



Ministry of Education

Identified Competency Focus Areas and Core Courses for Ethiopian Higher Education Institutions' Exit Examination

Finalized and Validated Program: - BSc in Food Technology and Process Engineering

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1. INTRODUCTION

Now a day, food processing industries get great recognition in Ethiopia as a high-priority area. In order to achieve the expected returns on investment through good quality and right value addition, application of technology and Engineering has become imperative, leading to an unprecedented demand for scientists, technologists, Engineers and other professionals who can manage the emerging challenges of the food processing industry effectively. The importance of Food Engineering program has to be greatly enhanced in scenario of the country today.

The Food Engineering is the youngest science based Engineering profession which has been cultivated quickly and gets great attention in the country. The historical Background of the curriculum is as follows; a three-year study curriculum was designed in Food Technology program in 1993 E.C. In 1997 E.C, the program was upgrade to four-year study named as Bachelor of Science in Food and Biochemical Technology. With the help of Engineering Capacity Building Program (ECBP), the program was extended to five years' study and named as Food Technology and Food Process Engineering, in which four batches have been graduated since 2004 E.C. The name of the curriculum is currently changed to Food Engineering which is designed for 2007 E.C entries and now days, this harmonized Food Engineering curriculum has been delivered in different Ethiopian Universities.

This exit exam is highly depending on Harmonized curriculum which incorporates demanding engineering courses which improves the quality of its graduates to address the need of the industry. Its development is crucial to meet national growth and transformation plan focused on agriculture-led- industrialization development policy of the country typically in agro-processing sector.

The Food Engineering Program aims to train autonomous professionals with the values and professional competencies to apply Scientific, Technological and Engineering knowledge to design industrial food processes, upgrade existing classical production methods, develop food products, design and manage quality systems from the perspective of sustainable social development. Graduates are trained to write up, design and execute engineering projects related

to the food industry. This is all focused on the higher productivity, greater economic benefits, taking into account food security and respect for the environment.

Food engineering profession is unique among other engineering professions. All engineering profession (including food engineering) use and manipulate mathematics, physics, and engineering art to solve technical problems in a safe and economical fashion. In addition, Food engineering includes the vast application of other disciplines such as food chemistry, physics, microbiology and nutrition in order to manufacture and distribution of food products for the common good of our society. This makes the scope of Food Engineering much broader discipline.

The national exit exam will make the graduates to be well qualified in skill, knowledge as well as attitude to provide sounded service based on their profession training. Exit exam not only assure the quality of the education but it also provide job opportunities for the examinees and helps to eradicate a lot challenges which occurs in different food sector of industries .This exit exam is mainly developed by considering the Harmonized curriculum of Food Engineering by selecting the basic thematic areas which capable to install the bridge between the food industries and competent of the graduates.

1.2 Objectives of the Exit Examination

The Food Technology and Process Engineering (FTPE) exit exam shall have the following objectives

- ✓ To produce skilled and competent manpower to national and international market
- ✓ Assessing students' educational achievement in major areas of Food Technology and Process Engineering (FTPE)
- ✓ Ensuring whether the graduation profile of FTPE curriculum have achieved at least common standards of knowledge and practical skills
- ✓ Improving public trust and confidence in food processing activities of professionals
- ✓ Facilitating the efforts of students to revise the core learning outcomes of the courses covered by the exit examination
- ✓ Ensuring all graduates from HEIs satisfy the requirements of the labor market and employability through the national wide implementation of competency-based exit exam
- ✓ Creating competitive spirit among FTPE departments in Ethiopia with the vies to encouraging them to give due attention to the national standards

1.3 Significance of the Document

It is important to set competency areas of the subject matter (program) in order to measure the how much graduates are acquired with skills, knowledge and attitudes. The following shows us the significance or setting competencies and identifying core courses of the program;

- ✓ To set competencies that helps to assess the basic skills, knowledge and attitude of graduating students
- ✓ To systematically identify the core courses which will be included the exit exam

2. GRADUATE PROFILE

Graduates of this FTPE are equipped with theoretical knowledge and practical skills in food processing and preservation technology, process control and optimization, new product development, functional and nutritional food processing, food safety, quality control & assurance and processing science and technology of various agricultural products. Thus, they are capable of working in eminent capacities for:

- ✓ Food and agro-industries (food and beverage industries) as experts in *quality and process control, product development, and plant management*
- ✓ Cottage food processing industry as product developer and innovator
- ✓ Governmental and non-governmental organizations, regulatory agencies, quality standard and health organizations involved in *food processing and preservation, food safety & security and various communities development activities.*
- ✓ Ministry of agriculture in the food quality assessment and handling
- ✓ Ministry of health in safety and food nutrition departments
- ✓ International and national research institutes involved in food science, technology and process engineering
- ✓ Municipalities and law enforcing establishments in the improvement of food retail markets organization, quality handling and structures
- ✓ As expert in the Ethiopian commodity exchange routes
- ✓ Teaching and research institutes
- ✓ Different companies and agencies as private consultant
- ✓ Universities and colleges
- ✓ NGO`s working in the food sector

