

Academic Reference Standards (ARS)
for
Food Safety
B.Sc. Program
Faculty of Agriculture, Benha University

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2nd Edition

Introduction

Introduction to Agriculture Education

Agriculture is an economic activity that provides the community with safe food and fiber. The agricultural programs are aiming at graduating professionals to fulfill the community needs in the sector of agri-business. This is in addition to strengthen the concepts of natural resources preservation as well as make emphasizes good agricultural practices and maintain the natural bio-diversity. The agricultural programs are planned to allow students to complete their study within four years. The structure of the programs is designed as a combination of biology, mathematics, economics, sociology, and other sciences related to agriculture. This academic reference structure is targeted to build-up the capacity of the graduates to integrate the principles of basic sciences to adopt and utilize the new concepts and technologies for sustainable agricultural development. The B. Sc. in agriculture includes eight programs; each program may comprise **one or more majors**:

1. Plant production that serves the majors of agronomy and horticulture,
2. Animal production that serves the majors of livestock, poultry, and fish production,
3. Food sciences include the sectors of dairy and food safety.
4. Plant protection.
5. Biotechnology.
6. Agricultural engineering.
7. Agricultural socio- economic that services the majors of agriculture economics and agriculture extension.
8. The soil and Water integrated management or Agriculture natural resources management and Environment.

The NARS of these programs are based on the national requirements and international standards. The NARS allow flexibility for the academic programs to adopt new techniques and technologies in the light of the international progress and profession development. The NARS also give special attention to the skills of self-management and evaluation, self-learning, communication, language and leadership skills.

Graduates of these programs have job opportunity in a wide range of agricultural firms: Agro-industries, commercial trading, mass media, rural development, human nutrition, analytical laboratories, pharmaceutical firms, technical sales, quality control and research stations, educational institutions, and agricultural ecommerce organization.

I. National Academic Reference Standards (NARS) for **Agricultural Science**

1. General Academic Reference Standards.

1.1. General Attributes of Agriculture Graduates

Graduate of agriculture must be able to:

- 1.1.1. Recognize the role of agriculturalists in society.
- 1.1.2. Manage and utilize agricultural recourses appropriately.
- 1.1.3. Participate in managing agricultural business.
- 1.1.4. Display appropriate professional commitment and attitudes.
- 1.1.5. Conserve natural resources and maintain bio- diversity.
- 1.1.6. Demonstrate awareness of relevant legal, ethical, and socio-economic issues.,
- 1.1.7. Be prepared for self-management and continuous learning.
- 1.1.8. Be prepared to engage in research studies.

1.2. Knowledge and Understanding:

Graduate of agriculture must acquire the following knowledge and understanding:

- 1.2.1. The basic and applied sciences related to agriculture.
- 1.2.2. The terminologies in agriculture used in farming communities areas.
- 1.2.3. Quality management concepts.
- 1.2.4. Risk factors in agriculture and how to deal with it.
- 1.2.5. Methods of handling and recycling agricultural wastes.
- 1.2.6. Basics of planning for agricultural business.
- 1.2.7. Basics of micro- economics, macroeconomics, and international economics.
- 1.2.8. Scio- economic aspects related to sustainable agriculture.
- 1.2.9. Bio-safety regulations and practices in agriculture.
- 1.2.10. Concepts of bio-diversity and maintaining natural resources.
- 1.2.11. Agricultural legislations and ethics related to environment and human-being health.

1.2.12. Basics of information economy and experimental economics.

1.3. Practical Skills:

Graduates of Agricultural Program must be able to:

- 1.3.1 Apply good practices in agriculture that increase and improve agro-products.
- 1.3.2. Produce safe food and fiber considering environmental issues.
- 1.3.3. Use of agricultural recourses for sustainable agriculture.
- 1.3.4. Prepare preliminary accounting records for agricultural projects.
- 1.3.5. Plan according to changes in national and international economics.
- 1.3.6. Prioritize developmental issues related to rural community and urban areas.
- 1.3.7. Perform agricultural extension plans and programs.
- 1.3.8. Plan and conduct an independent investigation with limited guidance.

1.4. Intellectual Skills:

Graduates of Agricultural Program must be able to:

- 1.4.1. Observe, collect, and analyze data to solve agricultural problem.
- 1.4.2. Design and conduct experiments and draw conclusions.
- 1.4.3. Integrate some lines of evidence to elucidate phenomenon and assess risks.
- 1.4.4. Choose the best among alternatives to maximize benefits.

