Republic of the Philippines
BATANGAS STATE UNIVERSITY
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CURRICULUM

Bachelor of Science in Food Engineering (BSFE)

Academic Year 2023-2024

Reference CMOs: CMO No. 101 s. 2017, CMO No. 4 s. 2018 and CMO No. 20 s. 2013, CMO No. 39, s. 2021, CMO No. 40, s. 2021

Curriculum Description

Food Engineering is a multidisciplinary field of applied physical sciences which combines science, microbiology, and engineering education for food and related industries. Food engineering includes, but is not limited to, the application of agricultural engineering and chemical engineering principles to food materials. Food engineers provide the technological knowledge transfer essential to the cost-effective production and commercialization of food products and services.

Program Educational Objectives of Food Engineering

The food engineering alumni three to five years after graduation shall:

1. Be at the forefront of advancing technology in line with food products development and processing.
2. Assure the safest and most environmentally friendly ways of processing, packaging, preserving, storing and distribution of foods; and
3. Be a recognized professional in the food industry and food enterprises with strong initiative and exceptional leadership and management skills.

Institutional Graduate Attributes

The student should achieve at least 75% for each IGA upon graduation.

1. **Knowledge Competence.** Demonstrate a mastery of the fundamental knowledge and skills required for functioning effectively as a professional in the discipline, and an ability to integrate and apply them effectively to practice in the workplace.

2. **Creativity and Innovation.** Experiment with new approaches, challenge existing knowledge boundaries and design novel solutions to solve problems.

3. **Critical and Systems Thinking.** Identify, define, and deal with complex problems pertinent to the future professional practice or daily life through logical, analytical and critical thinking.

4. **Communication.** Communicate effectively (both orally and in writing) with a wide range of audiences, across a range of professional and personal contexts, in English and Pilipino.

5. **Lifelong Learning.** Identify own learning needs for professional or personal development; demonstrate an eagerness to take up opportunities for learning new things as well as the ability to learn effectively on their own.

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6. **Leadership, teamwork, and Interpersonal Skills**. Function effectively both as a leader and as a member of a team; motivate and lead a team to work towards goal; work collaboratively with other team members; as well as connect and interact socially and effectively with diverse culture.

7. **Global Outlook**. Demonstrate an awareness and understanding of global issues and willingness to work, interact effectively and show sensitivity to cultural diversity.

8. **Social and National Responsibility**. Demonstrate an awareness of their social and national responsibility; engage in activities that contribute to the betterment of the society; and behave ethically and responsibly in social, professional and work environments.

Student Outcomes

The following skills, knowledge and behaviors are expected to be attained by the students as they progress through the program:

1. **Discipline Knowledge.** Ability to apply mathematics, sciences and principles of engineering to solve complex food engineering problems;

2. **Investigation.** Ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions;

3. **Design/Development of Solutions.** Design solution, system, components, processes, exhibiting improvements/innovations, that meet specified needs with appropriate consideration for public health and safety, cultural, societal, economical, ethical, environmental and sustainability issues.

4. **Leadership and Teamwork.** Function effectively as a member of a leader on a diverse team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives;

5. **Problem Analysis.** Identify, formulate, and solve complex food engineering problems by applying principles of engineering, science, and mathematics;

6. **Ethics and Professionalism.** Apply ethical principles and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, environmental, and societal contexts;

7. **Communication.** Communicate effectively on complex engineering activities with the community, and the society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions;

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8. **Environment and Sustainability.** Recognize the impact of professional engineering solutions in societal, global, and environmental contexts and demonstrate knowledge of and need for sustainable development;

9. **Lifelong Learning.** Recognize the need for, and ability to engage in independent and life-long learning in the broadest context of technological change;
10. **The Engineer and Society.** Apply reasoning based on contextual knowledge to assess societal, health, safety, legal, cultural, contemporary issues, and the consequent responsibilities relevant to professional engineering practices;

11. **Modern Tool Usage.** Apply appropriate techniques, skills, and modern engineering and IT tools to complex food engineering activities;

12. **Project Management and Finance.** Demonstrate knowledge and understanding of engineering management and financial principles as member or a leader of a team to manage projects in multidisciplinary settings, and identify opportunities of entrepreneurship; and

13. **Social and National Responsibility.** Apply acquired food engineering knowledge and skills in addressing community problems that contributes to national development.

