



Ministry of Education

National Exit Examination Blueprint:

Program: Bachelor of Science Degree in Food Science and Postharvest Technology (FSPT)

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1. INTRODUCTION

Exit examination for Ethiopian undergraduate students was initiated to be implemented in 2015 EC as a graduation requirement by Ministry of Education. Following the initiation, competencies focus areas and the core courses were selected and validated through different workshop by professionals on the programs from different program offering universities. To prepare the actual test, the test blue print is must and should be in line with the identified competencies and should emphasis the selected courses to make the exam preparation process more easy and controlled.

Exam blueprinting is the method used in creating exams that allows the administrators to check an exam meets the desired requirements. It is a map and a specification for an assessment which ensures that all components of the identified competencies match with the course contents. The term blueprint comes from the domain of architecture which means ‘detailed plan of action’. In simple terms, exam blueprint links assessments to learning objectives and indicate the marks allocated to specific learning objectives.

Exam blueprint is useful to know which question will test which objective and which content unit. It also enables that the exam is assessing a particular topic or learning objectives at the appropriate level of difficulty describing the elements of a test including the contents to be covered, the amount of the emphasis allocated to each area and important features. Accordingly, this test blueprint for Food Science and post-harvest technology program is initiated to achieve the following objectives:

2. OBJECTIVES OF THE EXAM BLUEPRINT

The exit exam blueprint shall have the following objectives:

- ★ To provide a detail of how a technical staff should build the exam from the selected courses
- ★ To design the conceptual work with details of the course portions that can be understood by the technical teams to create exam components
- ★ To describe the process of developing an exam questions for the written exit examinations
- ★ To create a pathway for the harmonized exit exam content and other details
- ★ To provide a detailed plan of action for the exam preparation
- ★ To ensure all aspects of the curriculum and educational domains are covered by the assessment
- ★ To link identified competencies with the courses content and provide appropriate assessment modality

3. EXPECTED PROFILES OF THE GRADUATES

Graduates of this program will be equipped with attitude, skill and knowledge in Food Science, Food Processing and preservation, product development, food safety, quality control & assurance and postharvest handling of various agricultural products. They will:

- Consult and advise quality and process control and product development,
- Advise governmental and non-governmental organizations, regulatory agencies (work in inspection, accreditation, standardization, etc), quality standard, health organizations, and the like involved in food processing and preservation, food safety & security and various community development activities,
- Advocate and work towards the standards, codes of conduct and ethics of the food industry, research and food processing,
- Consult stakeholders in the postharvest loss reduction and product quality control,
- Coordinate and consult with stakeholders in the improvement of food retail markets organization, quality handling and structures,
- Conduct food safety and quality tests and manage warehouses,
- Engage in research in food science and postharvest technology and related fields,

- Consult different companies and agencies on food processing, product development and postharvest handling,
- Involve in food security and nutrition programs,
- Involve in food systems monitoring and evaluation to maintain the quality and safety of foods in Ethiopia, and
- Teach at various education levels

4. OBJECTIVES OF THE FSPT PROGRAM EXIT EXAMINATION

The national public administration 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 Science and Postharvest Technology
- Ensuring whether the graduation profile of FSPT curriculum have achieved at least common standards of knowledge and practical skills
- Improving public trust and confidence in Food Science and Postharvest Technology 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 Food Science and Postharvest Technology departments in Ethiopia with the vies to encouraging them to give due attention to the national standards

5. THEMES, LIST OF COURSES AND ALLOCATED CREDIT HOUR

Course identification is done based on the Food Science and Postharvest Technology thematic areas, relevancy to measure the three learning domains (knowledge, skill and attitude) as well as the courses that can measure the stated competencies of the graduates. Accordingly, the core courses for this purpose are selected and categorized in themes as follows (73 total ECTS or 44 Credit Hours):

Theme-1 Basics of Food Science			
Courses		ECTS	Cr.Hr
1	Food Microbiology	5	3
2	Food Chemistry	5	3
3	Food Analysis	5	3
4	Human Nutrition	5	3
Total ECTS		20	12
Percentage (%) coverage		27%	

Theme-2 Food Processing and Postharvest Technology			
Courses		ECTS	Cr.Hr
1	Meat, Poultry and Fish Processing Technology	5	3
2	Sugar, Honey and Confectionary Technology	5	3
3	Fats and Oils Processing Technology	3	2
4	Dairy Product Processing Technology	5	3
5	Beverage Processing Technology	5	3
6	Food Biotechnology and Fermentation	5	3
7	Coffee, Tea, Spices and Herbs Processing Technology	5	3
8	Grains Postharvest Handling and Processing Technology	5	3
9	Fruits and Vegetables Postharvest Handling and Processing Technology	5	3
Total ECTS		43	26
Percentage (%) coverage		59%	

