## Department of Agricultural and Biosystems Engineering - North Dakota State University AGRICULTURAL ENGINEERING CONCENTRATION CURRICULUM GUIDE - FALL 2022\*

Advisor

Student ID#

**FALL SPRING** General Education Electives 300 See www.ndsu.edu/registrar/gened for approved courses. Gen Gen /400 /400 Crs Course Crs Course Grade Grade Ed Ed Level<sup>2</sup> Gen Ed Course Grade Level<sup>2</sup> Crs ABEN 110 Introduction to ABEN 3 **ABEN 348** Ag Technology Expo Α ENGR 327 3 CHEM 121 General Chemistry I ME 212 3 3 Fund.of Visual Communication Α S 3 ENGL 110<sup>3</sup> College Composition I С ME 221 Engineering Mechanics 1 3 В 3 MATH 165 Calculus I R CHEM 122 General Chemistry II 3 S В 3 CHEM/BIO Elective (see side bar and back) 3 С С 3 3 **ENGL 120** College Composition II D ■ (Double-count with A or B above) **MATH 166** Calculus II 4 3 G ● (Double-count with A or B above) 3 17 16 W Biomaterials Processing ABEN 255 Comp. Aided Analysis/Design **ABEN 263** 3 **General Education Categories:** С COMM 110 Fund Public Speaking **PHYS 252** Univ Physics II 4 S 3 G - Global Perspectives • A - Humanities/Fine Arts Engineering Mechanics II L - Co-requisite Lab ME 222 3 PHYS 252L Univ Physics II Lab B - Social/Behavioral Sciences R - Quantitative Reasoning C - Communication ME 223 Mechanics of Materials 3 MATH 266 Intro Diff Equations 3 D - Cultural Diversity S - Science & Technology MATH 259 Multivariate Calculus ME 350 Thermodynamics 3 3 3 MATH 128 Intro to Linear Algebra Computer Elective (see back) 3 W Gen Ed Elective (see side bar) 2 **Program Electives** 18 17 Select courses in consultation with your advisor Crs Grade IME 460 Eval Engr Data (or STAT 330) 3 3 **ABEN 377** Modeling in ABEN 3 3 Course CE 309 Fluid Mechanics (or ME 352) ABEN 482 Inst and Measurement 3 3 3 3 ABEN Electives - 9 cr. req ENGL 320, 321, 324, or 459 Intensive Writin 3 ECE 301 Electrical Engineering I 3 3 Seminar 3 **ABEN 391** 1 ABEN Elective (see side bar and back) 1 CHEM/BIO Elective (see side bar and back) 3 ABEN Elective (see side bar and back) 3 Gen Ed Elective (see side bar) 3 A/B CHEM/BIO/ENVIRO Science Electives<sup>4</sup> - 9 cr. req Complete your Degree Audit this semester 16 ABEN 487 Design Project I ABEN 486 Design Project I 2 2 ENGR 327 Ethics, Engr, & Tech 3 3 Α Tech Elective (see side bar and back) 3 Engineering Economy CHEM/BIO Elective (see side bar and back) 2 2 3 Tech Electives - 8 cr. req ABEN Elective (see side bar and back) 3 Gen Ed Elective (see side bar) 3 A/B Tech Elective (see side bar and back) 5 Gen Ed Elective (see side bar) 3 A/B Business or Communication Elective (see pg 2) 3 Complete your Application for Graduation by 3rd week of 17 15 Adv Biosciences - 9 cr. req (double-count with Electives above)<sup>5</sup> Minimum Degree Total The last 30 credits must be earned in residence at NDSU.

- <sup>1</sup> Use this column to tally grades; use "T" for transfer courses and "IP" for courses currently in progress.
- $^{2}$  Use this column to tally 36 credits of 300/400 level courses required for graduation.

Student:

- <sup>5</sup> A minimum of 3 credits must be from non-ABEN courses in the Advanced Bioscience Courses list on page 2.
- \*As a student at NDSU, it is your responsibility to know the requirements of your degree. To ensure all degree requirements are met, meet with your academic advisor regularly and follow your Academic Requirements Report found on Campus Connection. Required ABEN courses are typically offered only once per year, ABEN electives are typically offered only once every two years, and all course offerings are subject to change.

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The following electives are approved. Alternatives may be available with advisor approval.

## Advanced Bioscience Courses

Select 9 credits from the courses listed below. At least 3 credits must be from non-ABEN courses.

Additional courses may be available in consultation with your advisor; qualifying courses must have a biological science component with one or more prerequisites.

