Department: Food Technology
Curriculum Structure
(Effective from 2021-22 admission batch)

First Year First Semester

Sl.N	Category	Course Code	Course Title	Hours per week				Credits
				L	T	P	Total	
	A. THEORY							
1	Basic Science course	PH101	Physics-I	3	0	0	3	3
2	Basic Science course	M101	Mathematics –I	4	0	0	4	4
3	Humanities and Social Sciences including Management courses	HSMC101	Professional Communication	2	0	0	**2**	2
	B. PRACTICAL							
4	Basic Science course	PH191	Physics-I Lab	0	0	3	3	1.5
5	Engineering ScienceCourses	ME191	Workshop and Manufacturing Practices Lab	0	0	3	3	1.5
6	PROJECT	PR191	Theme based Project I	0	0	1	1	0.5
7	PROJECT	PR192	Skill Development I:Soft Skill	0	0	1	1	0.5
	C. MANDATORY ACTIVITIES / COURSES							
8	Mandatory Course	MC181	Induction Program	0	0	0	0	0
	TOTAL CREDIT							13.0

First Year 2nd Semester

Sl. No.	Category	Course Code	Course Title	Hours per week				Credits
				L	T	P	Total	
	A. THEORY							
1	Basic Science courses	CH201	Chemistry-I	3	0	0	3	3
2	Basic Science courses	M201	Mathematics –II	4	0	0	4	4
3	Engineering Science Courses	EE201	Basic Electrical Engineering	3	0	0	3	3
4	Engineering Science Courses	CS201	Programming for Problem Solving	3	0	0	3	3
	B. PRACTICAL							
5	Basic Science course	CH291	Chemistry-I Lab	0	0	3	3	1.5
6	Humanities and Social Sciences including Management courses	HSMC291	Professional Communication LAB	0	0	2	2	1.0
7	Engineering Science Courses	EE291	Basic Electrical Engineering Lab	0	0	3	3	1.5
8	Engineering Science Courses	ME292	Engineering Graphics and Design Lab	0	0	3	3	1.5
9	Engineering Science Courses	CS291	Programming for Problem Solving Lab	0	0	3	3	1.5
10	PROJECT	PR291	Theme based Project II	0	0	1	1	0.5
11	PROJECT	PR292	Skill Development II: Life Skill	1	0	0	1	0.5
	C. MANDATORY ACTIVITIES / COURSES							
12	Mandatory Course	MC281	NSS/Physical Activities / Meditation and Yoga / Photography	0	0	2	2	0
	TOTAL CREDIT							21

2nd Year 1st Semester

Sl. No.	Category	Course Code	Course Title	L	T	P	Total	Credits
					Hours per week			Credits
A THEORY								
A. THEORY								
1	Basic Science course	CH(FT)301	Chemistry-II	3	0	0	3	3
2	Engineering ScienceCourses	CH(FT)302	Environmental Engineering	3	1	0	4	4
3	Engineering ScienceCourses	FT301	Engineering Thermodynamics and Kinetics	3	1	0	4	4
4	Program Core Course	FT302	Food Microbiology	3	0	0	3	3
5	Program Core Course	FT303	Chemistry of Food	3	0	0	3	3
6	Humanities and SocialSciences including Management courses	HSMC303	Universal Human Values 2:Understanding Harmony	3	0	0	3	3
B. PRACTICAL								
7	Basic Science course	CH(FT)391	Chemistry-II Lab	0	0	3	3	1.5
8	Engineering ScienceCourses	CH (FT)392	Environmental EngineeringLab	0	0	3	3	1.5
9	Program Core Course	FT391	Chemistry of Food Lab–I	0	0	3	3	1.5
10	Program Core Course	FT392	Food Microbiology Lab	0	0	3	3	1.5
11	PROJECT	PR391	Theme Based Project III	0	0	1	1	0.5
12	PROJECT	PR392	Skill Development III: Technical Seminar Presentation	0	0	1	1	0.5
C. MANDATORY ACTIVITIES / COURSES								
13	MC	MC381	Learning an Art Form [vocalor instrumental, dance, painting, clay modeling, etc.]OR Environmental Protection Initiatives	0	0	2	2	0
	TOTAL CREDIT WITHOUT MOOCS COURSES							27
D.MOOCS COURSES**								
14	MOOCS COURSES	HM301	MOOCS Course-I	3	1	0	4	4
TOTAL CREDIT WITH MOOCS COURSES								31