1.5. General Skills:

Graduates of Agricultural program must be able to:

- 1.5.1. Present information and interpret phenomena verbally by report writing.
- 1.5.2. Show satisfactory English language.
- 1.5.3. Use appropriate audiovisual aids in a presentation.
- 1.5.4. Work in a team and understand group behavior.
- 1.5.5. Demonstrate basic management capabilities.
- 1.5.6. Use software packages in variety of agricultural activities.
- 1.5.7. Use information technology for trade and communication.
- 1.5.8. Demonstrate self and long life learning.
- 1.5.9. Exhibit satisfactory leadership ability.

5. National Academic Reference Standards (NARS) for Food science

Reference Standards for Food Sciences

Food science program includes two majors: food processing and dairy technology. In addition to basic sciences related to agriculture program,

microbiology, chemistry, human nutrition, and engineering sciences are the cornerstones of this program. Graduates of this program can work in food processing firms, quality control organizations, technical sales, research and development, food microbiologist, food standards officers, food technologists and in research centers.

5.1. Attribute of graduates:

Graduates of Food Sciences program must be able to:

- 5.1.1. Process different food and related products.
- 5.1.2. Apply quality control and food safety standards.
- 5.1.3. Use the up-dated methods to evaluate food and related products.
- 5.1.4. Recognize the appropriate storage conditions for various food products.
- 5.1.5. Control food deterioration and spoilage.

5.2. Knowledge and understanding

Graduates of food sciences Program must acquire the following Knowledge and understanding:

- 5.2.1. Physical properties and reactions of food components and how to control these reactions.
- 5.2.2. Traditional and non-traditional methods for food processing and preservation
- 5.2.3. Important pathogens and spoilage microorganisms in foods and how to control their growth.
- 5.2.4. Concepts of total quality management in industrial firms.
- 5.2.5. Principles of handling and transportation of food-stuff.
- 5.2.6. Principles of processing flow, techniques, and food preservation
- 5.2.7. Basics of thermo-dynamics and mechanical operations during food processing
- 5.2.8. Properties and uses of different food packaging materials.
- 5.2.9. Basic principles and practices of cleaning and sanitation in food processing operations.
- 5.2.10. Organoleptic qualities of food.
- 5.2.11. The national and international legislation and agencies relevant to the food quality.
- 5.2.12. The recycling of food by-products and treatment food industry wastes.

5.3. Practical skills

Graduates of food sciences Program must acquire the following knowledge and understanding:

- 5.3.1. Analyze food physically, chemically, and microbiologically.
- 5.3.2. Identify storage problems and affiliated causes in processing technology.
- 5.3.3. Select appropriate package for processed food.
- 5.3.4. Operate basic food processing equipment.
- 5.3.5. Apply the good manufacture practices (GMP).
- 5.3.6. Monitor sanitary food delivery and transportation system.
- 5.3.7. Implement the principles of food processing and preservation methods.
- 5.3.8. Control deterioration and spoilage of raw materials and processed food.
- 5.3.9. Detect food adulteration.
- 5.3.10. Apply quality control standards and assure food safety.

5.3.A. Additional skills for dairy technology option

- 5.3.A.1. Process native dairy products.
- 5.3.A.2. Perform concentration and ice cream mixtures calculations.
- 5.3.A.3. Evaluate dairy products.

5.3.B. Additional skills for food processing option

- 5.3.B.1 Process traditional foods.
- 5.3.B.2. Grade/evaluate meat and fish products.
- 5.3.B.3. Process cereal grains.
- 5.3.B.4. Formulate daily dietetic requirements.
- 5.3.B.5. Process edible oils, vegetables, fruits, sweeteners, brewing products and oil products.
- 5.3.B.6. Process vegetables and fruits
- 5.3.B.7. Process sweeteners and brewing products
- 5.3.B.8. Process functional food
- 5.3.B.9. Process sugar and its products.

5.4. Intellectual skills

Graduates of food sciences Program must acquire the following knowledge and understanding:

- 5.4.1. Apply mathematical and statistical principles to food industry.
- 5.4.2. Identify and solve basic processing problems.

6. Bachelor of Science (Honours) in Food Safety and Technology (Benchmarks) (2-year self-financed top-up programmer). Department of Applied Biology & Chemical Technology, The Hong Kong Polytechnic University.

Professional/academic knowledge and skills

On successful completion of the programme, a student will be able to

- 6.1. Demonstrate a clear understanding of the fundamentals of food chemistry and a food.
- 6.2. Identify the major microorganisms and other harmful substances in foods as and sanitation practices, under which the assurance of food safety can be achieved.
- 6.3. Understand the basic principles involving food preservation, processing and engineer practices and requirements.
- 6.4. Appreciate the government regulations required for the manufacture and sale of food.
- 6.5. Recognize current topics of significance to food safety and technology.
- 6.6. Integrate and apply the knowledge and skills acquired to identify and solve food safety particular those related to the control and assurance of the quality of food products, s food hazards, sanitation operation, etc.
- 6.7. Appreciate the important relations between food and health.
- 6.8. Possess supporting knowledge as well as competence in practical skills to start his/he or enter into a postgraduate programmer in Food.