Theme-3 Food Product Development, Quality Control and Safety Standards			
Courses		ECTS	Cr.Hr
1	Product Development and Sensory Evaluation	5	3
2	Food Quality and Safety Management	5	3
Total ECTS		10	6
Percentage (%) coverage		14%	

6. Share of the Themes/Courses/Items and the Three Domains (KSA) in Percentage

Table 4: Test Blueprint table (table of specification) for BSc in Food Science and Postharvest Technology

Themes and Share of the themes in %	Name and Share of the Courses in %	Credit hour	General objective/Competency	Specific objectives /learning outcomes	Learning outcomes								No. of items
					Cognitive						Affective	Psychomotor	
					Remembering	Understanding	Application	Analysis	Evaluation	Creation/Synthesis			
Theme 1: Basics of Food Science (27%)	Food Micro Biology (7%)	3	Students will develop a broader knowledge of microorganism and food materials, Factors Affecting the Growth and Survival of Microorganisms in Foods, microbiology of food preservation, and food microbiology and public health, methods of microbiological examination	Students will be able to describe the important microorganisms in foods.	1	1							2
				Students will be able to explain the factors associated with growth and survival of microorganisms		1			1			1	3
				Students will be able to conduct microbial analysis of food samples					1			1	2
				Total									7
	Food Chemistry (7%)	3	Students will understand chemical and physical properties of major food components, enzymes as well as food color	Students will be able to explain chemical and physical properties of nutrients, changes occur in foods during, processing, preservation and storage	1	2		1					4

			and flavor	Students will be able to describe enzyme nomenclature, classification and applications as well as functions of food additives		1	1						1	3
				Total										7
	Food Analysis (7%)	3	Students will develop skills on methods of food analysis, sampling methods, principles and methods of analytical techniques and food analysis parameters	Students will be able to describe main groups nutrients and non- nutrient chemicals in foods	1	2								3
				Students will be able to explain the different types of food sampling techniques		1							1	
				Students will be able to summarize the analytical techniques available and their application for food analysis		1	1	1					3	
				Total										7
	Human Nutrition(7%	3	Students will develop concrete knowledge on food digestion and absorption, energy, nutritional and health benefits of different nutrients, nutritional assessment and intervention	Students will be to describe the biochemical processes in occurring in the body	1	2								3
				Students will be able to explain the nutritional value of common foods	1	1								2
				Students will be able to design and implement researches on nutritional assessment and intervention			1					1	2	
				Total										7
	Theme 2: Food Processing and Post harvest	Meat, poultry and Fish	3	Students will develop knowledge on	Students will be able to: Classify meat, poultry and fish products		2							2

Technology (59%)	processing Technology (7%)		chemical composition and structure of meat, the slaughter of animals, meat quality, meat processing, preservation and storage, poultry and fish processing technology										
				Students will be able to :Explain properties of meat, poultry and fish and their products		2							2
				Students able to Describe processing, preservation and storage technologies meat, poultry and fish	1	2							3
				Total									7
	Sugar, honey and confectionary technology (7%)	3	Students will develop a broader knowledge on determination and analysis of sugar raw materials quality, extraction and refining of sugar, sugar and chocolate confectionaries as well as honey processing	Students will be able to: Adhere principles of unit operations in sugar processing		2							2
				Students will able to:Analyze quality of raw materials and sugar products		1		1					2
				Students will able to :Determine quality of honey and confectionaries	1	2							3
				Total									7
	Fats and oils processing technology (5%)	3	Students will develop understanding of sources and chemistry of fats, handling and preparation of oil seeds, extraction and refining of fats and oils, modifications and products of fats and oils	Students will be able to: Describe the unit operations involved in fats and oils extraction	1	1							2
				Students will be able to: Produce various commercial products of fats and oils		1	1						2

				Students will be able to: Extract, Analyze, modify, refine and pack fats and oils		1								1	
				Total											5
	Dairy Product processing technology (7%)	3	Students will develop the knowledge of sources and production of milk, composition and structure of milk, microbiological and hygienic aspects of milk, physicochemical properties of milk and other dairy products as well as dairy products processing	Students will be able to: Describe various dairy products and their processing technologies	1	1								2	
				Students will be able to: Explain physicochemical and microbial aspects of dairy products	1	2								3	
				Students will be able to: Analyze composition and adulteration of milk		1		1						2	
				Total											7
	Beverage processing technology(7 %)	3	Students will understand classification and importance of beverages, brewing technologies, winery technologies, distilled sprits, soft drinks as well as hot drinks	Students will be able to: Classify, produce and pack beverages	1	2								3	
				Students will be: Explain brewing, winery, distilled sprits, soft drinks and hot drinks technologies	1	2	1							4	
				Total											7
	Food biotechnology and fermentation (7%)	3	Students will develop the knowledge of biotechnology based food production and processing, application	Students will be able to: Explain food fermentation and biotechnology	1	2								3	

