Recommended preconditions	None
Learning outcomes	Students understand principle processing, characteristics, quality standards and safety criteria for non-alcohol beverages, including juices, dairy-based

	beverages, soft drinks, energy drinks, coffee, tea, and etc.
Teaching contents	Juices, dairy-based beverages, soft drinks, energy drinks, coffee, tea, and etc. in the aspects of chemical composition, classification, raw materials and ingredients, processing step, current and new technology related to production, quality standards and safety criteria, factors affecting shelf life of products
Assessment of achievements	Written or oral examination
Precondition for grant of CPs	Successful written examination, constant and active attendance
Media	Power point, video, demonstrations with equipment
Literature	- VarnAm, AH, Sutherland, JP, Varnum, A 1994, Beverages: Technology, Chemistry and Microbiology (Food Products), Kluwer Academic Publishers, New York. - Paquin, P 2009, Functional and Speciality Beverage Technology, Woodhead Publishing, UK. - Ashurst, P, Hargitt, R, 2009, Soft Drink and Fruit Juice Problems Solved, Woodhead Publishing, New York.

3.3 Alcoholic Beverage technology

Module	Alcoholic beverage technology
Semester	2 nd
Person responsible	Sumalika Morakul (KU)
Lecturer	Sumalika Morakul (KU) Ulaiwan Withayagiat (KU) Sarn Settachaimongkol (CU)
Language	Thai and English
Course (weekly contact hours)	2
Weekly self-study hours	4
Credit points	2
Recommended preconditions	beverage chemistry and microbiology
learning outcomes	<ul style="list-style-type: none"> • Understand principle of alcohol beverage processing, including wine, beer, spirits and related drinks • Know how to control the quality of product • Can identify the problem and its solution properly
Teaching contents	<ul style="list-style-type: none"> • Principle of wine, beer, spirit and related drink production • Process control • Product quality control and analytical method • Nutrition and health aspects • Trends and developments
Assessment of achievements	written examination 50% oral presentation 25%

	<p>course attendance 5%</p> <p>The overall score must higher than 50% to pass the course</p> <p>A: 80% up</p> <p>B:70-79%</p> <p>C:60-69%</p> <p>D:50-59%</p> <p>F<50</p>
Media	Power point, video,
Literature	<ul style="list-style-type: none"> • Wolfgang Kunze. 2004.Technology brewing and malting. VBL, Berlin. • Kevin Zraly. 2008. Windows on the world:complete wine course. Sterling, NewYork. • Buglass J.A. 2011.Handbook of alcoholic beverages volume¹. Wiley, New Delhi.

3.4 Product & Process Development

Module	Product and Process Development
Semester	2
Person responsible	Chaleeda Borompichaichartkul (CU)
Lecturer	<ul style="list-style-type: none"> • Chaleeda Borompichaichartkul (CU) • Ulaiwan Withayagiat (KU) • Guest lecturer from beverage industry • Guest lecture from Department of Product Development, KU • Guest lecture from Department of Packaging and Material Technology, KU
Language	Thai/English
Course (weekly contact hours)	2
Weekly self-study hours	4
Credit points	2
Recommended preconditions	<ul style="list-style-type: none"> • Unit operation and automation • Beverage chemistry and microbiology
learning outcomes	<ul style="list-style-type: none"> • Capability to understand and gain experience in the process of beverage product and process development • Capability to integrate knowledge in chemistry, microbiology, processing, packaging and engineering concepts in beverage product and process development • Capability to identify challenges involved in beverage product and process development • Understanding techniques and knowledge related to basic consumer research and marketing concerns in beverage industry • Capability to prepare a prototype or concept of new beverage product and process • Understanding concept of sustainable waste management and by-product utilization from beverage

