



**2010-11 Course Requirements for BSE Degree – Courses Common to All Option Areas**

All courses in this table must be included in calculations used to check the 2.35 GPA program entrance requirement

Crds	Sem/Yr Taken	Grade	Requirement	Course Taken to Meet Requirement
			MATH 221 (5) Calculus and Analytic Geometry	
			MATH 222 (5) Calculus and Analytic Geometry	
			MATH 234 (3) Calculus - Functions of Several Variables	
			Intro Statistics for Engineers (STAT 224 (3) or 324 (3))	
			Chemistry (CHEM 109 (5) or CHEM 103 (4) and CHEM 104 (5))	
			COMP SCI 310 (3) Problem Solving (preferred) or CBE 255 (3) or CIV ENGR 291 (3)	
			Agr. and Life Science Course (min. of 3 crds from required list). Food and Bioprocess Engrs must take FOOD SCI 432 (3)	
			Biological Sciences (min. 3 crds from required list)	
			E M A 201 (3 crds) Statics	
			PHYSICS 202 (5) General Physics	
			M E 231 (2) Introductory Engineering Graphics or M E 170 (2) Civil Engineering Graphics	
			M E 361 (3) Thermodynamics or CBE 310 (3) Chemical Process Thermodynamics	
			Engineering Economics Course (I SY E 313 (3) or M E 314(3) or ACCT I S 300 (3) or FINANCE 300 (3))	
			BSE 249 (3) Engr. Principles for Biological Systems or CBE 250 (3)	
			BSE 364 (3) Engr. Properties of Food and Biological Materials	
			BSE 365 (3) Measurements and Instrumentation for Biol Systems	
			BSE 375 (3) Biological Concepts for Engineers	
			BSE 409 (1) Career Management for Engineers	
			BSE 509 (3) BSE Senior Design	

**2010-11 Course Requirements for BSE Degree – Food and Bioprocess Engineering Specialization**

All courses in this table must be included in calculations used to check the 2.35 GPA program entrance requirement

Crds	Sem/Yr Taken	Grade	Requirement	Course Taken to Meet Requirement
			BSE 441 (3) Rheology of Foods & Biomaterials	
			BSE 542 (3) Food Engineering Operations	
			MICROBIO 325 (3) Food Bacteriology	
			BIOCHEM 501 (3) Introduction to Biochemistry	
			M E 361(3) Fluid Dynamics or CBE 320 (4) Introductory Transport Phenomena	
			FOOD SCI 410 (3) Food Chemistry I	
			FOOD SCI 532 (4) Integrated Food Manufacturing	
			M E 364 (3) Elementary Heat Transfer or CBE 326 (3) Momentum and Heat Transfer Operations or	
			BSE Breadth Course. One course from the following: 351 (3), 356 (3), 367 (3), 372 (2), 460 (3), 472 (3), 473 (2), 475 (3), 476 (3), 571 (3)	
			CHEM 341 (3) or 343 (3) Organic Chemistry (Chem 341 recommended)	
			Technical Elective	
			Technical Elective	
			Technical Elective	
			Technical Elective	
			Technical Elective	
			Technical Elective	
			<b>TOTAL– Minimum 41 Credits Required</b>	

## 2010-11 Course Requirements for BSE Degree – Food and Bioprocess Engineering Technical Electives

The following courses can be used to meet technical elective requirements for the Food and Bioprocess Engineering specialization

Area	Course	Area	Course
Biomedical, Bioengineering, Biomedical	B M E 310 (3) Bioinstrumentation	General	INTEREGR 160 (3) Intro to Engr. Design (for Freshman only)
	B M E 315 (3) Biomechanics		Up to 3 credits of BSE 001 Cooperative Education Program, BSE 299 Independent Study, BSE 399 Coordinated Internship, and/or BSE 699 Special Topics. No more than 2 credits of BSE 399 taken in a given semester can be used to meet technical elective requirements.
	B M E 401 (3) Physics for Medicine and Biology		Up to 6 credits of math, science, statistics or computer science courses that are designated "advanced", or engineering courses with a 300 or greater course number
	B M E 430 (3) Biological Interactions with Materials		E C E 376 (3) Electrical and Electronic Circuits
	B M E 461 (3) Modeling of Physiological Systems		M E / STAT 424 (3) Statistical Experimental Design for Engineers
	B M E 505 (3) Biofluidics		Physics 201 (5) General Physics
	B M E 530 (3) Medical Imaging Systems		BSE 351 (3) Structural Design for Agricultural Facilities
	B M E 547 (3) Biomedical Optics		BSE 356 (3) Sustainable Residential Construction
	ECE 230 (4) Circuit Analysis		BSE 367 (3) Renewable Energy Systems
Processing	ECE 330 (3) Signals and Systems	Biological Systems Engineering	BSE 372 (2) On-Site Waste Water Treatment
	CBE 311 (3) Thermodynamics of Mixtures		BSE 460 (3) Biorefining: Energy & Prod. from Renewable Res.
	CBE 324 (2) Transport Phenomena Lab		BSE 472 (3) Sediment & Bio-Nutrient Engr. & Mgmt.
	CBE 426 (3) Mass Transfer Operations		BSE 473 (2) Irrigation and Drainage System Design
	CBE 430 (3) Chemical Kinetics and Reactor Design		BSE 475 (3) Engr Principles-of Ag Machinery
	CBE 560 (3) Biochemical Engineering		BSE 476 (3) Engr Principles of Off-Road Vehicles
	CBE 562 (3) Special Topics in Chemical Engineering		BSE 571 (3) Small Watershed Engineering
	CBE 565 (3) Food Process Engineering		BSE 642 (2 or 3) Food and Pharmaceutical Separations
Rheology	BSE 642 (2) Food and Pharmaceutical Separations	Mechanical Design	E M A 202 (3) or M E 240 (3) Dynamics
	M S E 271 (2) Materials Science and Engr. Problem Solving I		E M A 303 (3), EMA 304 (3) or M E 306 (3) Mechanics of Materials
	M S E 350 (3) Introduction to Materials Science		E M A 405 (3) Practicum in Finite Elements
	M E 417 (3) Introduction to Polymer Processing		M E 232 (3) Geometric Modeling for Engineering Applications
	M E 418 (3) Engineering Design with Polymers		
	M E 508 (3) Composite Materials		
	M E / CBE 525 (3) Macromolecular Hydrodynamics		
	CBE 540 (3) Polymer Science and Technology		
CBE 541 (3) Plastics and High Polymer Laboratory			

