AGRICULTURAL ENGINEERING CURRICULUM
LAND AND WATER RESOURCES ENGINEERING OPTION*
(2016-2017 Catalog)

A total of 128 credits required for graduation

I. **Communications** (10 credits)
   3 cr. Engl 150 (FSSS) Critical Thinking and Communication
   3 cr. Engl 250 (FSSS) Written, Oral, Visual, and Electronic Composition
   3 cr. Communications Select one of the courses below:
   Engl 309 (FS) Report and Proposal Writing
   Engl 314 (FSSS) Technical Communication
   Sp Cm 212 (FSSS) Fundamentals of Public Speaking
   Ag Eds 311 (FS) Presentation and Sales Strategies for Ag Audiences
   MKT 343 Personal Sales
   1 cr. Lib 160 (FSSS) Library Instruction

II. **Mathematical Sciences** (14 credits)
   4 cr. Math 165 (FSSS) Calculus I
   4 cr. Math 166 (FSSS) Calculus II
   3 cr. Math 266 (FSSS) Elementary Differential Equations
   3 cr. Stat 305 (FSSS) Engineering Statistics

III. **Physical Sciences** (18 credits)
   4 cr. Chem 167 (FS) General Chemistry for Engineering Students
   1 cr. Chem 167L (FS) Laboratory in General Chemistry for Engineering
   5 cr. Phys 221 (FSSS) Introduction to Classical Physics I
   5 cr. Phys 222 (FSSS) Introduction to Classical Physics II
   3 cr. Geol 201 (F) Geology for Engineers and Environmental Scientists.

IV. **Agricultural and Biological Sciences and Applications** (12 credits)
   3 cr. Agron 154 (FS) Fundamentals of Soil Science
   3 cr. Biology Select one of the courses below:
   Biol 251 (S) Biological Processes in the Environment
   Biol 211 (FS) Principles of Biology I
   2 cr. Micro 201 (FS) Introduction to Microbiology
   1 cr. Micro 201L (FS) Introduction to Microbiology Laboratory
   3 cr. GIS Select one of the courses below:
   CRP 251X (F) Fundamentals of Geographic Information Systems
   CRP 451 (FSSS) Introduction to Geographic Information System
   ENSCI 370X Natural Resources Photogrammetry and Geographic Information Systems
   ENSCI 461I(SS) Introduction to GIS
   GEOL 452 (F) GIS for Geoscientists
   NREM 345 (F) Natural Resource Photogrammetry and Geographic Information Systems
   NREM 446 (S) Integrating GPS and GIS for Natural Resource Management

V. **Social Sciences and Humanities** (12 credits)
   3 cr. U. S. Diversity Course (Select from University-approved list).
   3 cr. International Perspectives Course (Select from University-approved list).
   6 cr. Social Science and Humanities Electives (Select from CALS-approved list).
VI. Engineering (3 credits)
R cr. Engr 101 (FS) Engineering Orientation
3 cr. A B E 160 (FSSS) Engineering Problems with Computer Applications Lab

VII. Agricultural Engineering (37 credits)
1 cr. A B E 110 (S) Experiencing Agricultural and Biological Engineering
3 cr. A B E 170 (FS) Engineering Graphics and Introductory Design
1 cr. A B E 201 (FS) Entrepreneurship and Internship Seminar
3 cr. A B E 216 (F) Fundamentals of Agricultural and Biological Engineering
2 cr. A B E 218 (S) Project Management & Design in Ag & Biological Systems Engr
1 cr. Computer Graphics Select one of the courses below:
   A B E 271 (FS) Engineering Applications of Parametric Solid Modeling
   A B E 272 (FS) Parametric Solid Models, Drawings, and Assemblies Using Pro/ENG
   A B E 273 (S) CAD for Process Facilities and Land Use Planning (Preferred)
3 cr. A B E 316 (FS) Computer Applications and Systems Modeling
4 cr. A B E 363 (FS) Agri-Industrial Applications of Electric Power and Electronics
3 cr. A B E 404 (F) Instrumentation for Agricultural and Biological Engineering
3 cr. A B E 431 (F) Design and Evaluation of Soil and Water Conservation Systems
3 cr. Water Quality Select one of the courses below:
   A B E 436 (Sp-even) Design & Evaluation of Soil and Water Monitoring Systems
   A B E 432 (Sp-odd) Non-Point Pollution and Control
   A B E 537 (Fl-odd) Total Maximum Daily Load (TMDL) Development and Implementation
3 cr. Structures Select one of the courses below:
   A B E 472 (Sp-even) Design of Environmental Systems for Agricultural Structures
   A B E 478 (Sp-odd) Design of Agricultural Structures
3 cr. ABE Breadth Select one of the courses below:
   A B E 340 (F) Functional Analysis and Design of Agricultural Field Machinery
   A B E 380 (S) Engineering Analysis of Biological Systems
   A B E 469 (S) Grain Processing and Handling
   A B E 424 (S) Air Pollution (Modules A, B, and E)
2 cr. A B E 415 (FS) Agricultural Engineering Design I
2 cr. A B E 416 (FS) Agricultural Engineering Design II

VIII. Mechanical Engineering (3 credits)
3 cr. M E 231 (FS) Thermodynamics

IX. Engineering Mechanics (10 credits)
3 cr. E M 274 (FSSS) Statics of Engineering
3 cr. E M 324 (FSSS) Mechanics of Materials
1 cr. E M 327 (FSSS) Mechanics of Materials Laboratory
3 cr. E M 378 (FSSS) Mechanics of Fluids

X. Civil Engineering (9 credits)
3 cr. C E 372 (FS) Engineering Hydrology and Hydraulics
3 cr. C E 326 (FS) Principles of Environmental Engineering
3 cr. Subsurface Systems Select one of the courses below
   C E 360 (FS) Geotechnical Engineering
   C E 473 (F) Groundwater Hydrology

*Please check the current catalog and Schedule of Classes for most recent offerings

*Increasingly, employers in land and water resources engineering consider the Master’s degree to be the entry “working degree”. Students are therefore strongly encouraged to consider a concurrent BS/MS.
Also, there are many excellent and career-relevant courses at Iowa State that are not required in this curriculum, but would be good choices for a student who has the room and inclination to take them. These include (but are not limited to):

- ABE 388 (F) 3 cr. Sustainable Engineering and International Development
- CE 111 (FS) 3 cr. Fundamentals of Surveying I
- EnSci 404 (S) 3 cr. Global Change
- EnSci 407 (S) 4 cr. Watershed Management
- EnSci 411 (F) 4 cr. Hydrogeology (could be substituted for CE subsurface systems course also)
- EnSci 418 (Alt F13) 3 cr. Stream Ecology
- EnSci 463 (S) 4 cr. Soil Formation and Landscape Relationships