	<p>industry</p> <ul style="list-style-type: none"> • Capability to develop and enhance team cooperation and communication skills
Teaching contents	<ul style="list-style-type: none"> • Introduction: types of product development , significance to beverage industry, product policy and goals, product failure and success • Generating and screening of new product ideas • Product concept and concept testing • Development of prototype product: information search, feasibility, detailed process and packaging • Process development • Experimentation in prototype development • Sensory Analysis and consumer testing • Shelf life study • Sustainable waste management and by-product utilization
Assessment of achievements	<ul style="list-style-type: none"> • Course assignment • Oral presentation • Written examination • Participation during contact hours
Media	<ul style="list-style-type: none"> • Computer-based information literacy • Course readers and handouts
Literature	<ul style="list-style-type: none"> • Fuller, G.W., 2016. New Food Product Development: From Concept to Marketplace, Third Edition. CRC Press. • Other suggested readings to be assigned

3.5 Hygienic Engineering and Design

Module	Hygienic Engineering and Design
Semester	2
Person responsible	Navaphattra Nunak (KMITL)
Lecturer	Navaphattra Nunak (KMITL) Taweeapol Suesut (KMITL) Weerachet Jittanit (KU) Worapanya Suthanupapwut (PATKOL)
Language	Thai/English
Course (weekly contact hours)	3
Weekly self-study hours	6
Credit points	3
Recommended preconditions	Unit operations, microbiology
learning outcomes	<ul style="list-style-type: none"> • Understand law & regulations for food machinery design, Material of construction for equipment in contact with food • Design and specify the specifications of factory building, piping system, valves and accessories, pumps, water treatment and other equipment related to beverage factory. • Design the processing lines and plant layout of beverage

	<p>factory.</p> <ul style="list-style-type: none"> • Understand principle measurement, instrumentation and automation used in beverage industry
Teaching contents	<p>Law & Regulations for food machinery design, Material of construction for equipment in contact with food, Instrumentation and Automation, Hygienic equipment design criteria, Hygienic design of piping, valves, pumps, Air handling system, Water treatment for beverage factory, Design the processing lines and plant layout of beverage factory, and Steam quality</p>
Assessment of achievements	<p>oral assessment of the learning outcomes</p>
Media Literature	<p>Power point, video, demonstrations with equipment (test rig), ...</p>

3.6 QA & QC

Module	Quality Assurance and Quality Control
Semester	2
Person responsible	Chaleeda Borompichaichartkul (CU)
Lecturer	<ul style="list-style-type: none"> • Chaleeda Borompicahaichartkul (CU) • Kriskamol Na Jom (KU) • Guest lecturer from beverage industry
Language	Thai/English
Course (weekly contact hours)	2
Weekly self-study hours	4
Credit points	2
Recommended preconditions	<ul style="list-style-type: none"> • Beverage chemistry and microbiology • Practical LAB in beverage industry
learning outcomes	<ul style="list-style-type: none"> • Understanding the principles of quality control and quality assurance in the beverage industry • Capability to diagnose and analyze problems causing variation in beverage manufacturing process • Understanding the standard quality analysis tools and techniques • Understanding the complexities of statistical analysis and control-chart interpretation and application
Teaching contents	<ul style="list-style-type: none"> • Food quality: importance and functions of quality control and quality assurance • Types of risks associated with food and beverage • Overview of food quality and safety assurance systems • Principles of aspects of sampling plan, sample collection techniques, sampling tools and documentation • Methods of quality assessment of raw materials, in-process and finished products : physical, chemical and microbiological properties assessment • Principles of sensory analysis in quality control • Statistical methods for food and beverage quality control

	<ul style="list-style-type: none"> • Current challenges in quality, safety, fraud and adulteration in beverage industry
Assessment of achievements	<ul style="list-style-type: none"> • Course assignment • Oral presentation • Written examination • Participation during contact hours
Media	<ul style="list-style-type: none"> • Computer-based information literacy • Course readers and handouts
Literature	<ul style="list-style-type: none"> • Alli, I., 2016. Food Quality Assurance: Principles and Practices. CRC Press. • Foster, T., Vasavada, P.C., 2003. Beverage Quality and Safety. CRC Press. • Hubbard, M., 2013. Statistical Quality Control for the Food Industry. Springer US. • Kilcast, D., 2010. Sensory Analysis for Food and Beverage Quality Control: A Practical Guide. Elsevier Science. • To be assigned according to lecturers suggestion