** MOOCS COURSES for HONOURS/MINOR Degree are Program specific and to be taken from MOOCS BASKET

2nd Year 2nd Semester

Sl. No.	Category	Course Code	Course Title	Hours per week				Credits
				L	T	P	Total	
A. THEORY								
1	Basic Science course	M(FT)401	Applied Statistics and Numerical Methods	2	1	0	3	3
2	PC	FT401	Biochemistry and Nutrition	4	0	0	4	4
3	PC	FT402	Principles of Food Preservation	3	0	0	3	3
4	PC	FT403	Microbial Technology and Food Biotechnology	4	0	0	4	4
5	PC	FT404	Food Process Technology–I (Cereals, Fruits, Vegetables, Beverages)	3	0	0	3	3
6	Humanities and Social Sciences including Managementcourses	HSMC402	Gender Culture and Development	2	0	0	2	2
B. PRACTICAL								
7	EngineeringScience course	M(FT)491	Applied Statistics and Numerical Methods Lab	0	0	3	3	1.5
8	PC	FT491	Biochemistry Lab	0	0	3	3	1.5
9	PC	FT492	Chemistry of Food Lab-II	0	0	3	3	1.5
10	PC	FT493	Microbial Technology Lab	0	0	3	3	1.5
11	PROJECT	PR491	Theme based Project IV	0	0	1	1	0.5
12	PROJECT	PR492	Skill Development IV: Soft Skill and Aptitude-I	0	0	1	1	0.5
C. MANDATORY ACTIVITIES / COURSES								
13	MC	MC401	Environmental Science	2	0	0	2	0
	TOTAL CREDIT WITHOUT MOOCS COURSES							26
D.MOOCS COURSES								
14	MOOCS COURSES	HM401	MOOCS COURSE-II	3	1	0	4	4
TOTAL CREDIT WITH MOOCS COURSES								**30**

** MOOCS COURSES for HONOURS/MINOR Degree are Program specific and to be taken from MOOCS BASKET

3rd Year 1st Semester

Sl. No.	Category	Course Code	Course Title	L	T	P	Total	Credits
A. THEORY								
1	Humanities and Social Sciences including Management courses	HSMC505	Principles of Management	2	0	0	2	2
2	PC	FT501	Food Process Technology–II (Fish,Meat, Poultry)	3	0	0	3	3
3	PC	FT502	Food Process Technology–III (Milkand Milk Products)	3	0	0	3	3
4	PE	FT503A/B/C (Professional Elective I)	A. Principles of Biochemical Engineering	2	1	0	3	3
			B. Enzyme Technology	2	1	0	3	3
			C. Modeling and Simulation of Food Processing	2	1	0	3	3
5	PE	FT504A/B/C (Professional Elective II)	A. Fluid Mechanics and Heat Transfer	2	1	0	3	3
			B. Mass Transfer I	2	1	0	3	3
			C. Mechanical Operation andSeparation Process I	2	1	0	3	3
B. PRACTICAL								
6	PC	FT591	Food Processing Lab–I	0	0	3	3	1.5
7	PC	FT592	Food Analysis and Quality ControlLab-I	0	0	3	3	1.5
8	PE	FT593A/B/C (Professional Elective II Lab)	A. Fluid Mechanics and Heat Transfer Lab	0	0	3	3	1.5
			B. Mass Transfer I Lab	0	0	3	3	1.5
			C. Mechanical Operation andSeparation Process I Lab	0	0	3	3	1.5
9	PROJECT	PR591	Minor Project I	0	0	2	2	1
10	PROJECT	PR592	Skill Development V: Soft Skill and Aptitude-II	0	0	1	1	0.5
C. MANDATORY ACTIVITIES / COURSES								
11	MC	MC501	Constitution of India	2	0	0	2	0
	TOTAL CREDIT WITHOUT MOOCS COURSES							20
D. MOOCS COURSES**								
12	MOOCS COURSES	HM501	MOOCS COURSE-III	3	1	0	4	4
	TOTAL CREDIT WITH MOOCS COURSES							**24**