ABEN Courses eligible for Advanced Bioscience Courses						
Course #	Course Name	Cr.	Prerequisites			
ABEN 444	Transport Processes	3	ABEN 263, ME 352 or CE309, and MATH 266			
ABEN 452	Bioenvironmental Sys Design	3	CE 309 or ME 350			
ABEN 456	Biobased Energy	3	Junior standing in Engineering or Science			
ABEN 458	Process Engr for Food, Biofuels	3	Junior standing			
ABEN 464	Resource Conserv & Irrigation	4	CE 309			
ABEN 484	Drainage & Wetland Engr	3	CE 309 or SOIL 433			

	Soil Fertility & Fertilizers	3	SOIL 210, CHEM 121, CHEM 121L	
COII 251			OOIL 210, OFILIN 121, OFILIN 121L	
301L 331	Soil Ecology	3	SOIL 210	
SOIL 410	Soils and Land Use	3	SOIL 210, CHEM 121, CHEM 121L	
SOIL 444	Soil Genesis	3	SOIL 210	
SOIL 465	Soil & Plant Analysis	3	SOIL 210, CHEM 121, CHEM 121L	

PLSC Courses					
Course #	Course Name	Cr.	Prerequisites		
PLSC 320	Princ.of Forage Product	3	PLSC 110		
PLSC 335	Seed Tech & Production	2	PLSC 110		
PLSC 350	Sugarbeet Production	2	PLSC 110 or PLSC 210		
PLSC 411	Genomics	3	BIOL 150, STAT 330		
PLSC 431	Intermediate Genetics	3	PLSC 315		

ADD'L Options						
Course #	Course Name	Cr.	Prerequisites			
BIOL 364	General Ecology	3	BIOL 150 or BIOL 151			
BOT 380	Plant Physiology	3	BIOL 150			
ANSC 357	Animal Genetics	3	PLSC 315, STAT 330			
RNG 452	Geo Info Sys in Range Sci	3	RNG 336			
BOT 414	Plant Systematics	3	BIOL 151, BIOL 151L			

Suggested Computer Electives					
CE 212	Civil Engineering Graphic Comm.	3			
CSCI 122	Visual Basic	3			
CSCI 160	Computer Science I	4			
ECE 173	Introduction to Computing	3			
GEOG 455	Introduction to GIS	4			
IME 380	CAD/CAM for Manufacturing	3			
ME 213	Modeling of Engineering Systems	3			

	Suggested Business or Communication Electives May count as GenEd D or G, but not A or B.	
ACCT 102	Fundamentals of Accounting	3
ACCT 200	Elements of Accounting I	3
AGEC 242	Intro to Agricultural Mgmt	3
AGEC 244	Agricultural Marketing	3
AGEC 246	Intro to Agricultural Finance I	3
COMM 212	Interpersonal Comm	3
COMM 214	Persuasive Speaking	3
COMM 216	Interculutural Comm	3
COMM 260	Prin/Internet Web-Base Design	3
ECON 201	Principles of Microeconomics	3
ECON 202	Principles of Macroeconomics	3
MGMT 301	Mgmt for non-business majors	3
MRKT 301	Mrkt for non-business majors	3

<sup>3</sup> First year students with a composite ENGL ACT sub-score ≥ 18 should register for ENGL 120 (unless transfer credit for ENGL 120 is received). If ENGL 120 is completed with a grade of "C" or better, credits will be awarded for ENGL 110 with a passing grade (P). For more details on NDSU's English Placement process, go to https://bulletin.ndsu.edu/academic-policies/undergraduate-policies/english-and-math-placement/#englishplacementtext
4 ABEN courses may not be used to fulfill CHEM/BIO/ENVIRO Science Electives.