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CURRICULUM COMPONENTS

Classification/ Field / Course	No. of Hours/Week		Credit Units
	Lec	Lab	
I. TECHNICAL COURSES			
A. Mathematics			
Differential Calculus	3	0	3
Integral Calculus	3	0	3
Differential Equations	3	0	3
Engineering Data Analysis	3	0	3
Sub Total	12	0	12
B. Natural/Physical Sciences			
General Chemistry	3	3	4
Modern Biology	2	3	3
Physics 1	3	3	4
Sub Total	8	9	11
C. Basic Engineering Sciences			
Introduction to Engineering	0	3	1
Engineering Drawing	0	3	1
Computer Programming 1	0	3	1
Computer –Aided Design	0	3	1
Engineering Economics	3	0	3
Engineering Management	2	0	2
Sub Total	5	12	9
D. Allied Courses			
Physics 2	3	3	4
Analytical Chemistry	4	3	5
Organic Chemistry	4	3	5
Basic Electrical and Electronics Engineering	2	3	3
Material Science and Engineering	3	0	3
Environmental Science and Engineering	3	0	3
Engineering Mechanics	3	0	3
Technopreneurship	3	0	3
Sub Total	25	12	29
E. Professional Courses			
Food Engineering Calculations	2	3	3
Physical Chemistry	2	3	3
Advanced Engineering Mathematics for FE	3	0	3
Thermodynamics	3	0	3
Flow of Fluids	2	3	3
Food Chemistry	3	3	4
Heat and Mass Transfer in food	2	3	3
Separation Processes and Introduction to Particle Technology	2	3	3
Process Dynamics and Control	2	3	3

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General Microbiology	2	3	3
Food Microbiology	3	3	4
Food Processing I	2	3	3
Food Processing II	2	3	3
Food Process Industries	3	0	3
Research Methods	3	0	3
Computer Applications in Food Engineering	0	3	1
Industrial Waste Management and Control	3	0	3
Technical Analysis of Food and Feeds	3	3	4
Sensory Evaluation and Product Development	2	3	3
Field Trips and Seminars	0	3	1
Post-Harvest Handling Technology	3	0	3
Food Packaging and Labeling	3	0	3
Food Engineering Design I	1	3	2
Food Engineering Design II	1	3	2
Laws, Ethics and Process Safety for Food Engineering	3	0	3
Elective I	3	0	3
On the Job Training	320 hrs		4
Food Engineering Project I	1	3	2
Sub Total	59	54	81
TOTAL OF TECHNICAL COURSES	**109**	**87**	**142**
II. NON-TECHNICAL COURSES			
A. General Education Courses			
Mathematics for the Modern World	3	0	3
Readings in Philippine History	3	0	3
Understanding the Self	3	0	3
Purposive Communication	3	0	3
The Contemporary World	3	0	3
Science, Technology and Society	3	0	3
Art Appreciation	3	0	3
Ethics	3	0	3
Sub Total	24	0	24
B. Elective Courses			
Kontekstwalisadong Komunikasyon sa Filipino	3	0	3
Flilipino sa Iba't Ibang Disiplina	3	0	3
ASEAN Literature	3	0	3
Sub Total	9	0	9
C. Mandated Courses			
Life and Works of Rizal	3	0	3
PATHFit 1 - Movement Competency Training	2	0	2
PATHFit 2 - Exercise-based Fitness Activities	2	0	2

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PATHFit 3 - Menu of Dance, Sports, Martial Arts, Group Exercise, Outdoor & Adventure Activities Menu Offering: Traditional and Recreational Games	2	0	2
PATHFit 4 - Menu of Dance, Sports, Martial Arts, Group Exercise, Outdoor & Adventure Activities Menu Offering: Team Sports (Basketball and Volleyball)	2	0	2
National Service Training Program 1	3	0	3
National Service Training Program 2	3	0	3
Sub Total	17	0	17
TOTAL OF NON- TECHNICAL COURSES	**50**	**0**	**50**
GRAND TOTAL	**159**	**87**	**192**

