

College of Agriculture and Life Sciences

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www.ag.iastate.edu

Departments of the College

Agricultural Education and Studies
 Agricultural and Biosystems Engineering
 Agronomy
 Animal Science
 Biochemistry, Biophysics, and
 Molecular Biology
 Ecology, Evolution, and Organismal Biology
 Economics
 Entomology
 Food Science and Human Nutrition
 Genetics, Development and Cell Biology
 Horticulture
 Natural Resource Ecology and Management
 Plant Pathology
 Sociology

Students enrolled in the College of Agriculture and Life Sciences are provided a broad-based education that includes coursework in communications; biological, physical, and social sciences; humanities; and technical subject matter.

Upon graduation students find diverse career opportunities because of the well balanced education they have received as undergraduates. Opportunities for graduates include production agriculture, business and industry, public agencies, education, biological and environmental sciences, value-added processing, natural resource management, rural development, animal and human health professions, and graduate studies.

High School Preparation

Requirements for students entering from high school or transferring with less than 24 college credits into the College of Agriculture and Life Sciences include four years of English; three years of mathematics which must include one year each of algebra, geometry, and advanced algebra; three years of science which must include one year each of biology and chemistry, or biology and physics, or chemistry and physics; and two years of social studies. No foreign language is required for admission to the College of Agriculture and Life Sciences.

Majors in the College of Agriculture and Life Sciences

A student has many majors from which to choose. Each major is unique although many courses are common. This is helpful to students in that they may transfer from one major to another before the second year with little loss of credits. Options and areas of specialization further define the majors and required coursework within some majors. In all cases, majors are designed to help students succeed

in their chosen professions. Majors in agriculture and life sciences are:

Primary Majors

Agricultural Biochemistry
 Agricultural Business
 Agricultural and Life Sciences Education
 Agricultural Studies
 Agricultural Systems Technology
 Agronomy
 Animal Ecology
 Animal Science
 Biochemistry
 Biology
 Culinary Science
 Dairy Science
 Dietetics
 Diet and Exercise
 Environmental Science
 Food Science
 Forestry
 Genetics
 Global Resource Systems
 Horticulture
 Industrial Technology
 Insect Science
 Microbiology
 Nutritional Science
 Public Service and Administration in Agriculture

Secondary Majors

Environmental Studies
 International Agriculture
 Seed Science

A secondary major must be taken in conjunction with a primary major.

Minors

Agricultural Biochemistry
 Agricultural Education and Studies
 Agricultural Systems Technology
 Agronomy
 Animal Ecology
 Animal Science
 Biology
 Emerging Global Diseases*
 Entrepreneurial Studies*
 Environmental Science
 Environmental Studies
 Food Safety*
 Food Science
 Forestry
 Genetics
 Horticulture
 Industrial Technology
 Insect Science
 International Agriculture
 Meat Science
 Microbiology
 Nutrition

*The College of Agriculture and Life Sciences participates in these interdepartmental minors.

Certificate

Occupational Safety

See statement on minors in the *Colleges and Curricula* section of this catalog.

Special Programs

Agriculture Exploration

Agriculture Exploration is a starting place for students who wish to pursue careers in the life sciences, food science, natural resources, production agriculture, business, or communications but who are unsure of which majors to choose. Students entering this program will be advised in the Student Services Office until they select their majors.

Preveterinary Medicine

Students in the College of Agriculture and Life Sciences may complete the requirements for admission to the College of Veterinary Medicine by enrolling in any major within the college. Because a solid foundation in the sciences is basic to the program in veterinary medicine, those majors that emphasize the sciences are usually more compatible with preveterinary medicine (see College of Veterinary Medicine section of this catalog for specific admissions requirements).

Students who are undecided about choice of major may enroll in general preveterinary studies (Gen PV). These students will also enroll in an orientation course, which describes the various college majors. A Gen PV student has up to 1.5 semesters to select a major.

Preveterinary medicine students also have an opportunity, with careful planning, to complete the requirements for a bachelor of science degree in an individual curriculum within the College of Agriculture and Life Sciences after admission to the College of Veterinary Medicine. This may be done by completing the prescribed course of study established by an individual major. Students also may meet degree requirements of an individual major through the College of Agriculture and Life Sciences Honors Program. Further details are available from an academic adviser or from members of the College of Agriculture and Life Sciences Honors Committee.