3. Competences

3.1 Knowledge

Food Engineering professionals are equipped with professional knowledge and skill in the area and are able to employ modern technology extensively to produce and analyze food products , design food process and plant ,simulate and test how a machine or food system operates, generate specifications for foods , machinery, or packaging , monitor product quality , safety , and control process efficiency

- The ability to apply knowledge of mathematics, science and engineering to identify, formulate and solve engineering problems
- The ability to design and conduct experiments, as well as to analyze and interpret data
- The ability to design a system, component, or process to meet desired needs within realistic constraints such as economics, environmental, social, political, ethical, health and safety, manufacturability and sustainability.
- Students must graduate to take pioneering, entrepreneurial and innovative roles in private and public enterprises and institutions for food processing, design and development of new products.
- Educated students capable of design and manage quality systems to obtain food products with technical and microbiological quality required as safe products and from an ecological and sustainable perspective

3.2 Skills

- A genuine interest in science and how it is applied to food and cookery
- High standards of cleanliness and the ability to adhere to strict hygiene rules
- Strong written and verbal communication skills
- Leadership qualities
- People and team working skills
- A flexible approach to working
- Numeracy and problem-solving skills
- Good organizational ability and time-management skills

3.3 Attitude

- The attitude to function on multi-disciplinary teams
- The understanding of professional and ethical responsibility
- The attitude to use information technology and communicate effectively
- understand the impact of engineering solutions in a global economic, environmental and societal context
- The recognition of the need for, and an ability to engage in life-long learning
- Equipped with the knowledge of contemporary issues
- The attitude towards the use of the techniques, skills and modern engineering tools necessary for engineering practice
- Attitude to create job opportunities and engaged in food business activities

4. LEARNING OUT COME

The Food Engineering programs competencies are established based on program educational Objectives. All graduates of Food Engineering undergraduate program are expected to have the following competencies:

- modify existing products and processes and develop new ones
- check and improve safety and quality control procedures in your own and suppliers' factories, from the raw material stage through to the finished product
- research current consumer markets and latest technologies to develop new product concepts
- select raw materials and other ingredients from suppliers
- prepare product costing based on raw materials and manufacturing costs to ensure profitable products
- audit suppliers or manage internal audits
- run trials of new products - either alongside or together with product development
- coordinate launches of new products
- deal with any customer complaint investigations or product issues
- compile, check and approve product specifications and labeling

- undertake long-term projects with other departments, such as reducing waste by improving efficiency
- work on packaging innovation and technology
- conduct experiments and produce sample products
- design the processes and machinery for making products with a consistent flavor, color and texture in large quantities
- build relationships with suppliers and customers
- Market expansion or opening of the new food industry distribution network
- Application of a food safety system

5. THEMATIC AREA

The following thematic area of the course is selected by considering the harmonized curriculum which enables to achieve the mentioned competencies.

- 5.1 Applied Sciences for Food Engineering
- 5.2 Unit Operations in Food Processing
- 5.3 Basics of Food Engineering
- 5.4 Food Processing Technology
- 5.5 Reaction and Bioprocess Engineering
- 5.6 Food Quality, Safety and Product Design

6. COURSE TO BE INCLUDED FOR EXIT EXAM

Even though under Food engineering (BSC) program sixty six (66) course are delivered for the sake of national exit exam the following core courses are identified ,which are very important in order to achieve the above mentioned expected out come and competence of Food Engineer professional .

Tematic Areas	COURSES	ECTS	CHr
Applied Sciences for Food Engineering	Food Chemistry	5	4
	Food Analysis	4	3
	Food Microbiology	5	4
Unit Operations in Food Processing	Mechanical Unit Operation	5	4
Food Processing Technology	Grain Processing Technology (cereal and pulse processing Technol	5	4
	Beverage Processing Technology	5	4
	Sugar and confectionary Processing Technology	5	4
	Dairy Processing Technology	4	3
	Fat and oil Processing Technology	4	3
	Meat, Poultry and Fish Processing Technology	5	4
Basics of Food Engineering	Fluid Mechanics	5	4
	Applied Thermodynamics	5	4
Reaction and Bioprocess Engineering	Biochemical Engineering	5	4
Food quality, safety and food product design	Food Quality and Safety Management	3	2
	Food Packaging Technology	3	2

7. Conclusion

As a conclusion, Food Engineering national exit exam will enhance quality of the graduates in different aspects like skill, knowledge and attitude. This document is highly devoted to present the major and comprehensive relevant courses to carry out the national exit exam of Food Engineering graduates. The exit exam questions are highly focused on the long –term knowledge and transferred skill rather than more specific and subjective cases. Based on Ministry of education (MoE) direction the exit exam course should be between (10-15 courses), thus the selected course is categorized under eight /8/ thematic area by including fifteen /15/ courses. The exam will be delivered after graduation. The selection of the course is done by considering the discipline of Food (science, technology and Engineering). This exit exam will commence for 2015 E, C graduates.