SUMMARY

Courses	Number of Units
I. Technical Courses	
A. Mathematics	12
B. Natural/Physical Sciences	11
C. Basic Engineering Sciences	9
D. Allied Courses	29
E. Professional Courses	81
F. Core Courses	
G. On-the-Job Training	
II. Non-Technical Courses	
A. General Education Courses	24
B. Elective Courses	9
C. Mandated Courses	17
GRAND TOTAL	**192**

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PROGRAM OF STUDY

FIRST YEAR						
First Semester						
Course Code	**Course Title**	**No. of Hour/s**		**Unit/s**	**Pre-requisite/s**	**Co-requisite/s**
		Lec	**Lab**			
ENGG 401	Introduction to Engineering	0	3	1		
GEd 101	Understanding the Self	3	0	3		
GEd 102	Mathematics for the Modern World	3	0	3		
GEd 106	Purposive Communication	3	0	3		
MATH 401	Differential Calculus	3	0	3		
NSTP 111	National Service Training Program 1	3	0	3		
PATHFit 1	Movement Competency Training	2	0	2		
SCI 401	General Chemistry	3	3	4		
GEd 105	Readings in Philippine History	3	0	3		
	Total	**23**	**6**	**25**		

FIRST YEAR						
Second Semester						
Course Code	**Course Title**	**No. of Hour/s**		**Unit/s**	**Pre-requisite/s**	**Co-requisite/s**
		Lec	**Lab**			
CpE 401	Computer Programming 1	0	3	1		
ENGG 402	Engineering Drawing	0	3	1		
GEd 104	The Contemporary World	3	0	3		
GEd 108	Art Appreciation	3	0	3		
GEd 109	Science, Technology and Society	3	0	3		
MATH 402	Integral Calculus	3	0	3	MATH 401	
NSTP 121	National Service Training Program 2	3	0	3	NSTP 111	
PATHFit 2	Exercise-based Fitness Activities	2	0	2	PATHFit 1	
SCI 403	Physics 1	3	3	4	MATH 401	MATH 402
	Total	**20**	**9**	**23**		

FIRST YEAR						
Midterm						
Course Code	**Course Title**	**No. of Hour/s**		**Unit/s**	**Pre-requisite/s**	**Co-requisite/s**
		Lec	**Lab**			
GEd 103	Life and Works of Rizal	3	0	3		
GEd 107	Ethics	3	0	3		
SCI 402	Modern Biology	2	3	3		
	Total	**8**	**3**	**9**		

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SECOND YEAR						
First Semester						
Course Code	**Course Title**	**No. of Hour/s**		**Unit/s**	**Pre-requisite/s**	**Co-requisite/s**
		Lec	**Lab**			
ChE 401	Analytical Chemistry	4	3	5	SCI 401	
ENGG 403	Computer-Aided Design	0	3	1	ENGG 402	
ENGG 413	Environmental Science and Engineering	3	0	3	SCI 401	
FE 401	Food Engineering Calculations	2	3	3	SCI 401	
Fili 101	Kontekstwalisadong Komunikasyon sa Filipino	3	0	3		
MATH 403	Engineering Data Analysis	3	0	3	MATH 402	
MATH 404	Differential Equations	3	0	3	MATH 402	
PATHFit 3	Menu of Dance, Sports, Martial Arts, Group Exercise, Outdoor & Adventure Activities Menu Offering: Traditional and Recreational Games	2	0	2	PATHFit 1 and 2	
SCI 404	Physics 2	3	3	4	SCI 403	
	Total	**23**	**12**	**27**		