Honors Program

The College of Agriculture and Life Sciences Honors Program provides an opportunity for students of high ability to maximize their educational experience by individualizing their program of study. (See statement on Honors Program in the *Colleges and Curricula* section of this catalog). For more information, contact the chair of the College of Agriculture and Life Sciences Honors Committee, or a department Honors contact person.

Off-Campus Programs

Coursework leading to a master of science degree in agricultural education, master of agriculture degree in professional agriculture and a master of science degree in agronomy are offered to students who choose to study off-campus; see *Extended and Continuing Education* for further information.

Study Abroad and International Travel Opportunities

Agriculture and life sciences are part of a highly interconnected global system; decisions made in one sector have profound impacts worldwide. It is important for students to develop an understanding and appreciation for the global system and the role that U.S. agriculture plays in providing a safe and predictable food supply for a growing world population. The College of Agriculture and Life Sciences provides study abroad and international internship opportunities in more than 25 countries around the world. For additional information, contact the Office of Global Agriculture Programs in the College of Agriculture and Life Sciences.

Internships and Cooperative Education Programs

Practical work experience can provide a unique learning opportunity that complements academic coursework. This experience is provided through internships or cooperative education programs. For additional information, contact a departmental adviser or internship coordinator.

College of Agriculture and Life Sciences Core Curriculum and Electives

All curricula in the College of Agriculture and Life Sciences lead to a bachelor of science degree. Each major has specific degree requirements for graduation based on department and college student learning outcomes. College of Agriculture and Life Sciences core curriculum requirements for the four areas listed below are established to provide the foundation for successful accomplishment of both departmental and college level learning outcomes.

Students pursuing a primary major in another college and taking a second major in the College of Agriculture and Life Sciences must fulfill the core curriculum requirements of the College of Agriculture and Life Sciences, and all the requirements of the second major. The College of Agriculture and Life Sciences core curriculum follows.

Minimum

Credits Subject Area

- | | |
|-----|---|
| 9.5 | Interpersonal and public communication skills |
| 6 | English composition with grades of C or better |
| 3 | Speech fundamentals with grades of C or better; 0.5 credit in Lib 160 |
| 17 | Mathematical, physical, and life sciences |
| | 3 credits of mathematics; 3 credits of statistics; 5 credits of physical science (e.g., chemistry, geological and atmospheric sciences, physics); 6 credits of life sciences including Biology 101 or 211, and 3 credits of life sciences from a college-approved list: (http://www.ag.iastate.edu/student/student_services.php) |

- | | |
|----|--|
| 12 | Humanities, social sciences |
| | 3 credits of humanities; 3 credits of social sciences; 3 credits of U.S. diversity from an approved list; 3 credits of international perspectives from an approved list. |
| 3 | Ethics |
| | Requirement met in one of two ways designated by the student's major program of study: 1) 3 credits from a college-approved list; or 2) a course in foundational elements of ethical/critical thinking offered by the Department of Philosophy specifically to meet this requirement for College of Agriculture and Life Sciences majors, and a course designated by the student's major program designated to coordinate with this foundational course. Refer to the College of Agriculture and Life Sciences web site for details of the ethics requirement. |

All students graduating with majors within the College of Agriculture and Life Sciences are expected to be proficient in the following college-level outcomes:

Professional, Interpersonal and Cross-cultural Communications

- Speak and write clearly and persuasively.
- Prepare effective visual, oral, written and electronic presentations.
- Effectively read, listen, observe and reflect.

Problem-Solving/Critical Thinking

- Apply a holistic approach to solving complex issue laden problems.
- Apply a rational and objective process to:
 - Distinguish verifiable facts from value claims,
 - Determine the accuracy of statements,
 - Identify assumptions and detect bias,
 - Distinguish relevant from irrelevant information,
 - Prioritize needs.
- Summarize, analyze, and interpret simple research data and policy issues.

Leadership

- Organize, facilitate, and participate effectively in a group, team, or organization.
- Define a problem or opportunity, implement an action planning process, work towards a goal and justify actions taken.

Entrepreneurship

- Demonstrate innovativeness and creativity regardless of context.
- Identify and pursue opportunities that produce value.
- Be persistent in shepherding necessary resources and managing associated risk to facilitate change.

Life-long learning

- Articulate how continued learning after graduation will enrich their lives.
- Identify and participate in new areas for learning beyond the classroom and after graduation.

Ethics

- Define and assess their ethical perspective, moral responsibility, and values.
- Identify and critically evaluate contemporary ethical and moral issues in professional and private life.