			of enzymes technology to food processing, food fermentation technology, microbiology of fermentation, bioreactors, uses and production of single cell protein	Students will be able to: Describe the role of enzymes in food production		2							2
				Students will be able to: Explain bioreactors, uses and production of single cell protein	1	1							2
				Total									7
	Coffee, tea, spices and herbs processing technology(7 %)		Students will understand postharvest processing and technology of coffee, tea, spices and herbs	Students will be able to: Produce different coffee, tea and spices products		2		1					3
				Students will be able to: Manage quality control and marketing of coffee, tea and spices	1	1					1	1	4
				Total									7
	Grain postharvest handling processing technology(7 %)		Students will have the knowledge of grain anatomy, chemical composition and uses, postharvest handling and management practices, quality assessment of grain and grain products	Students will be able to: explain methods of postharvest management and processing of grains	1	2							3
				Students will be able to: Process various grain products		1	1						2
				Students will be able to: Describe physicochemical properties of grain products		2							2
				Total									7
	Fruits and vegetables	3	Students will cultivate the knowledge of	Students will be able to: Analyze nutritional components of fruits	1	2		1					4

	handling and processing technology(7 %)		composition and nutritional value of fruits and vegetables, physiology of ripening of fruits and vegetables, postharvest quality, handling and processing of fruits and vegetables	and vegetables										
				Students will be able to: Explain the physiology and processing technologies of various fruits and vegetables	1	2							3	
				Total										7
Theme3: Food Product Development and Sensory Evaluation (14%)	Food product development and sensory evaluation (7%)		Students will develop the knowledge of product development and innovation strategies, role consumer in product development, sensory evaluation of products and fortification	Students will be able to: Describe process, strategies and design of food product development		2							2	
				Students will be able to: Explain consumer behavior and preference product development	1	2							3	
				Students will be able to: Conduct sensory evaluation and analyze data			1	1					2	
				Total										7
	Food quality and safety management (7%)	3	Students will understand principles food quality control, evaluation of food quality, food legislation, food standards and regulating bodies	Students will be able to: Explain the principles and practices of food quality control	1	2							3	
				Students will be able to: Describe food standards and regulating bodies	1	3							4	
				Total										7
Total Number of Items														100

Key: In the cells/boxes there are numbers that indicate the number of items that correspond to the levels of domains.

Share of themes and share of items per course percentage (%) calculations formulas:

$$\text{Share of themes (T)} = \frac{a}{b} * 100,$$

Where, a = the credit hour of the theme

b = the sum of total credit hours of the selected courses for the program

$$\text{Share of the courses per theme (C)} = \frac{\text{Credit hour of the course}}{\text{Total Credit hour of the theme}} * 100$$

$$\text{Share of items per course} = \text{Share of the courses} * \text{Total number of items}$$

7. LEARNING OUTCOMES IN TERMS OF THE THREE DOMAINS (COGNITIVE, AFFECTIVE AND PSYCHOMOTOR)

Professionals from Food Science and Postharvest Technology are involved in food production, processing, preservation, development, post-harvest technology and packaging. They are capable of practicing research in the area of Food Science and Technology, postharvest handling of agricultural products and related disciplines such as food and beverage industries, and other bioprocess industries (particularly as experts in processing, optimizing/ modifying, quality control and assurance).

Professionals can disseminate appropriate technologies to potential users with a high sense of responsibility to themselves and society, with discipline and creativity as well as conducting research and engage in development in Food science and postharvest technology as its outcomes.

The Food Science and Postharvest Technology professional produce human power with:

Cognitive

- knowledge that meet the basics international standards of Food science and postharvest technology

Psychomotor

- Applying the skill necessary for food science and postharvest technology and value addition of agricultural products.

Affective

- The ability to adapt and/or generate technologies through demand-driven and problem-solving research in the area of food science and postharvest technology.

8. CONCLUSION

In general, exam blueprinting is aimed at reducing biased sampling of the content of domain or course contents, reduce error of unrelated variables and favor inclusion of appropriate contents. For the Food Science and post-harvest Technology program, there were 15(fifteen) courses selected for the exam with the total of 73 ECTS or 44 Credit hours categorized under three themes. The appropriate distribution of questions across the themes, courses and topics was also calculated and the appropriate weightage was given to each themes, courses and topics with the valued level difficulty (see in the table). Items of the exam should be more of general and mapped with the selected core courses, within which the three learning domains (knowledge, skill and attitude) can be measured.

To conclude, this blueprint acts as a valid tool to align objectives with assessment, helps in distribution of appropriate weightage and questions across the courses and topics under the courses. It is should be considered as an integral part of the exit exam preparation and implemented during questions preparation.