3.7 Beverage Chemistry & Microbiology

Module	Beverage chemistry & microbiology
Semester	1st
Person responsible	Kriskamol Na Jom (KU)
Lecturer	Kriskamol Na Jom (KU) Sasitorn Tongchitpakdee(KU) Warapa Mahakarnjanakul(KU) Ulaiwan Withayagiat(KU)
Language	Thai/English
Course (weekly contact hours)	2
Weekly self-study hours	4
Credit points	2
Recommended preconditions	None
Learning outcomes	<ul style="list-style-type: none"> - Understand the chemistry of different beverages - Understand the microbiology of different beverages - Understand the basics of shelf life prediction
Teaching contents	Principle of chemistry for beverage e.g. colloid, additives, preservatives, Principle of microbiology for beverage, shelf-life study
Assessment of achievements	Written examination and oral presentation of term project
Media	Power point, video, internet, practical laboratory, excursion
Literature	Alan H. Varnam and Jane P. Sutherland. 1994. BEVERAGES technology, chemistry and microbiology. AN Aspen Publications.

3.8 Target marketing and strategic pricing for beverage industry

Module	Target marketing and strategic pricing for beverage industry
Semester	1 st
Person responsible	TBA
Lecturer	TBA
Language	Thai/English
Course (weekly contact hours)	2
Weekly self-study hours	4
Credit points	2
Recommended preconditions	None
Module objections and learning results	-Students understand concept of A target marketing or STP strategy as well as pricing strategy for beverage business.
Teaching contents	A target marketing or STP strategy for beverage business. The profit function, willingness to pay and pricing strategy are provided to comply with the target consumers and become a positioning strategy.
Assessment of achievements	Written or oral examination and project work
Precondition for grant of CPs	Successful written examination and presentation of project work
Media	Power point and video
Literature	- Dorfman, J 2013, Economics and Management of the Food Industry, Taylor Francis, London. -Olson, JS, Lopez , C, Olson, G 2009, Build Your Beverage Empire, Cube 17, Texas.

3.9 Supply chain management for beverage industry

Module	Supply chain management for beverage industry
Semester	1 st
Person responsible	TBA
Lecturer	TBA
Language	Thai/English
Course (weekly contact hours)	2
Weekly self-study hours	4
Credit points	2
Recommended preconditions	None
Module objections and learning results	-Students understand supply chain and logistics management for beverage industry
Teaching contents	Integration of procurement, logistics network distribution, operations, inventory management, transportation and distribution of beverages from raw materials to consumers.

	Supply chain operations reference model and supply chain performance measurement. Strategies and tactics in supply chain and logistics management for sustainable development.
Assessment of achievements	Written or oral examination and project work
Precondition for grant of CPs	Successful written examination and presentation of project work
Media	Power point and video
Literature	- Dorfman, J 2013, Economics and Management of the Food Industry, Taylor Francis, London. -Olson, JS, Lopez , C, Olson, G 2009, Build Your Beverage Empire, Cube 17, Texas. -To be assigned accrodg to lecturers suggestion

3.10 Planning and project management for beverage industry

Module	Planning and project management for beverage industry
Semester	2 nd
Person responsible	TBA
Lecturer	TBA
Language	Thai/English
Course (weekly contact hours)	2
Weekly self-study hours	4
Credit points	2
Recommended preconditions	None
Module objections and learning results	-Students understand management concepts for beverage operations as well as planning and operational strategy for beverage industry.
Teaching contents	Management concepts for beverage operations. Operational strategy, planning and decisions. Process and work-force management. Techniques in site selecting and plant layout, capacity planning, production planning, inventory control and project management for beverage-industry.
Assessment of achievements	Written or oral examination and project work
Precondition for grant of CPs	Successful written examination and presentation of project work
Media	Power point and video
Literature	- Dorfman, J 2013, Economics and Management of the Food Industry, Taylor Francis, London. -Olson, JS, Lopez , C, Olson, G 2009, Build Your Beverage Empire, Cube 17, Texas. -To be assigned accrodg to lecturers suggestion

