

# AGRICULTURAL SYSTEMS TECHNOLOGY

The Department of Agricultural and Biosystems Engineering offers a bachelor of science degree in Agricultural Systems Technology (AST). Students majoring in AST choose between two options: Agricultural and Biosystems Management or Machine Systems. The department also offers a minor in Agricultural Systems Technology.

Successful AST graduates gain knowledge, skills, and abilities in solving technical problems, understanding the design process, excelling in authentic leadership, being aware of safety issues, having a quality orientation, effectively managing projects, and having a systems-thinking perspective. This translates to a holistic approach where AST graduates apply science, technology and engineering principles to manage complex agricultural and other production systems, including how the constituent sub-systems are interrelated and the broader impact of these systems.

Graduates find careers within a variety of agricultural industries, businesses, and organizations in the fields of agricultural machinery; off-road equipment; food, feed and grain processing; water quality; biorenewable resources; precision agriculture; or livestock production systems.

Common job duties of AST Agricultural and Biosystems Management graduates include:

- technical support
- operations management
- production supervision
- grain elevator management

Common job duties of AST Machine Systems graduates include:

- precision agriculture support
- testing or sales management
- technical support
- maintenance supervision

## Student Learning Outcomes

Upon graduation, all AST students should be able to:

1. Apply knowledge of mathematics, science, and applied engineering to identify and solve applied science and technology problems
2. Develop and conduct experiments, and analyze and interpret resulting data
3. Evaluate and adapt systems, components, processes to meet specified needs
4. Function effectively on multi-disciplinary teams

5. Communicate effectively, ethically, and professionally in written, oral, and other formats to technical and non-technical audiences
6. Understand the potential impacts and limitations of solutions in global and societal contexts
7. Recognize the need for, and demonstrate an ability to, engage in life-long learning
8. Effectively apply modern scientific and technical tools necessary for professional practice to address contemporary issues in applied engineering and technology

Upon graduation, AST students in the agricultural and biosystems management (ABM) option should be able to:

1. Design, implement, and evaluate best practices for the management of global and natural resource systems
2. Integrate and utilize agricultural and biosystems applied engineering and technology to address contemporary issues in bio-based industries
3. Evaluate the factors impacting the complex systems that sustain water, air, soils, food, and feed

Upon graduation, AST students in the machine systems (MS) option should be able to:

1. Specify, manage, and test machine systems in the context of a complete agricultural, biological production or processing system
2. Use and apply the technology of machine systems including power and information flows, function and interaction with biological materials
3. Perform an energy and cost analyses of complete machine systems to ensure the success and sustainability of an enterprise

For more information about the AST degree: <http://www.abe.iastate.edu/undergraduate-students/agricultural-systems-technology> (<http://www.abe.iastate.edu/undergraduate-students/agricultural-systems-technology/>)

### Total Degree Requirement: 120 cr.

Only 65 cr. from a two-year institution may apply which may include up to 16 technical cr.; 9 P-NP cr. of free electives; 2.00 minimum GPA.

### Communications Proficiency:

6 cr. of English composition with a C or better and 3 cr. of speech fundamentals with a C or better.

### Communication/Library: 13 cr.

ENGL 150	Critical Thinking and Communication	3
ENGL 250	Written, Oral, Visual, and Electronic Composition	3
One of the following:		3
ENGL 302	Business Communication	
ENGL 309	Proposal and Report Writing	

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ENGL 314	Technical Communication	
AGEDS 327	Survey of Agriculture and Life Sciences Communication	
One of the following:		3
SP CM 212	Fundamentals of Public Speaking	
COMST 214	Professional Communication	
AGEDS 311	Presentation and Sales Strategies for Agricultural Audiences	
LIB 160	Introduction to College Level Research	1
<b>Total Credits</b>		<b>13</b>

**Mathematical, Physical, and Life Sciences: 25 cr.**

MATH 145	Applied Trigonometry	3
MATH 151	Calculus for Business and Social Sciences	3
STAT 104	Introduction to Statistics	3
CHEM 163	College Chemistry	4
PHYS 131	General Physics I	4
PHYS 131L	General Physics I Laboratory	1
CHEM 163L	Laboratory in College Chemistry	1
One of the following:		3
BIOL 101	Introductory Biology	
BIOL 211	Principles of Biology I	
BIOL 212	Principles of Biology II	
BIOL 251	Biological Processes in the Environment	
Life Sciences Elective from approved College of Agriculture and Life Sciences list		3
<b>Total Credits</b>		<b>25</b>