Environmental Awareness

- Explain the physical and biological interactions within ecosystems
- Explain how human activities impact the environment and how societies are affected by environmental change.

International/Multi-Cultural Awareness

- U.S. Diversity – Students should achieve two of the following outcomes. They should be able to:

Articulate how their personal life experiences and choices fit within the context of the larger mosaic of U.S. society, indicating how they have confronted and critically analyzed their perceptions and assumptions about diversity-related issues,

Analyze and evaluate the contributions of various underrepresented social groups in shaping the history and culture of the U.S.,

Analyze individual and institutional forms of discrimination based on factors such as race, ethnicity, gender, religion, sexual orientation, class, etc.,

Analyze the perspectives of groups and individuals affected by discrimination,

Analyze how cultural diversity and cooperation among social groups affect U.S. society.

- International Perspectives – Students should achieve two of the following outcomes. They should be able to:

Analyze the accuracy and relevancy of their own worldviews and anticipate how people from other nations may perceive that worldview,

Describe and analyze how cultures and societies around the world are formed, are sustained, and evolve,

Analyze and evaluate the influence of global issues in their own lives,

Describe the values and perspectives of cultures other than their own and discuss how they influence individuals' perceptions of global issues and/or events,

Communicate competently in a second language.

In addition to the College level learning outcomes, each department within the college has additional discipline-specific outcomes that apply to graduates of that department.

Electives

Students use electives to broaden their education or to strengthen an area of specialization. Electives may be used to meet the requirements for a double major (see statement on double majors in this catalog). Those who wish to change their major, or who decide to graduate with a double major, must be enrolled for the last two semesters in the curriculum in which they expect to graduate. Students in ROTC may apply ROTC credits toward elective requirements.

Advising

Each student in the College of Agriculture and Life Sciences works closely with an academic adviser who is associated with the major in which the student is enrolled.

All entering students are strongly encouraged to participate in the summer orientation program in which they will have the opportunity to meet and work with academic advisers in planning their first semester schedule of classes.

The advisers also assist students in making personal adjustments to university life, offer suggestions on academic and co-curricular choices, and provide information on career choices. Advisers make a special effort to adjust course schedules in accordance with students' interests and capabilities.

A student may wish to prepare for admission to a professional program such as law, medicine, or veterinary medicine while pursuing a bachelor of science degree in the College of Agriculture and Life Sciences. This may be accomplished through several majors; however, it is recommended that the student work closely with an academic adviser.

Each department prepares a guide to help students chart their long-term programs and to specify the exact requirements for graduation. Visit the college web site www.ag.iastate.edu.

Graduate Study

Graduate study in agriculture is conducted through the Graduate College. Details are found in the Graduate College section of this catalog.

Various departments in the College of Agriculture and Life Sciences also participate in the following graduate-level interdepartmental offerings:

Biorenewable Resources and Technology
Ecology and Evolutionary Biology
Environmental Science
Genetics
Immunobiology
Microbiology
Molecular, Cellular, and Developmental Biology
Neuroscience
Nutritional Sciences
Plant Biology
Professional Agriculture (off-campus)
Seed Technology and Business
Sustainable Agriculture
Technology and Social Change (interdepartmental minor)
Toxicology

For details, consult the Graduate College section of this catalog.

Curriculum in Agricultural Biochemistry

Administered by the Department of Biochemistry, Biophysics and Molecular Biology.

- Cr. Degree Requirements**
- 9.5 Interpersonal and public communication skills**
Engl 150, 250; Sp Cm 212; Lib 160
- 62-63 Mathematical, physical, and life sciences**
Math 165, 166, 265 or 266;
Phys 221, 222; Chem 201 (or 177, 178), 177N (or 177L), 210 or 211, 211L, 322L, 324, 325, 331, 331L, 332; Biol 211, 212, 211L or 212L, 313, 314
- 15 Humanities, ethics, and social science**
3 cr. in ethics from an approved list; 3 cr. in humanities; 3 cr. in social sciences; 3 cr. in U.S. diversity from an approved list; 3 cr. in international perspectives from an approved list
- 9 Agricultural sciences**
9 cr. from an approved list available in the department. Two courses with environmental awareness emphasis will be chosen from an approved list.
- 11-13 Agricultural biochemistry**
BBMB 101, 102, 201, 404, 405 or 501, 502; 411. Students wishing research experience in agricultural biochemistry are encouraged to enroll in BBMB 499
- 21.5-22.5 Electives**
- 128 Total credits**

