Course Syllabus
Gyanmanjari Institute of Technology
Semester-4

Subject: Food Packaging Technology- BETFT14306

Type of course: Professional Core

Prerequisite: Fundamental understanding of food chemistry and basic material science.

Rationale: This course provides essential knowledge of the rapid evolution of food processing and global supply chains has heightened the need for robust packaging solutions that ensure product safety, quality, and shelf stability. Understanding the interactions between diverse packaging materials and food matrices enables the development of tailored systems that protect against physical, chemical, and microbial hazards. Advances in sustainable and intelligent packaging demand a solid foundation in material selection, barrier properties, and regulatory compliance to meet environmental and consumer expectations. This course equips students with practical and theoretical insights to innovate packaging technologies that balance functionality, safety, and sustainability.

Teaching and Examination Scheme:

Teaching Scheme			Credits	Examination Marks					Total Marks
				Theory Marks		Practical Marks		CA	
CI	T	P	C	ESE	MSE	V	P	ALA	
4	0	0	4	60	30	10	00	50	150

Legends: CI-Class Room Instructions; T – Tutorial; P - Practical; C – Credit; ESE - End Semester Examination; MSE- Mid Semester Examination; V – Viva; CA - Continuous Assessment; ALA- Active Learning Activities.

Course Content:

Unit No.	Course content	Hrs.	% Weightage
1	**Introduction to Food Packaging** Global and Indian packaging scenarios; functions and need of packaging, Packaging requirements (protection, containment, communication) and labeling laws, Hazards during transportation	15	25%

	and storage; climatic and mechanical stresses, Environmental impact and sustainability considerations		
2	**Packaging Materials** Paper and paper-board: manufacture, grades, advantages, limitations, Glass containers: types, manufacture, properties, advantages, disadvantages, Metal packaging: tinplate, aluminum; fabrication, properties, pros/cons, Plastics: classification (thermoplastics, thermosets), manufacturing, properties, uses of PE, PP, PS, PET, PVC, PVDC, cellulose derivatives, nylon	15	25%
3	**Lamination, Coating and Aseptic Packaging** Lamination: need, methods (solvent, extrusion, adhesive), properties, advantages/disadvantages, Surface coatings on paper and films: types (PVDC, acrylic, wax), functions, coating techniques, Aseptic packaging: principles, process flow, comparison with conventional packaging, Intelligent and active packaging: oxygen scavengers, moisture control, antimicrobial films	15	25%
4	**Advanced and Sustainable Packaging** Biodegradable and edible packaging materials: starch, PLA, chitosan films, Modified atmosphere packaging (MAP) and controlled atmosphere packaging (CAP), Barrier properties: water vapour, gas transmission rates; testing methods, Recycling and waste management; regulatory standards and certifications	15	25%

Continuous Assessment:

Sr. No.	Active Learn	Marks
1.	**Packaging Material Comparison Report** Compare three common packaging materials (paper, glass, plastic) for a selected food product, detailing their properties and suitability in two pages then upload as a PDF to the GMIU Web Portal.	10
2.	**Hazard Analysis Worksheet** Identify and describe three potential hazards (mechanical, climatic, microbial) during the storage and transportation of a perishable food item, and propose mitigation strategies and submit the brochure in PDF format on GMIU Web Portal.	10
3.	**Lamination Technique Demonstration** Prepare a laminated film sample using any two methods (solvent and extrusion) in the lab, document the process, and evaluate its strength and barrier properties and upload to the GMIU Web Portal.	10
4.	**Aseptic Packaging Process Flowchart** Create a detailed process flowchart for an aseptic packaging line of a beverage product, annotating key steps and critical control points and upload to the GMIU Web Portal.	10
5.	**Biodegradable Film Development** Formulate a simple starch-based biodegradable film in the lab, test its thickness and tensile strength, and summarize findings in a two-page report then upload as a PDF to the GMIU Web Portal.	10
Total		50

Suggested Specification table with Marks (Theory): 60

Distribution of Theory Marks (Revised Bloom's Taxonomy)						
Level	Remembrance (R)	Understanding (U)	Application (A)	Analyze (N)	Evaluate (E)	Create (C)
Weightage	20%	40%	30%	10%	-	-

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from the above table.

Course Outcome:

After learning the course, the students should be able to:	
CO1	Analyze packaging functions, hazards, and labeling regulations for compliant design.
CO2	Select suitable packaging materials based on properties, advantages, and limitations.
CO3	Apply lamination, coating, and aseptic techniques with active packaging for safety.
CO4	Develop sustainable packaging (biodegradable films, MAP/CAP) and assess barrier properties.

Instructional Method:

The course delivery method will depend upon the requirement of content and the need of students. The teacher in addition to the conventional teaching method by blackboard, may also use any of the tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.

From the content, 10% of topics are suggested for flipped mode instruction.

Students will use supplementary resources such as online videos, NPTEL/SWAYAM videos, e-courses, Virtual Laboratory

The internal evaluation will be done based on the Active Learning Assignment

Reference Books:

[1] Food Packaging Principles and Practice by Gordon L. Robertson

[2] Handbook of Food Packaging edited by Theodoros Varzakas and Fotis Arvanitoyannis

[3] Introduction to Food Packaging Technology by Richard Coles, Mark J. Kirwan, and Mark H. Chapman

[4] Packaging of Food Products by S. M. Sablani

[5] Food Packaging: Materials and Methods by R. Ahvenainen

[6] Innovative Food Packaging Technologies by Jung H. Han