3.11 Practical Laboratory in Beverage industry

Module	Practical Laboratory in beverage industry
Semester	1
Person responsible	Chaleeda Borompichaichartkul
Lecturer	<ul style="list-style-type: none"> • Chaleeda Borompichaichartkul (CU) • Sarn Settachaimongkon (CU) • Kriskamol Na Jom (KU) • Sasitorn Tongchitpakdee (KU) • Sumallika Morakul (KU)
Language	Thai/English
Course (weekly contact hours)	3
Weekly self-study hours	2
Credit points	1
Recommended preconditions	<ul style="list-style-type: none"> • Unit operation and automation • Beverage chemistry and microbiology
learning outcomes	<ul style="list-style-type: none"> • Understanding concepts and practices of process involved in the manufacturing of beverages • Understanding the implementation of physical, chemical, microbiological and sensory measurements in beverage industry • Capability to evaluate the impact of manufacturing process on the quality and safety of beverage products • Improving skills in planning and conducting experiments, collecting data, analyzing and interpreting results, and writing technical reports
Teaching contents	<ul style="list-style-type: none"> • Introduction to laboratory practice and safety concern • Preparation of raw materials: sorting, peeling, extraction etc. • Thermal process: retort, canning and heat penetration • Pasteurization unit: plate-heat exchanger • UHT pilot plant demonstration • Spray and drum drying system • Concentration by evaporation • Clarification and filtration • Beverage packaging assessment • Analysis of physical, chemical, microbiological and sensory characteristics of beverage products
Assessment of achievements	<ul style="list-style-type: none"> • Attendance, technical skill and performance • Laboratory report • Written examination
Media	<ul style="list-style-type: none"> • Computer-based information literacy • Laboratory facilities and equipments • Course readers and handouts
Literature	<ul style="list-style-type: none"> • Fellows, P.J., 2009. Food Processing Technology: Principles and Practice. Elsevier Science.

	<ul style="list-style-type: none"> • Kilcast, D., 2010. Sensory Analysis for Food and Beverage Quality Control: A Practical Guide. Elsevier Science. • Sehgal, S., 2016. A Laboratory Manual of Food Analysis. I K International Publishing House Pvt. Limited. • To be assigned according to lecturers suggestion
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3.12 Seminar

Module	Seminar
Semester	1 st and 2 nd
Person responsible	Sumallika Morakul (KU)
Lecturer	Faculty members from KU, CU and KMITL
Language	Thai and English
Course (weekly contact hours)	1
Weekly self-study hours	2
Credit points	1
Recommended preconditions	None
learning outcomes	<ul style="list-style-type: none"> • Be able to analyze and comprehend the scientific research papers. • Use scientific database to update or follow the research • Be able to give oral scientific presentation effectively • Write a seminar report as the scientific review paper
Teaching contents	<ul style="list-style-type: none"> • Literature reviewing for information related to special problem topics and presenting the literature review
Assessment of achievements	<ul style="list-style-type: none"> • Active discussion and oral presentation 70% • Abstract and final written report 25% • Participation during contact hours 5% <p>The overall score must higher than 50% to pass the course</p> <p>A: $\geq 80\%$ B: 70-79% C: 60-69% D: 50-59% F: <50</p>
Media	<ul style="list-style-type: none"> • Computer-based information literacy • PowerPoint program and other presentation related programs • Electronic data processing using various statistics packages and software
Literature	<ul style="list-style-type: none"> • Nair, P.K.R., Nair, V.D., 2014. Scientific Writing and Communication in Agriculture and Natural Resources. Springer International Publishing. • To be assigned according to special problem topics