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**2010-11 Course Requirements for BSE Degree – Food and Bioprocess Engineering Technical Electives**

The following courses can be used to meet technical elective requirements for the Food and Bioprocess Engineering specialization

Area		Course	Area		Course
Mechanical Design		M E 307 (1) Mechanics of Materials Lab	Environmental		CEE 310 (3) Fluid Mechanics or M E 363 (3) but not both
		M E 340 (3) Introduction to Dynamic Systems			CEE 311 (3) Hydrosience
		M E 342 (3) Design of Machine Elements			CEE 315 (3) Hydrology
		M E 350 (3) Advanced Graphic Analysis			CEE 320 (3) Environmental Engineering
		M E 361 (3) Thermodynamics			CEE 322 (3) Environmental Engineering Processes
		M E 363 (3) Fluid Dynamics or CE 310 (3) but not both			CEE 330 (4) Soil Mechanics
		M E 443 (3) Design and Analysis of Rotating Machinery			CEE 423 (3) Air Pollution Effects, Measurement and Control
		M E 444 (3) Design Problems in Elasticity			CEE 426 (3) Design of Wastewater Treatment Plants
		M E 467 (3) Refrigeration			CEE 428 (3) Water Treatment Plant Design
		M E 520 (3) Two-Phase Flow and Heat Transfer			CEE 500 (3) Water Chemistry
		M E 563 (3) Intermediate Fluid Dynamics			
		M E 573 (3) Computational Fluid Dynamics			

# Four Year Road Map: Food and Bioprocess Engineering Specialization

This Road Map is a tool to assist you and your advisor in planning your academic career. Use it along with the Curriculum Sheet for your major, your DARS report, the appropriate checklist in the back of this document, and the Timetable. Your specific program of study could, and probably will, look different. You need to customize the Road Map to fit your situation, and consult with your advisor about the best path for you.

Year 1 – Fall Semester Course	Credits
MATH 221 (Calculus and Analytic Geometry)	5
CHEM 109 (Advanced General Chemistry)	5
Social Science (See I.E.4)	3
E P D 155 (Basic Communication) or other Comm A course (See I.C.)	2
	15

Year 2 – Fall Semester Courses	Credits
MATH 234 (Calculus -- Functions of Several Variables)	3
CHEM 341 (Introductory Organic Chemistry)	3
Technical Elective (See VI.D)	5
COMP SCI 310 (Problem Solving Using Computers)	3
BSE 249 (Engr. Princ. Bio. Systems) or CBE 250 (Process Synthesis)	3
	17

Year 3– Fall Semester Courses	Credits
BSE 364 (Engineering Properties of Food and Biological Materials)	3
I SY E 313 (Engineering Economics Analysis)	3
M E 363 (Fluid Dynamics) or CBE 320 (Intro Transport Phenomena)	3 or 4
MICROBIO 325 ( Food Bacteriology)	3
FOOD SCI 410 (Food Chemistry)	3
BSE 409 (Career Management for Engineers)	1
	16 or 17

Year 4– Fall Semester Courses	Credits
BSE 509 (Biological Systems Engineering Senior Design)	3
Breadth Requirement (See VI.D.)	3
FOOD SCI 532 (Integrated Food Manufacturing)	4
E P D 397 (Technical Comm.) or other Comm B course (See I.C.)	3
Technical Elective (See VI.D.)	3
	16

Year 1 – Spring Semester Courses	Credits
MICROBIO 101 (Gen Micro) or MICROBIO 303 (Bio of Microorgms.)	3
MATH 222 (Calculus and Analytic Geometry)	5
EMA 201 (Statics)	3
Economics Course (See I.E.1)	4
M E 231 (Introduction to Engineering Graphics)	2
	17

Year 2 – Spring Semester Courses	Credits
M E 361 (Thermodynamics) or CBE 310 (Chem. Process Thermo.)	3
Ethnic Studies/International (See I.E.2 & I.H.)	3
PHYSICS 202 (General Physics)	5
BSE 375 (Biological Concepts for Engineers)	3
STAT 224 (Introductory Statistics for Engineers)	3
	17

Year 3 – Spring Semester Courses	Credits
Humanities (See I.E.3)	3
BIOCHEM 501 (Introduction to Biochemistry)	3
FOOD SCI 432 (Principles of Food Preservation)	3
M E 364 (Heat Transfer) or CBE 326 (Mom. & Heat Transfer Ops.)	3
BSE 365 (Measurements and Inst. for Biological Systems)	3
	15

Year 4 – Spring Semester Courses	Credits
BSE 542 (Food Engineering Operations)	4
BSE 441 (Rheology)	2
Humanities (See I.E.3)	3
Technical Elective (see VI.D.)	5 or 6
	14 or 15

**Notes:** Need 128 credits to complete degree. If Chemistry 103 & 104 is taken in place of Chemistry 109, it is suggested to take Chemistry 103 in Fall semester and Chemistry 104 in Spring semester of year 1.