SECOND YEAR						
Second Semester						
Course Code	**Course Title**	**No. of Hour/s**		**Unit/s**	**Pre-requisite/s**	**Co-requisite/s**
		Lec	**Lab**			
ChE 431	Physical Chemistry	2	3	3	ChE 430, MATH 404	
ChE 402	Organic Chemistry	4	3	5	SCI 401	
ChE 432	Flow of Fluids	2	3	3	FE 401, MATH 404	
FE 402	Advanced Engineering Mathematics for FE	3	0	3	MATH 404	
FE 403	Food Chemistry	3	3	4	ChE 430	
FE 404	General Microbiology	2	3	3	SCI 402	
Litr 102	ASEAN Literature	3	0	3		
PATHFit 4	Menu of Dance, Sports, Martial Arts, Group Exercise, Outdoor & Adventure Activities Menu Offering: Team Sports (Basketball and Volleyball)	2	0	2	PATHFit 1 and 2	
	Total	**21**	**15**	**26**		

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THIRD YEAR						
First Semester						
Course Code	**Course Title**	**No. of Hour/s**		**Unit/s**	**Pre-requisite/s**	**Co-requisite/s**
		Lec	**Lab**			
ChE 434	Heat and Mass Transfer in Food	2	3	3	ChE 433	
ENGG 409	Engineering Mechanics	3	0	3	SCI 403	
ENGG 412	Materials Science and Engineering	3	0	3	SCI 401	
ENGG 416	Research Methods	3	0	3	MATH 403	
FE 405	Food Microbiology	3	3	4	FE 404	
FE 406	Food Processing I	2	3	3	FE 403	
FE 407	Computer Applications in Food Engineering	0	3	1	ENGG 403	
Fili 102	Filipino sa Iba't Ibang Disiplina	3	0	3		
ME 431	Thermodynamics	3	0	3	SCI 403, MATH 402	
	Total	**22**	**12**	**26**		

THIRD YEAR						
Second Semester						
Course Code	**Course Title**	**No. of Hour/s**		**Unit/s**	**Pre-requisite/s**	**Co-requisite/s**
		Lec	**Lab**			
ChE 416	Process Dynamics and Control	2	3	3	FE 402	
ChE 418	Industrial Waste Management and Control	3	0	3	ENGG 413	
ChE 435	Separation Processes and Introduction to Particle Technology	2	3	3	ChE 434	
ENGG 406	Engineering Management	2	0	2		
FE 408	Sensory Evaluation and Product Development	2	3	3	MATH 403, FE 407	
FE 409	Food Processing II	2	3	3	FE 406	
FE 410	Technical Analysis of Food and Feeds	3	3	4	FE 403	
	Total	**16**	**15**	**21**		

THIRD YEAR						
Midterm						
Course Code	**Course Title**	**No. of Hour/s**		**Unit/s**	**Pre-requisite/s**	**Co-requisite/s**
		Lec	**Lab**			
FE 411	Food Process Industries	3	0	3		
FE 412	Field Trips and Seminars	0	3	1		
ENGG 404	Engineering Economics	3	0	3	MATH 402	
	Total	**6**	**3**	**7**		

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FOURTH YEAR						
First Semester						
Course Code	**Course Title**	**No. of Hour/s**		**Unit/s**	**Pre-requisite/s**	**Co-requisite/s**
		Lec	**Lab**			
EE 420	Basic Electrical and Electronics Engineering	2	3	3	SCI 404	
FE 413	Post-Harvest Handling Technology	3	0	3	FE 409, FE 410	
FE 414	Food Packaging and Labeling	3	0	3	FE 405, ENGG 412	
FE 415	Food Engineering Design 1	1	3	2	FE 407, FE 409	
FE 416	Laws, Ethics and Process Safety for Food Engineering	3	0	3	ENGG 405	
FE 417	Elective I	3	0	3		
	Total	**15**	**6**	**17**		

FOURTH YEAR						
Second Semester						
Course Code	**Course Title**	**No. of Hour/s**		**Unit/s**	**Pre-requisite/s**	**Co-requisite/s**
		Lec	**Lab**			
ENGG 417	On-the-Job Training	320		4	Fourth Year Standing	
ENGG 405	Technopreneurship	3	0	3	Fourth Year Standing	
FE 418	Food Engineering Project I	1	3	2	ENGG 416	
FE 419	Food Engineering Design II	1	3	2	FE 415, ChE 416	
	Total	**5**	**6**	**11**		
GRAND TOTAL UNITS		**159**	**87**	**192**		