3.13 Special Problem

Module	Special Problem
Semester	2

Person responsible	Sarn Settachaimongkon (CU)
Lecturer	Sarn Settachaimongkon (CU) Sumalika Morakul (KU)
Language	Thai/English
Course (weekly contact hours)	3
Weekly self-study hours	6
Credit points	3
Recommended preconditions	<ul style="list-style-type: none"> • Product and process development OR • Other related courses according to the consent of faculty
learning outcomes	<ul style="list-style-type: none"> • Capability to identify a research problem in beverage industry • Capability to search and collect relevant information • Understanding how to write a project proposal • Understanding research methodology in beverage technology • Capability to perform critical discussion and interpretation of results • Capability to communicate the outcomes by oral presentation and report
Teaching contents	<ul style="list-style-type: none"> • Information literacy including relevant article searching, data collection and reference handling • How to write a project proposal • Research methodology and data interpretation • Scientific documentation and presentation
Assessment of achievements	<ul style="list-style-type: none"> • Independent study competence • Progressive works • Active discussion and oral presentation • Final written report • Participation during contact hours
Media	<ul style="list-style-type: none"> • Computer-based information literacy • Laboratory facilities • Electronic data processing using various statistics packages and software • Personal communication with project advisor
Literature	<ul style="list-style-type: none"> • Bower, J.A., 2013. Statistical Methods for Food Science: Introductory Procedures for the Food Practitioner. Wiley. • Gacula, M.C., Schweigert, B.S., Hawthorn, J., Stewart, G.F., Singh, J., 2013. Statistical Methods in Food and Consumer Research. Elsevier Science. • Greenfield, T., Greener, S., 2016. Research Methods for Postgraduates. Wiley. • Nair, P.K.R., Nair, V.D., 2014. Scientific Writing and Communication in Agriculture and Natural Resources. Springer International Publishing. • Quinn, G.P., Keough, M.J., 2002. Experimental Design and Data Analysis for Biologists. Cambridge University Press. • Taylor, S., Penfield, M.P., Campbell, A.M., 2012. Experimental Food Science. Elsevier Science.

	<ul style="list-style-type: none">• To be assigned according to project advisor
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4 Annex 2: Details of CPD modules

4.1 Shelf-life of beverages

Topic title	Shelf-life of beverages
Topic category	QA&QC
format	Workshop (face to face)
Workload in h	6 (contact hours)
target groups	Food practitioners and operators, professionals, lecturers, teachers, students
Language of delivery	EN
responsible person	Paola Pittia ppittia@unite.it
additional trainers	A series of guest speakers will be invited to contribute with oral contribution and practicals on the several aspects of beverages shelf-life
date and time of delivery	October 2017
pre knowledge expected	Food technology, Food quality
learning outcomes	After successful completion of the activity, the participants: <ol style="list-style-type: none"> 1. Will be able to define with objective indices the shelf-life of foods and beverages 2. Will determine the main factors (processing, environmental, product, packaging) that could contribute to prolong shelf-life of beverages 3. Will be able to highlight the critical factors that decrease quality of beverages during storage and distribution and to optimize processing and storage conditions to maintain the quality of beverages
content	Tentative <ul style="list-style-type: none"> - Shelf-life life concepts and models for prediction and estimation - Intrinsic and extrinsic factors of beverages affecting quality of processed products during storage - Role of packaging on beverage stability - Conventional and innovative actions to improve microbial stability of beverages - Modern analytical tools to trace quality and stability of beverages
Teaching method	Lectures and groupworks
recommended reading	GSICA website (packaging and shelf-life) http://www.gsica.net/en/?lan=en Others to be included

criteria & registration	No limitation to number of participants Fee according to expenses and expected number of participants The workshop will take place either at KU facilities or in other locations that may allow a easy participation of the interested parties
Assessment of achievements	Multiple choice test
attachments	

4.2 Sugars in foods

Topic title	Sugars in foods
Topic category	Beverage processing
format	Webinar
Workload in h	4
target groups	Students, technical personnel, teachers, researchers
Language of delivery	English
responsible person	Paola Pittia
additional trainers	-
date and time of delivery	To be defined
pre knowledge expected	Food processing Food chemistry
learning outcomes	After successful completion of the activity, the participants: <ol style="list-style-type: none"> 1. Will have an improved knowledge about the technological functionality of small saccharides (sugars) 2. Will determine the main factors, food properties and stability affected by presence and concentration of sugars in foods 3. Will have improved knowledge in food and beverage design and formulation
content	<ol style="list-style-type: none"> 1. Molecular properties of the small saccharides 2. Technological functionalities of sugars (sensory, physical properties) 3. Matrix-environment factors affecting stability and functionality of sugars in foods and beverages
Teaching method	Distance
recommended reading	
criteria & registration	Web-based (via ISEKI-Food Association webinar platform)
Assessment of achievements	QA
attachments	