**Business, Humanities, Ethics, and Social Sciences: 18 cr.**

ACCT 284	Financial Accounting	3
ECON 101	Principles of Microeconomics	3
TSM 370	Occupational Safety (Ethics)	3
Humanities course from College of Agriculture and Life Sciences list		3
International Perspectives course from University list		3
U.S. Diversity course from University list		3
<b>Total Credits</b>		<b>18</b>

**Technical Core: 30 cr.**

TSM 110	Introduction to Technology	1
TSM 111	Experiencing Technology	1
TSM 115	Solving Technology Problems	3
TSM 116	Introduction to Design in Technology	3
TSM 201	Preparing for Workplace Seminar	1
TSM 210	Fundamentals of Technology	3
TSM 214	Managing Technology Projects	1

TSM 270	Principles of Injury Prevention and Safety	3
TSM 310	Total Quality Improvement	3
TSM 363	Electrical Power and Control Systems for Agriculture and Industry	4
TSM 397	Internship in Technology	R
TSM 399	Work Experience in Technology	2
TSM 415	Applied Project Management in Technology	2
TSM 416	Technology Capstone	3
<b>Total Credits</b>		<b>30</b>

No more than 4 cr. of TSM 399 may count toward graduation.

**Agricultural and Biosystems Management Option: 34 cr.**

TSM 322	Preservation of Grain Quality	3
TSM 322L	Preservation of Grain Quality Laboratory	1
TSM 324	Soil and Water Conservation Management	3
TSM 325	Biorenewable Systems	3
TSM 327	Animal Production Systems	3
TSM 330	Agricultural Machinery and Power Management	3
TSM 433	Precision Agriculture	3
TSM 455	Feed Processing and Technology	3
ECON 230	Farm Business Management	3
9 credits of free electives		9
<b>Total Credits</b>		<b>34</b>

**Machine Systems option: 34 cr.**

TSM 216	Advanced Technical Graphics, Interpretation, and CAD	2
A B E 271, A B E 272, or A B E 273		1
TSM 240	Introduction to Advanced Manufacturing and Metals Processing	3
TSM 330	Agricultural Machinery and Power Management	3
TSM 335	Tractor Power	4
TSM 337	Fluid Power Systems Technology	3
TSM 433	Precision Agriculture	3
TSM 443	Statics and Strength of Materials for Technology	3
TSM 465	Automation Systems	3
9 credits of free electives		9
<b>Total Credits</b>		<b>34</b>

Agricultural Systems Technology, B.S. - Machine Systems

**First Year**

Fall	Credits	Spring	Credits
TSM 110	1	TSM 111	1
TSM 116	3	TSM 115	3

ENGL 150	3 MATH 151	3	
LIB 160	1 PHYS 131	4	
MATH 145	3 PHYS 131L	1	
CHEM 163	4 US	3	
	Diversity - see list <sup>1</sup>		
CHEM 163L	1		
<hr/>		<b>16</b>	<b>15</b>

**Second Year**

<b>Fall</b>	<b>Credits</b>	<b>Spring</b>	<b>Credits</b>		
TSM 201		1 TSM 216	2		
TSM 210		3 A B E 271, 272, or 273	1		
TSM 214		1 TSM 240	3		
TSM 270		3 STAT 104	3		
ACCT 284		3 BIOL 101 or 211	3		
ENGL 250		3 ECON 101	3		
<hr/>		<b>14</b>	<b>15</b>		

**Third Year**

<b>Fall</b>	<b>Credits</b>	<b>Spring</b>	<b>Credits</b>	<b>Summer</b>	<b>Credits</b>
TSM 335		4 TSM 310		3 TSM 397	0
TSM 363		4 TSM 330	3		
TSM 433		3 TSM 337	3		
ENGL 302, 309, 314, or AGEDS 327		3 Humanities - See list <sup>2</sup>	3		
		Life Science - See list <sup>3</sup>	3		
<hr/>		<b>14</b>	<b>15</b>	<b>0</b>	

**Fourth Year**

<b>Fall</b>	<b>Credits</b>	<b>Spring</b>	<b>Credits</b>
TSM 399		2 TSM 370	3
TSM 415		2 TSM 416	3
Elective		6 TSM 443	3
International Perspectives - see list <sup>1</sup>		3 TSM 465	3