Academic Reference Standards (ARS) for Food safety

The attributes of Food Safety graduates:

The graduates of food safety must be able to

1. Recognize the role of agriculturalists in society.
2. Manage and utilize agricultural recourses appropriately.
3. Conserve natural resources and maintain bio- diversity.
4. Demonstrate awareness of relevant legal, ethical, and socio-economic issues.
5. Be prepared to engage in research & development and continuous learning.
6. Apply different food products and quality control and food safety standards.
7. Use modern methods to evaluate food and related products.
8. Recognize the appropriate storage conditions and preservation methods for various food products.
9. Control and inspect of food adulteration, spoilage and borne disease.
10. Apply good agriculture practices (GAP) and good hygienic practices (GHP) and good manufacturing practices (GMP) in food production.
11. Apply food safety procedures and systems throughout food chain (HACCP and ISO 22000).

➤ Intended Learning Outcomes (ILO's):

The program provides the opportunity for the students to gain the necessary knowledge and understanding of food safety and to gain the intellectual skills for establishing sanitary program inside food processing plants and providing a good and safety food for human, as well as other technology skills according to the needs of the surrounding community. However, by completion of the program, students should be able to:

A-Knowledge and Understanding:

Graduate of food Safety must acquire the following knowledge and understanding:

- A1 The basic and applied sciences related to agriculture.
- A2 The terminologies in agriculture used in farming communities' areas.
- A3 Quality management concepts.
- A4 Risk factors in agriculture and how to deal with it.
- A5 Methods of handling and recycling agricultural wastes.
- A6 Basics of planning for agricultural business.
- A7 Basics of micro-economics, macroeconomics, and international economics.
- A8 Scio-economic aspects related to sustainable agriculture.

- A9 Bio-safety regulations and practices in agriculture.
- A10 Concepts of bio-diversity and maintaining natural resources.
- A11 Agricultural legislations and ethics related to environment and human-being health.
- A12 Basics of information economy and experimental economics.

- A13 Physical properties and reactions of food components and how to control these reactions.
- A14 Traditional and non-traditional methods for food processing and preservation
- A15 Important pathogens and spoilage microorganisms in foods and how to control their growth.
- A16 Concepts of total quality management in industrial firms.
- A17 Principles of handling and transportation of food-stuff.
- A18 Principles of processing flow, techniques, and food preservation
- A19 Basics of thermo-dynamics and mechanical operations during food processing.
- A20 Properties and uses of different food packaging materials.
- A21 Basic principles and practices of cleaning and sanitation in food processing operations.
- A22 Organoleptic qualities of food.
- A23 The national and international legislation and agencies relevant to the food quality.
- A24 The recycling of food by-products and treatment food industry wastes.

- A25 Demonstrate a clear understanding of the fundamentals of food chemistry and a food.
- A26 Identify the major microorganisms and other harmful substances in foods as and sanitation practices, under which the assurance of food safety can be achieved.
- A27 Identify the basic principles involving food preservation, processing and engineer practices and requirements.
- A28 Appreciate the government regulations required for the manufacture and sale of food.
- A29 Identify current topics of significance to food safety and technology.
- A30 integrate and apply the knowledge and skills acquired to identify and solve food safety particular those related to the control and assurance of the quality of food products, s food hazards, sanitation operation, etc.
- A31 Appreciate the important relations between food and health.
- A32 Possess supporting knowledge as well as competence in practical skills to start his/he or enter into a postgraduate programmer in Food.

B- Intellectual Skills:

At the end of this program, student will be able to:

- B1 Observe, collect, and analyze data to solve agricultural problem.
- B2 Design and conduct experiments and draw conclusions.

- B3 Integrate some lines of evidence to elucidate phenomenon and assess risks.
- B4 Choose the best among alternatives to maximize benefits.

- B5 Apply mathematical and statistical principles to food industry.
- B6 Identify and solve basic processing problems.

- B7 Demonstrate a clear understanding of the fundamentals of food chemistry and food product
- B8 Identify the major microorganisms and other harmful substances in foods and sanitation practices, under which the assurance of food safety can be achieved.
- B9 Explain the basic principles involving food preservation, processing and engineer practices and requirements.
- B10 Appreciate the government regulations required for the manufacture and sale of food.
- B11 Choose current topics of significance to food safety and technology
- B12 Integrate and apply the knowledge and skills acquired to identify and solve food safety particular those related to the control and assurance of the quality of food products, s food hazards, sanitation operation, etc.
- B13 Appreciate the important relations between food and health.
- B14 Possess supporting knowledge as well as competence in practical skills to start his/he or enter into a postgraduate programmer in Food.