4.3 Food law & Regulations for beverage

Topic title	Food Law & Regulations for beverages
Topic category	QA&QC
format	Workshop (face to face)
Workload in h	6 (contact hours) 2 evening or saturday
target groups	Food professionals, startup managers, students
Language of delivery	TH/EN
responsible person	Kriskamol fagikmn@ku.ac.th
additional trainers	Guest speakers (e.g. from Thai Ministry, international lawyer)
date and time of delivery	1/year
pre knowledge expected	none
learning outcomes	After successful completion of the activity, the participants: <ul style="list-style-type: none"> • Will know relevant national and international regulations • Able to follow the regulations for certain cases
content	<ul style="list-style-type: none"> • Most important Thai international regulations relevant for beverages • Most important international regulations relevant for beverages • Product Registration process
Teaching method	Lectures and groupworks
recommended reading	Thai FDA website (www.fda.moph.go.th)
criteria & registration	No limitation to number of participants Fee according to expenses and expected number of participants The workshop will take place at KU facilities
Assessment of achievements	Written test or oral presentation of assignment (group work).
attachments	

4.4 Hygienic Design

Topic title	Hygienic Design
Topic category	Engineering
format	Workshop
Workload in h	8 contact hours in 3 days
target groups	Food professionals, Engineers

Language of delivery	TH/EN
responsible person	Navaphattra Nunak, navaphattra.nu@kmitl.ac.th
additional trainers	Guest speakers (e.g. from EHEDG)
date and time of delivery	3 days/year
pre knowledge expected	Should have relevant practical experience in food production line.
learning outcomes	After successful completion of the activity, the participants: <ul style="list-style-type: none"> 4. Will know relevant national and international legislation and standards 5. Will know insight into the hygienic design of equipment and processes for the food, feed and pharmaceutical industry, to better fulfil the wishes of purchasers and retailers.
content	<ul style="list-style-type: none"> 4. Legislation and standards requirements 5. Hazards in hygienic processing 6. Hygienic design criteria 7. Materials of construction 8. Welding stainless steel 9. Vales, Pumps 10. Cleaning and disinfection 11. Building and process lay out 12. Installation, maintenance and Lubricants
Teaching method	Lectures and groupworks
recommended reading	EHEDG website (http://www.ehedg.org) European Network for Hygienic Manufacturing of Food (www.hyfoma.com) US FDA website (http://www.fda.gov/) EU Legistration website(http://eur-lex.europa.eu/homepage.html) (Machinery directive 2006/42/EC, Materials and articles intended to come into contact with food EC 1935/2004)
criteria & registration	Maximum 25 participants Registration The workshop will take place at KMITL facilities
Assessment of achievements	Written test and oral presentation of assignment (group work).
attachments	none

4.5 New Product Development

Topic title	New Product Development
Topic category	QA&QC
format	Workshop (face to face)
Workload in h	6 (contact hours) 2 evening or saturday
target groups	Food professionals, startup managers, students

Language delivery	of	TH/EN
responsible person		Kriskamol fagikmn@ku.ac.th
additional trainers		Guest speakers (e.g. from Thai Ministry, international lawyer)
date and time of delivery		1/year
pre knowledge expected		none
learning outcomes		<p>After successful completion of the activity, the participants:</p> <ul style="list-style-type: none"> • Will know relevant national and international regulations • Able to follow the regulations for certain cases
content		<ul style="list-style-type: none"> • Most important Thai international regulations relevant for beverages • Most important international regulations relevant for beverages • Product Registration process
Teaching method		Lectures and groupworks
recommended reading		Thai FDA website (www.fda.moph.go.th)
criteria & registration		<p>No limitation to number of participants</p> <p>Fee according to expenses and expected number of participants</p> <p>The workshop will take place at KU facilities</p>
Assessment of achievements	of	Written test or oral presentation of assignment (group work).
attachments		