SP CM 212, COMST 214, or AGEDS 311	3 Elective	3
<hr/>		<b>16</b>
<hr/>		<b>15</b>

<sup>1</sup> U.S. Diversity and International Perspectives (<https://www.registrar.iastate.edu/students/div-ip-guide/>)

<sup>2</sup> Humanities Course List (<https://www.cals.iastate.edu/student-services/humanities/>)

<sup>3</sup> Life Sciences Course List (<https://www.cals.iastate.edu/student-services/life-science/>)

<sup>4</sup> Ethics Course List (<https://www.cals.iastate.edu/student-services/ethics/>)

Agricultural Systems Technology, B.S. - Agricultural & Biosystems Management

**First Year**

<b>Fall</b>	<b>Credits</b>	<b>Spring</b>	<b>Credits</b>
TSM 110		1 TSM 111	1
TSM 116		3 TSM 115	3
ENGL 150		3 MATH 151	3
LIB 160		1 PHYS 131	4
MATH 145		3 PHYS 131L	1
CHEM 163		4 ECON 101	3
CHEM 163L		1	
<hr/>		<b>16</b>	<b>15</b>

**Second Year**

<b>Fall</b>	<b>Credits</b>	<b>Spring</b>	<b>Credits</b>
TSM 201		1 TSM 322	3
TSM 210		3 TSM 322L	1
TSM 214		1 BIOL 101 or 211	3
TSM 270		3 ECON 230	3
ACCT 284		3 STAT 104	3
ENGL 250		3 SP CM 212, COMST 214, or AGEDS 311	3
<hr/>		<b>14</b>	<b>16</b>

**Third Year**

<b>Fall</b>	<b>Credits</b>	<b>Spring</b>	<b>Credits</b>	<b>Summer</b>	<b>Credits</b>
TSM 325		3 TSM 310		3 TSM 397	0
TSM 327		3 TSM 324	3		

TSM 363	4 TSM 370	3
ENGL 302, 309, 314, or AGEDS 327	3 Life Science - see list <sup>3</sup>	3
US Diversity - see list <sup>1</sup>	3 Elective	3
<b>16</b>		<b>15</b>
		<b>0</b>

**Fourth Year**

Fall	Credits	Spring	Credits
TSM 415	2 TSM 416	3	
TSM 399	2 TSM 330	3	
TSM 433	3 International Perspectives - see list <sup>1</sup>	3	
TSM 455	3 Elective	3	
Humanities - see list <sup>2</sup>	3		
Elective	3		
<b>16</b>		<b>12</b>	

<sup>1</sup> U.S. Diversity and International Perspectives (<https://www.registrar.iastate.edu/students/div-ip-guide/>)

<sup>2</sup> Humanities Course List (<https://www.cals.iastate.edu/student-services/humanities/>)

<sup>3</sup> Life Science Course List (<https://www.cals.iastate.edu/student-services/life-science/>)

<sup>4</sup> Ethics Course List (<https://www.cals.iastate.edu/student-services/ethics/>)

**Minor in agricultural systems technology**

The Department of Agricultural and Biosystems Engineering offers a minor in agricultural systems technology which may be earned by completing a minimum of 15 credits of technology systems management courses, which includes:

TSM 115	Solving Technology Problems	3
TSM 210	Fundamentals of Technology	3
9 credits from:		9
TSM 310	Total Quality Improvement	
TSM 322	Preservation of Grain Quality	
TSM 322L	Preservation of Grain Quality Laboratory	
TSM 324	Soil and Water Conservation Management	
TSM 325	Biorenewable Systems	
TSM 327	Animal Production Systems	
TSM 330	Agricultural Machinery and Power Management	

TSM 335	Tractor Power
TSM 337	Fluid Power Systems Technology
TSM 363	Electrical Power and Control Systems for Agriculture and Industry
TSM 393E	Topics in Technology: Chemical Application Systems
TSM 393F	Topics in Technology: Agricultural Safety and Health
TSM 433	Precision Agriculture
TSM 455	Feed Processing and Technology
TSM 457	Feed Safety, Ingredient Quality and Analytics

• At least six (6) credits of 300-level or higher TSM classes (from the classes listed above)

• At least nine (9) credits that are not used to meet any other department, college, or university requirement.