** MOOCS COURSES for HONOURS/MINOR Degree are Program specific and to betaken from MOOCS BASKET

3rd Year 2nd Semester

Sl. No.	Category	Course Code	Course Title	L	T	P	Total	Credits
A. THEORY								
1	Humanities and Social Sciences including Management courses	HSMC604	Economics for Engineers	2	0	0	2	2
2	PC	FT601	Bakery, Confectionary and Extruded Foods	3	0	0	3	3
3	PC	FT602	Food Process Technology–IV (Edible Fats and Oils)	3	0	0	3	3
4	PE	FT603A/B/C (Professional Elective III)	A. Mass Transfer II	2	1	0	3	3
			B. Separation Process II	2	1	0	3	3
			C. Transport Phenomena	2	1	0	3	3
5	PE	FT604A/B/C (Professional Elective IV)	A. Food Additives	3	0	0	3	3
			B. Supply Chain Management and Food Marketing	3	0	0	3	3
			C. Food Security and Sustainability	3	0	0	3	3
6	OE	FT605A/B/C (Open Elective I)	A. Data Structure and Algorithms	2	1	0	3	3
			B. Data Base Management System	2	1	0	3	3
			C. Software Engineering	2	1	0	3	3
B. PRACTICAL								
7	PC	FT691	Food Processing Lab–II	0	0	3	3	1.5
8	PC	FT692	Food Analysis and Quality Control Lab-II	0	0	3	3	1.5
9	PE	FT693A/B/C (Professional Elective III Lab)	A. Mass Transfer Lab II lab	0	0	3	3	1.5
			B. Separation Process II Lab	0	0	3	3	1.5
			C. Transport Phenomena Lab	0	0	3	3	1.5
10	OE	FT694A/B/C (Open Elective I Lab)	A. Data Structure and Algorithms Lab	0	0	2	2	1
			B. Data Base Management System Lab	0	0	2	2	1
			C. Software Engineering Lab	0	0	2	2	1
11	PROJECT	PR691	Minor Project II	0	0	3	2	1
12	PROJECT	PR692	Skill Development VI: Soft Skill and Aptitude-III	0	0	1	1	0.5
C. MANDATORY ACTIVITIES / COURSES								
13	MC	MC601	Intellectual Property Right	2	0	0	2	0
	TOTAL CREDIT WITHOUT MOOCS COURSES							24.0
D.MOOCS COURSES**								
14	MOOCS COURSES	HM601	MOOCS COURSE-IV	3	1	0	4	4
	TOTAL CREDIT WITH MOOCS COURSES							**28.0**

** MOOCS COURSES for HONOURS/MINOR Degree are Program specific and to be taken fromMOOCS BASKET

4th Year 1st Semester

Sl No	Course Code	Paper Code	Theory	Contact Hours /Week				Credit Points
				L	T	P	Total	
A. THEORY								
1	PC	FT701	Food Process Engineering	3	1	0	4	4
2	PE	FT702A/B/C (Professional Elective V)	A. Food Packaging Technology	3	0	0	3	3
			B. Functional Foods and Nutraceuticals	3	0	0	3	3
			C. Protein Technology	3	0	0	3	3
3	OE	FT703A/B/C (Open Elective II)	A. Process Instrumentation and Control	3	0	0	3	3
			B. Renewable Energy Technology	3	0	0	3	3
			C. Nanotechnology	3	0	0	3	3
4	OE	FT704A/B/C (Open Elective III)	A. Artificial Intelligence	3	0	0	3	3
			B. Machine Learning	3	0	0	3	3
			C. Introduction to Internet of Things	3	0	0	3	3
B. PRACTICAL								
5	PC	FT791	Food Engineering Lab	0	0	3	3	1.5
6	PROJECT	PR791	Major Project-I	0	0	4	4	2
7	PROJECT	PR792*	Industrial Training / Internship	0	0	0	0	1
8	PROJECT	PR793	Skill Development VII: Seminar and Group Discussion	0	0	1	1	0.5
C. MANDATORY ACTIVITIES / COURSES								
9	MC	MC701	Entrepreneurship and Innovation Skill	2	0	0	2	0
TOTAL CREDIT WITHOUT MOOCS COURSES								18
D.MOOCS COURSES**								
10	MOOCS COURSES	HM701	MOOCS COURSE-V	3	1	0	4	4
TOTAL CREDIT WITH MOOCS COURSES								22

*Collective Data from 3rd to 6th Semester (Summer/Winter Training during Semester Break & Internship should be done after 5th Semester or 6th Semester). All related certificates to be collected by the training/internship coordinator(s).