4.6 Innovative Technology for beverage industry

Topic title	Innovative Technology for beverage industry	
Topic category	Technology and engineering	
Format	Workshop (face to face)	
Workload in h	6 (contact hours) 2 Days workshop	
Target groups	Food professionals, startup managers, students	
Language delivery	of	TH/EN
Responsible person	Sasitorn Tonchitpakdee	
Additional trainers	Pitiya Kamonpatana	

	Guest speakers (e.g. from company, universities, government agency)
Date and time of delivery	1/year
Pre knowledge expected	none
Learning outcomes	<p>Upon successful completion of this course, participants should have the ability to:</p> <ul style="list-style-type: none"> – Describe the principles of innovative technologies for beverage industry such as irradiation , microwave, radio frequency, infrared and ohmic heating, pulsed electric field, ultrasound, superheated steam, and high hydrostatic pressure. – Discuss advantages and disadvantages of each technology
Content	Principle of innovative technologies for beverage industry including both thermal and non-thermal technologies such as irradiation, microwave, radio frequency, infrared and ohmic heating, pulsed electric field, ultrasound, superheated steam, and high hydrostatic pressure.
Teaching method	Lectures and groupworks
Recommended reading	-Sun, DW 2005, Emerging Technologies for Food Processing, Academic Press, Texas.
Criteria & registration	<p>No limitation to number of participants</p> <p>Fee according to expenses and expected number of participants</p> <p>The workshop will take place at KU facilities</p>
Assessment of achievements	Written test or oral presentation of assignment (group work).
Attachments	none

4.7 Project Management (Complex problem Solving)

Topic title	Project Management
Topic category	Soft skills
format	workshop
Workload	8 contact hours in 2 days
Target groups	Food professionals, students
Language of delivery	EN
Responsible person	Rainer Svacinka
Additional trainers	One Thai trainer required
Date and time of delivery	Autumn 2017
Pre-knowledge expected	None

Learning outcomes	<ol style="list-style-type: none"> 1. Get an overview on available project management methodologies and standards and its relevance for research projects. 2. Understand what project management means and covers. 3. Participants learn how to define and structure objectives and non-objectives. 4. Learn how to word deliverables and effective milestones. 5. Learn how to build up a project consortium in the project preparation phase (proposal phase). 6. Learn about the important tasks, activities and outputs of a kick-off meeting 7. Learn how to break down the project work in work packages and efficiently manage those WPs. 8. Some basic rules to plan a realistic project budget and ways to control and manage project finances 9. Learn about common project management structures and procedures 10. Get an overview on available management tools and how to apply them in a project 11. Know about the main steps of project reporting and controlling 12. Learn about ways to plan for good quality and perform quality assurance. 13. Learn to manage the project close down process and the close down meeting to successfully close a project
content	<ul style="list-style-type: none"> • Basics of project management methodologies • Description of Work, objectives, deliverables and milestones • Consortium building • Management of the project start, work packages and project results • Financial planning, management and control • Project management structure, procedures and tools • Reporting • Quality assurance • Management of the Project close down
Teaching method	Lectures and groupworks
Recommended reading	none
Criteria and registration	<p>Maximum 20 participants Fee according to expenses and expected number of participants and location</p>

Assessment of achievements	Written test
attachments	

4.8 Fruits & Vegetables Drink

Topic title	fruit and vegetable juices
Topic category	Beverage technology
format	workshop
Workload	8 contact hours in 2 days
Target groups	Food professionals, students
Language of delivery	EN
Responsible person	Frank Will
Additional trainers	One Thai trainer required
Date and time of delivery	
Pre-knowledge expected	Basic food tech.
Learning outcomes	Fruit and vegetable processing operations, production of semi-finished products
content	Post harvest storage, washing, sorting, process technology for juices and purees, juice extraction, clear/cloudy juices, enzyme technology, mash treatment, clarification and stabilization, degassing, pasteurization, sterilization, evaporation, aroma recovery, storage of the different products
Teaching method	lectures
Recommended reading	
Criteria and registration	Maximum 20 participants Fee according to expenses and expected number of participants and location
Assessment of achievements	Written test
attachments	