## AGRICULTURAL ENGINEERING CURRICULUM GUIDE CONTINUED

	The Agricult	ural Engineering concentration has three suggested amphasis a	NACCO 1
	Machine Systems	ural Engineering concentration has three suggested emphasis a  Processing Systems	Natural Resources and Environmental Systems
	Select electives with emphasis on machine, power, structural and	Select electives with emphasis on combining engineering,	Select electives with emphasis on areas that contribute to
		biological, and physical sciences in the application of engineering principles to handling and processing of biomaterials for food and non-food products.	solving problems in environmental engineering, natural resources management, hydrology, irrigation, drainage, watershed management, and waste management.
	Course # Course Name Cr.	Course # Course Name Cr.	Course # Course Name Cr.
	ABEN 358 Electric Energy App in Ag 3	ABEN 358 Electric Energy App in Ag 3	ABEN 358 Electric Energy App in Ag 3
Se	ABEN 452 Bioenvironmental Systems Design 3	ABEN 444 Transport Processes 3	ABEN 444 Transport Processes 3
	ABEN 458 Process Engr for Food, Biofuels/products 3	ABEN 450 Bioprocess Engineering 3	ABEN 452 Bioenvironmental Systems Design 3
ABEN Electives	ABEN 464 Resource Conservation & Irrigation 4	ABEN 452 Bioenvironmental Systems Design 3	ABEN 458 Process Engr for Food, Biofuels/prod. 3
Ele	ABEN 473 Agricultural Power 3	ABEN 456 Biobased Energy 3	ABEN 464 Resource Conservation & Irrigation 4
Z	ABEN 478 Machinery Analysis & Design 3	ABEN 458 Process Engr for Food, Biofuels/products 3	ABEN 484 Drainage & Wetland Engineering 3
ABI	ABEN 479 Fluid Power Systems Design 3		
	ASM/SOIL/NRM 264 Natural Resource Mgmt Syst. 3	ASM/SOIL/NRM 264 Natural Resource Mgmt Syst. 3	ASM/SOIL/NRM 264 Natural Resource Mgmt Syst. 3
	ANSC 220 Livestock Production 3	BIOL 111/L Concepts of Biology/Lab 3/1	BIOL 111/L Concepts of Biology/Lab 3/1
	ENT 210 Insects, Humans & the Environment 3	BIOL 124/L Environmental Science/Lab 3/1	BIOL 124/L Environmental Science/Lab 3/1
	NRM 322 Environmental Law & Policy 3	BIOL 150/L General Biology I/Lab 3/1	BIOL 150/L General Biology I/Lab 3/1
v	PLSC 110 World Food Crops 3	BIOL 151/L General Biology II/Lab 3/1	BIOL 151/L General Biology II/Lab 3/1
iive	PLSC 215 Weed Identification 1	CFS 210 Introduction to Food Science & Tech 2	CHEM 121L General Chemistry I Lab 3/1
<u> </u>	PLSC 225 Principles of Crop Production 3	CFS 370 Food Processing I 3	CHEM 122L General Chemistry II Lab 3/1
ы Б	PLSC 320 Principles of Forage Production 3	CFS 450 Cereal Technology 3	CHEM 240 Survey of Organic Chemistry 3
enc	PLSC 323 Principles of Weed Science 2	CHEM 121L General Chemistry I Lab 1	ENT 210 Insects, Humans & the Environ. 3
Chemical/Biological/Environmental Science Electives	PLSC 335 Seed Technology & Production 3	CHEM 122L General Chemistry II Lab 1	NRM 322 Environmental Law & Policy 3/1
Ital	SOIL 210 Intoduction to Soil Science 3	CHEM 240 Survey of Organic Chemistry 3	MICR 202/L Introduction Microbiology/Lab 3/1
neu	SOIL 217 Introduction to Meterology & Climatology 3	MICR 202/L Introduction Microbiology/Lab 3/1	MICR 350/L General Microbiology/Lab 3/1
onr	SOIL 410 Soils and Land Use 3	MICR 350/L General Microbiology/Lab 3/1	PLSC 110 World Food Crops 3
٧	SOIL 480 Soils and Pollution 3	NRM 322 Environmental Law & Policy 3	PLSC 215 Weed Indentification 1
Ē		PLSC 110 World Food Crops 3	PLSC 225 Principles of Crop Production 3
Jica		PLSC 215 Weed Identification 1	PLSC 315 Genetics 3
gole		PLSC 225 Principles of Crop Production 3	PLSC 320 Principles of Forage Production 3
Bio		PLSC 315 Genetics 3	PLSC 323 Principles of Weed Science 3
cal/		RNG 225 Natural Resource & Agro-Ecosystems 3	PLSC 335 Seed Technology & Production 2
im.		SOIL 210 Intoduction to Soil Science 3	RNG 225 Nat. Resource & Agro-Ecosystems 3
Š		SOIL 410 Soils and Land Use 3	SOIL 210 Intoduction to Soil Science 3
		SOIL 480 Soils and Pollution 3	SOIL 217 Intro to Meterology & Climatology 3  SOIL 410 Soils and Land Use 3