** MOOCS COURSES for HONOURS/MINOR Degree are Program specific and to be taken from MOOCS BASKET

4th Year 2nd Semester

Sl No	Course Code	Paper Code	Theory	L	T	P	Total	Credit Points
A. THEORY								
1	PE	FT801A/B/C (Professional Elective VI)	A. Waste Management of Food Industries	3	1	0	4	4
			B. Project Engineering and Food Plant Layout	3	1	0	4	4
			C. Plant Maintenance, Safety and Hygiene	3	1	0	4	4
2	OE	FT802A/B/C (Open Elective IV)	A. Entrepreneurship Development and Start-Up Management	3	0	0	3	3
			B. Quality Management System	3	0	0	3	3
			C. Smart Technologies	3	0	0	3	3
B. PRACTICAL								
3	PROJECT	PR891	Major Project-II	0	0	12	12	6
4	PROJECT	PR892	Grand Viva	0	0	0	0	1
C. MANDATORY ACTIVITIES / COURSES								
5	MC	MC801	Essence of Indian Knowledge Tradition	2	0	0	2	0
TOTAL CREDIT								14

Total:

Total for FT	
Without MOOCS	**With MOOCS**
34	**34**
27	**31**
26	**30**
20	**24**
24	**28**
18	**22**
14	**14**
163	183 (for Honors/minor)

Credit Distribution

Subject Category	Subjects	Credit Distribution as per AICTE (%)	Suggested Breakup of Credits (Total 160) as per AICTE	
Humanities and Social Sciences including Management courses (HSMC)	**Humanities & Social Science:** (i)English (ii)Language / English Lab **Management courses** (i)Principle of Management, (ii)Economics for Engineers (iii)Values & Ethics in Profession	5 to 10%	**12**	**9+3** **5.63%**
Basic Sciences (BS)	**Physics** (i)Introduction to Electromagnetic Theory (ii)Introduction to Mechanics (iii)Quantum Mechanics for Engineers (iv)Oscillation, Waves and Optics (v)Semiconductor Optoelectronics (vi)Semiconductor Physics	**15 to 20%**	**25**	**24.5** **15.3%**
	Chemistry & Biology (i)Chemistry – I (Concepts in chemistry for engineering) (ii)Chemistry Laboratory **Elective Courses** (i)Chemistry-II (Chemical Applications) (ii)Polymer Chemistry (iii)Experiments in Polymer Chemistry **Biology**			
	Mathematics (i)Mathematics (Option 1)			

	Mathematics 1 Mathematics 2 Mathematics 3 **(ii)Mathematics (Option 2)** (for CSE students)			
Engineering Sciences and Skills (ES)	(i)Workshop / Manufacturing Practice (ii)Drawing / Engineering Graphics & Design, (iii)Basics of Electrical (iv)Computer / Programming for Problem Solving (v) Numerical Methods (vi) Circuit theory	15 to 20%	**24**	**23** 14.38%
Professional core courses (PC)	Courses relevant to chosen branch	30 to 40%	**48**	**51** **31.88%**
Professional Elective	Elective courses relevant to chosen specialization/bran ch	10 to 15%	**18**	**23.5** 13.75%
Open Elective	Elective Courses from other technical programs and /or **emerging subjects**: 1.Artificial Intelligence (AI) 2. Internet of Things (IoT) 3. Block Chain 4. Robotics 5. Quantum Computing 6. Data Sciences 7. Cyber Security 8. 3D Printing and Design 9. Virtual Reality (VR)	5 to 10%	**18**	**13** **8.13%**
Project work, seminar and internship in industry or elsewhere	(i) PROJECT (PR....91): Project work (ii) PROJECT (PR....92): (iii) PROJECT (PR ...93): (iv)Grand Viva - 1	10 to 15%	**15**	**17.5** **10.94%**
Mandatory Courses [Environment	**MC Courses:** (i)Environmental Science, (ii)Foreign language,	**No Credit Course**	Minimum 2 units per semester min.	