4.9 Food Safety Management for SMEs

Topic title	Food Safety Management for SMEs
Topic category	QA&QC
Format	Workshop (face to face)
Workload in h	6 (contact hours) 2 evening or Saturday

Target groups	Food professionals, startup managers, students
Language of delivery	TH/EN
Responsible person	Warapa fagiwpm@ku.ac.th
Additional trainers	Guest speakers (e.g. from The National Food Institute)
Date and time of delivery	1/year
Pre knowledge expected	none
Learning outcomes	<p>After successful completion of the activity, the participants:</p> <ol style="list-style-type: none"> 1. Identify and critically evaluate food safety hazards and determine their significance as risks to public health in food operations and products 2. Analyse the relationship between prerequisite programmes, GMP and HACCP systems. 3. Apply GMP and HACCP methodology to a food operation in order to develop a HACCP plan. 4. Critically evaluate alternative approaches to HACCP implementation in food operations. 5. Perform HACCP and food safety management system verification, including design, planning and execution of appropriate verification programmes. 6. Apply some of the tools and techniques for managing projects and change in the context of the design and implementation of a HACCP project. 7. Synthesise and apply relevant food safety and/or food standards legislation to different industry sectors and international settings.
Content	Relevant and up-to-date experience in foodborne disease, GMP, HACCP Development, HACCP Audit and Management, Current Issues in Food Safety Management
Teaching method	Lectures and groupworks
Recommended reading	<ol style="list-style-type: none"> 1. Hazard Analysis and Critical Control Point (HACCP) system and guidelines for its application [Annex to CAC/RCP 1-1969, Rev 3 (1997)] 2. Notermans, S., et al. The HACCP Concept: Identification of Potentially Hazardous Microorganisms. Food Microbiol. 11:203-214, 1994. 3. Pierson, M.D. and Corlett, D.A., Jr. Editors. HACCP Principles and Applications.

	<p>4. Stevenson, K.E. and Bernard, D.T. Editors. HACCP: A Systematic Approach to Food Safety. 3rd Edition. The Food Processors Institute, Washington, D.C., 1999.</p> <p>5. Van Nostrand Reinhold, New York, 1992.</p> <p>6. FAOs official training manual: http://www.fao.org/docrep/W8088E/W8088E00.htm</p> <p>7. good hygiene practices: http://www.fao.org/docrep/006/y5307e/y5307e00.htm</p>
Criteria & registration	<p>No limitation to number of participants</p> <p>Fee according to expenses and expected number of participants</p> <p>The workshop will take place at KU facilities</p>
Assessment of achievements	Oral presentation of assignment (group work).
Attachments	none

4.10 Lean Business Plan Development

Topic title	Lean business plan development
Topic category	Soft skills
format	Workshop
Workload in h	8
target groups	Students, technical personnel, teachers, researchers
Language of delivery	English
responsible person	Rainer Svacinka
additional trainers	-
date and time of delivery	To be defined
pre knowledge expected	None
learning outcomes	<p>After successful completion of the activity, the participants:</p> <p>6. Will know how to create a business canvas</p> <p>7. Will know how to create a value proposition canvas</p> <p>8. Describe and structure their business idea using above mentioned tools</p>
content	<p>13. Introduction to lean business plan development approach</p> <p>14. Business model canvas</p> <p>15. Value proposition canvas</p>
Teaching method	Workshop
recommended reading	
criteria & registration	Web-based (via ISEKI-Food Association webinar platform)

Assessment of achievements	QA
attachments	

4.11 Selected topics of food safety for less educated food professionals

Topic title	Food Safety
Topic category	Soft skills
format	Short videos/cartoons for youtube
Workload in h	8
target groups	Food professionals
Language of delivery	English
responsible person	Gerhard Schleining
additional trainers	-
date and time of delivery	To be defined
pre knowledge expected	None
learning outcomes	After successful completion of the activity, the participants: Will have deeper knowledge on ...
content	
Teaching method	video
recommended reading	
criteria & registration	Web-based (via ISEKI-Food Association platform, youtube)
Assessment of achievements	
attachments	