C- Professional and Practical Skills:

At the end of this program, student will be able to:

- C1 Apply good practices in agriculture that increase and improve agro-products.
 - C2 Produce safe food and fiber considering environmental issues.
 - C3 Use of agricultural recourses for sustainable agriculture.
 - C4 Prepare preliminary accounting records for agricultural projects.
 - C5 Plan according to changes in national and international economics.
 - C6 Prioritize developmental issues related to rural community and urban areas.
 - C7 Perform agricultural extension plans and programs.
 - C8 Plan and conduct an independent investigation with limited guidance.

 - C9 Analyze food physically, chemically, and microbiologically.
 - C10 Identify storage problems and affiliated causes in processing technology.
 - C11 Select appropriate package for processed food.
 - C12 Operate basic food processing equipment.
 - C13 Apply the good manufacture practices (GMP).
 - C14 Monitor sanitary food delivery and transportation system.
 - C15 Implement the principles of food processing and preservation methods.
 - C16 Control deterioration and spoilage of raw materials and processed food.
 - C17 Detect food adulteration.
 - C18 Apply quality control standards and assure food safety.
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- C19 Identify the major microorganisms and other harmful substances in foods and sanitation practices, under which the assurance of food safety can be achieved.
- C20 Recognize current topics of significance to food safety and technology.
- C21 Appreciate the important relations between food and health.
- C22 Possess supporting knowledge as well as competence in practical skills to start his/he or enter into a postgraduate programmer in Food.

D- General and Transferable skills:

At the end of this program, student will be able to:

- D1 Present information and interpret phenomena verbally by report writing.
- D2 Show satisfactory English language.
- D3 Use appropriate audiovisual aids in a presentation.
- D4 Work in a team and understand group behavior.
- D5 Demonstrate basic management capabilities.
- D6 Use software packages in variety of agricultural activities.
- D7 Use information technology for trade and communication.
- D8 Demonstrate self and long life learning.
- D9 Exhibit satisfactory leadership ability.

References:

- 1- National Academic Reference Standards (NARS) Agriculture and Food science, issued (1st Edition) by the National Authority for Quality Assurance and Accreditation (2009) (common standards with general B.Sc program)>>>>with our self-modification.
- 2- Bachelor of Science (Honors) in Food Safety and Technology (Benchmarks) (2-year self-financed top-up programmer). Department of Applied Biology & Chemical Technology, The Hong Kong Polytechnic University.
http://www.polyu.edu.hk/abct/en/programmes_detail.php?id=5

Glossary

1. Institution:

A University, Faculty or higher institute providing education programs leading to a first university degree or a higher degree (Master's or Doctorate).

2. Attributes of the Graduates:

Competencies expected from the graduates based on the acquired knowledge and skills gained upon completion of a particular program.

3. National Academic Reference Standards (NARS):

Reference points designed by NAQAAE to outline/describe the expected minimum knowledge and skills necessary to fulfill the requirements of a program of study.

4. Academic Standards:

Reference points defined by an institution comprising the collective knowledge and skills to be gained by the graduates of a particular program. The academic standards should surpass the NARS, and be approved by NAQAAE.

5. Subject Benchmark Statements:

Guideline statements that detail what can be expected of a graduates in terms of the learning outcomes to satisfy the standards set for the program. They enable the outcomes to be compared, reviewed and evaluated against agreed upon standards.

6. The Program:

A set of educational courses and activities designed by the institution to determine the systematic learning progress. The program also imparts the intended competencies required for the award of an academic degree.

7. Intended Learning Outcomes (ILOs):

Subject-specific knowledge, understanding and skills intended by the institution to be gained by the learners completing a particular educational activity. The ILOs emphasize what is expected that learners will be able to do as a result of a learning activity.

8. Knowledge and Understanding:

Knowledge is the intended information to be gained from an educational activity including facts, terms, theories and basic concepts. Understanding involves comprehending and grasping the meaning or the underlying explanation of scientific objects.

9. Intellectual Skills:

Learning and cognitive capabilities that involve critical thinking and creativity. These include application, analysis, synthesis and evaluation of information.

10. Professional and Practical Skills:

Application of specialized knowledge, training and proficiency in a subject or field to attain successful career development and personal advancement..

11. General and Transferable Skills:

Skills that are not subject-specific and commonly needed in education, employment, life-long learning and self-development. These skills include communication, team work, numeracy, independent learning, interpersonal relationship, and problem solving..... etc.