al Sciences, Induction training, Indian Constitution, Essence of Indian Knowledge Tradition]	(iii)Constitution of India (iv)Behavioral & Interpersonal skills (v)Essence of Indian Knowledge Tradition **&others as mentioned in AICTE guidelines** **MC Activities:** (i)Induction Programming (ii)NSS/NCC/Yoga (iii)Technical Lecture Presentation **&others as mentioned in AICTE guidelines**		Max: 28 Units/Program	

Summary

Sub	Credit	%	AICTE %
HSMC	9	5.63	5to10
BSHU	24.5	15.3	15to20
ES	23	14.38	15to20
PC	51	31.88	30to40
PE	22	13.75	10to15
OE	13	8.13	5to10
Project	17.5	10.94	10to15
	160	100.00	

Professional Electives (It is expected Options in a vertical column would lead to expertise in a specific/allied domain)				
	Option 1	**Option 2**	**Option 3**	**Option 4**
Professional Elective I	A. Principles of Biochemical Engineering	B. Enzyme Technology	C. Modeling & Simulation of Food Processing	
Professional Elective II	A. Fluid Mechanics & Heat Transfer	B. Mass Transfer I	C. Mechanical Operation and Separation Process I	
Professional Elective III	A. Mass Transfer II	B. Separation Process II	C. Transport Phenomena	
Professional Elective IV	A. Food Laws and Standards	B. Food Supply Chain Management	C. Food and Consumer Studies	
Professional Elective V	A. Food Packaging Technology	B. Functional Foods & Nutraceuticals	C. Protein Technology	
Professional Elective VI	A. Waste Management of Food Industries	B. Project Engineering and Food Plant layout	C. Plant Maintenance, Safety and Hygiene	

Open Electives (It is expected Options in a vertical column would lead to expertise in a specific/allied domain)				
	Option 1	**Option 2**	**Option 3**	**Option 4**
Open Elective I	A. Data Structure and Algorithms	B. Data Base Management System	C. Software Engineering	
Open Elective II	A. Process Instrumentation and Control	B. Renewable Energy Technology	C. Nanotechnology	
Open Elective III	A. Artificial Intelligence	B. Machine Learning	C. Introduction to Internet of Things	
Open Elective IV	A. Entrepreneurship Development and Start-Up Management	B. Quality Management System	C. Smart Technologies	

Major/Honors programme for Dept. of Food Technology in R21 regulations

Program Name: Major/Honors in BIOPROCESSES

CURRICULUM

Sl.	Course Code	Course Name	Typ	Credi
1	HMFT001(BP)	Aspects of Biochemical Engineering	CC	3
2	HMFT002(BP)	Downstream Processing	CC	3
3	HMFT003(BP)	Material and Energy Balances	CC	3
4	HMFT004(BP)	Transport Phenomena in Biological Systems	CC	3
5	HMFT005(BP)	Thermodynamics for Biological Systems : Classical and Statistical Aspect	OC	3
6	HMFT006(BP)	Experimental Biotechnology	OC	3
7	HMFT007(BP)	Fundamental of Fluid Mechanics for Chemical and Biomedical Engineers	OC	3
8	HMFT008(BP)	Environmental Biotechnology	OC	3
9	HMFT009(BP)	Genetic Engineering: Theory and Application	OC	3

CC=> COMPULSORY COURSE
OC=> OPTIONAL COURSE
1. Students from B.Tech. in FT can follow this curriculum for a **Major/Honors** degree.
2. Students from any program not offering a major can follow this curriculum for a **Minor** degree.
3. Students can take the courses in order of their preference.
4. If any course(s) is(are) already taken by the student in their program curriculum, then the Computer Science department will suggest a different course in lieu of that, which has to be accepted by the students.
5. Students must take the courses from the **SWAYAM platform** and transfer the credit.
6. Courses in **Sl. No 1 to 4** are **compulsory courses,** which are to be taken on a **mandatory** basis.
7. Courses in **Sl. No. 5 to 9** are **optional courses,** and students must select the required number of courses to make the total credit a **minimum of 18** (including the credits of compulsory courses).
8. **A minimum of 18 credits are required for the Major/Minor Degree**.
9. Any syllabus proposed by the SWAYAM platform for any course is accepted.
10. Students must complete the courses taken from the SWAYAM platform and submit the completion certificate to the Department for the requisite Degree.
11. **Students are advised to check the credit of the course before enrolling the course.**