			SOIL 410 Soils and Pollution 3
			GOIL 100 GOING WINE I GHIGHEN
	ABEN 348 - Ag Tech Expo (1 add'l cr.) may be used as a T	e additional courses from ABEN, Engineering, Chem/Bio/Enviro, or Cechnical Elective. ABEN 496 - Field Exp./Internship, 1 cr., may be us	ed as an ABEN Elective or as a Technical Elective.
		redits of ABEN 496 FE/Internship may be counted towards degree re	<u> </u>
	ASM 323 Post Harvest Technology 3	ASM 323 Post Harvest Technology 3	CE 204 Surveying 4
	ASM 373/4 Tractors & Power Units/Lab 3/1	CE 310 Fluid Mechanics Lab 1	CE 310 Fluid Mechanics Lab 1
	ASM 378 Machinery Principles & Mgmt 3	CE 343 Structural Engr. & Analysis 4	CE 343 Structural Engr. & Analysis 4
	ASM 429 Hydraulic Power Principles 3	CE 404 Reinforced Concrete 3	CE 370/1 Intro to Environmental Engr./Lab 3/1
	CE 310 Fluid Mechanics Lab 1	CE 472 Solid Waste Management 3	CE         404         Reinforced Concrete         3           CE         408         Water Resources & Supply         3
	CE 343 Structural Engr. & Analysis 4  ECE 275 Digital Design 4	IME 330     Manufacturing Processes     3       IME 430     Process Engineering     3	
	ECE 275 Digital Design 4  ECE 303 Electrical Engineering II 3	IME 456 Program & Project Management 3	CE         410         Water & Wastewater Engr.         3           CE         421         Open Channel Flow         3
	ECE 376 Embedded Systems 4	IME 461 Quality Assurance & Control 3-4	CE 451 Advanced Surveying 2
	IME 330 Manufacturing Processes 3	ME 331 Materials Science & Engineering 4	CE 472 Solid Waste Management 3
	IME 335 Welding Technology 3	ME 353 Thermodynamics II 3	CE 473 Air Pollution 3
	IME 380 CAD/CAM for Manufacturing 3	ME 454 Heat and Mass Transfer 3	CE 477 Applied Hydrology 3
g	IME 430 Process Engineering 3	ME 473 Engineering with Polymeric Materials 3	CE 478 Water Quality Mgmt 3
Technical Electives	IME 431 Production Engineering 3	ME 474 Mechanics of Composite Materials 3	CE 479 Adv. Water & Wastewater Engr. 3
<u>  ec</u>	IME 450 Systems Engineering & Mgmt 3	ME 475 Automatic Controls 3	CE 483 Contracts and Specifications 3
a E	IME 455 Mgmt of People Systems 2	STAT 461 Applied Rgression Models 3	GEOG 105 Fundamentals of GIS 3
nic	IME 455 Might of People Systems 2  IME 456 Program & Project Management 3	STAT 462 Intro to Experiemental Design 3	GEOG 455 Intro. Geographic Info Systems 4
ech	IME 461 Quality Assurance & Control 3-4		GEOG 456 Adv. Geographic Info Systems 3
ľ	ME 331 Materials Science & Engineering 4		IME 456 Program & Project Management 3
	ME 341 Mechanics of Machinery 3		ME 475 Automatic Controls 3
	ME 353 Thermodynamics II 3		RNG 326 Modeling of Range & Agro-Eco 3
	ME 421 Theory of Vibrations 3		STAT 461 Applied Rgression Models 3
	ME 423 Intermediate Mechanics of Materials 3		STAT 461 Applied Ryression Models 3 STAT 462 Intro to Experiemental Design 3
			5 TAT 402 THE OLD EXPENSION DESIGN 5
	ME 442 Machine Design I 3  ME 454 Heat and Mass Transfer 3		
	ME 454 Heat and wass Transfer 3  ME 471 Experimental Stress Analysis 3		
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	0 0		
	ME 474 Mechanics of Composite Materials 3  ME 475 Automatic Controls 3		
	ME 487 Internal Combustion Engines 3 STAT 461 Applied Regression Models 3		
	STAT 462 Intro to Experiemental Design		
	STAT 462 Intro to Experiemental Design 3		

Notes

Projected ABEN Course Offerings								
Semester	Required		Elective		Graduate			
Fall	110-3	486-2	358-3	473-3	658-3	679-3		
ODD	255-3		458-3	479-3	673-3	765-3		
Years					790-1			
Spring	263-3	482-3	45	56-3	644-3	682-3		
EVEN	377-3	487-2	444-3		656-3	758-3		
Years		391-1	478-3		678-3			
Fall	110-3	486-2	358-3	473-3	652-3	684-3		
EVEN	255-3		452-3	479-3	673-3	747-3		
Years			484-3		679-3	790-1		
Spring	263-3	482-3	444-3	464-4	644-3	682-3		
ODD	377-3	487-2	478-3		664-4	750-3		
Years		391-1			678-3	758-3		

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