Program Name: Major/Honors in ENERGY AND ENVIRONMENT
CURRICULUM

Sl.	Course Code	Course Name	Typ	Credi
1	HMFT001(EE)	Environmental Quality Monitoring & Analysis	CC	3
2	HMFT002(EE)	Renewable Energy Engineering: Solar, Wind and Biomass Energy Systems	CC	3
3	HMFT003(EE)	Basic Environmental Engineering and Pollution Abatement	CC	3
4	HMFT004(EE)	Energy conservation and waste heat recovery	OC	3
5	HMFT005(EE)	Biomass Conversion and Biorefinery	OC	3
6	HMFT006(EE)	Physico-chemical processes for wastewater treatment	OC	3
7	HMFT007(EE)	Hydrogen Energy: Production, Storage, Transportation and Safety	OC	3
8	HMFT008(EE)	Ecology and Environment	OC	2
9	HMFT009(EE)	Technologies for clean and renewable energy production	OC	2

CC=> COMPULSORY COURSE
OC=> OPTIONAL COURSE
1.   Students from B.Tech. in FT can follow this curriculum for a **Major/Honors** degree.
2.   Students from any program not offering a major can follow this curriculum for a **Minor** degree.
3.   Students can take the courses in order of their preference.
4.   If any course(s) is(are) already taken by the student in their program curriculum, then the Computer Science department will suggest a different course in lieu of that, which has to be accepted by the students.
5.   Students must take the courses from the **SWAYAM platform** and transfer the credit.
6.   Courses in **Sl. No 1 to 3** are **compulsory courses,** which are to be taken on a **mandatory** basis.
7.   Courses in **Sl. No. 4 to 9** are **optional courses,** and students must select the required number of courses to make the total credit a **minimum of 18** (including the credits of compulsory courses).
8.   **A minimum of 18 credits are required for the Major/Minor Degree**.
9.   Any syllabus proposed by the SWAYAM platform for any course is accepted.
10.   Students must complete the courses taken from the SWAYAM platform and submit the completion certificate to the Department for the requisite Degree.
11.   Students are advised to check the credit of the course before enrolling the course.

Program Name: Major/Honors in BIOSCIENCES
CURRICULUM

Sl. No.	Course Code	Course Name	Type	Credits
1	HMFT001(BS)	Biochemistry	CC	3
2	HMFT002(BS)	Structural Biology	CC	3
3	HMFT003(BS)	Basics of Biology	CC	3
4	HMFT004(BS)	Introduction to Cell Biology	CC	2
5	HMFT005(BS)	Experimental Biochemistry	OC	3
6	HMFT006(BS)	Genetic Engineering: Theory and Application	OC	3
7	HMFT007(BS)	Introduction to proteomics	OC	2
8	HMFT008(BS)	Environmental Biotechnology	OC	3
9	HMFT009(BS)	Introduction to Developmental Biology	OC	3

CC=> COMPULSORY COURSE
OC=> OPTIONAL COURSE

1. Students from B.Tech. in FT can follow this curriculum for a **Major/Honors** degree.
2. Students from any program not offering a major can follow this curriculum for a **Minor** degree.
3. Students can take the courses in order of their preference.
4. If any course(s) is(are) already taken by the student in their program curriculum, then the Computer Science department will suggest a different course in lieu of that, which has to be accepted by the students.
5. Students must take the courses from the **SWAYAM platform** and transfer the credit.
6. Courses in **Sl. No 1 to 4** are **compulsory courses,** which are to be taken on a **mandatory** basis.
7. Courses in **Sl. No. 5 to 9** are **optional courses,** and students must select the required number of courses to make the total credit a **minimum of 18** (including the credits of compulsory courses).
8. **A minimum of 18 credits are required for the Major/Minor Degree**.
9. Any syllabus proposed by the SWAYAM platform for any course is accepted.
10. Students must complete the courses taken from the SWAYAM platform and submit the completion certificate to the Department for the requisite Degree.
11. **Students are advised to check the credit of the course before enrolling the course.**