Typical Program for the First Year

- Cr. Fall**
- 5 Advanced General Chemistry—Chem 201
- 1 Laboratory in General Chemistry—Chem 177N
- 4 Calculus I—Math 165
- 0.5 Library Instruction—Lib 160
- 3 Principles of Biology—Biol 211
- 1 Principles of Biology Laboratory—Biol 211L
- 1 Introduction to Biochemical Activities—BBMB 101
- Cr. Spring**
- 3 Critical Thinking and Communication—Engl 150
- 4 Calculus II—Math 166
- 3 Communications—Sp Cm 212
- 3 Principles of Biology—Biol 212
- 1 Principles of Biology Laboratory—Biol 212L
- 1 Introduction to Biochemistry—BBMB 102

Curriculum in Agricultural Business

Administered by the Department of Economics. Students majoring in Agricultural Business often choose elective coursework leading to minors in the College of Business or in the College of Agriculture and Life Sciences, or emphasizing specific areas within agricultural business such as finance, management, commodity analysis, research, agricultural sales and marketing, environmental economics, farm and ranch operations, international economics, agricultural extension, or government service.

- Cr. Degree Requirements**
- 12.5 Interpersonal and public communication skills**
Lib 160
Engl 150, 250
Engl 302 or Engl 309 or Engl 314
Sp Cm 212 or AgEdS 311
- 13 Mathematics**
Math 160, Econ 207, or
Math 165, Econ 207, or
Math 165, 166
Stat 226, 326
- 4-5 Physical Sciences**
Chem 163-163L or Phys 111
- 6 Life and Environmental Sciences**
Biol 101 or 211
NREM 120 or Biol 173 or other credits that meet the environmental intensive requirement
- 15 Social science, humanities, and ethics**
Courses in individual areas below may overlap but the total credits taken must equal 12 or more
Ethics
International Perspectives
U.S. diversity
Humanities (if the student has taken a humanities course among the ethics, international perspectives, or U.S. diversity requirements, the humanities requirement may be fulfilled by taking a course in a social science other than economics)
- 12 Business**
Acct 284, 285
Fin 301
One of the following: Mgmt 310, 370, Mkt 340, MIS 330, OSCM 320, or LSCM 360
- 6 Electives in agricultural, food, or natural resources sciences**
- 26.5 Economics**
Econ 101, 101L, 110, 235, 301, 302 or 353
Twelve credits in economics courses selected from an approved departmental list.
- 32-33 Free electives**
- 128 Total credits**

Typical Program for the First Year

Cr.	Fall
4	Microeconomics—Econ 101, 101L
0.5	Orientation in Agricultural Business—Econ 110
4	Mathematics I — Math 160 or 165
3	Elective in agricultural, food, or natural resource science.
3	Critical Thinking and Communication—Engl 150
0.5	Library Instruction — Lib 160
Cr.	Spring
3	Intro. to Agricultural Markets—Econ 235
3-4	Mathematics II—Econ 207 or Math 166
3	Macroeconomics—Econ 102
3	Environmental Biology—Biol 173
3	Agricultural, Food, or Natural Resources Science Course

Curriculum in Agricultural Education

Administered by the Department of Agricultural Education and Studies. Students majoring in Agricultural Education choose between two options: Teacher Certification or Communications.

Teacher Certification Option

Cr.	Degree Requirements
9.5	Interpersonal and public communication skills Engl 150, 250, Lib 160, AgEdS 311 (3 cr.)
18-19	Mathematical, physical, and life sciences Chem 163, 163L or 177, 177L; Stat 104; Biol 211, 211L; Biol 212, 212L; Math 104 or 150
18	Humanities, ethics, and social sciences Psych 230; C I 333 and 406; American history elective (3 cr.); from approved lists: 3 cr. in ethics; 3 cr. in international perspectives
37	Agricultural sciences and economics AgEds 488; Agron 114 and 154; An S 101 and 114; Hort 221; Econ 101, 331; NREM 120; 6 credits in agriculture and life sciences; 6 credits in courses 300-level or above to be chosen from technology systems management, animal science, agronomy, agricultural economics, forestry, or horticulture
31.5	Professional credits AgEdS 110A, 211A, 310, 401, 402, 416, 417 (14 Cr.); C I 201, 204, Sp Ed 450.
13-14	Electives

Communications Option

Cr.	Degree Requirements
9.5	Interpersonal and public communication skills— Engl 150, 250, Lib 160, AgEds 311
23-24	Mathematical, physical, and life sciences— Chem 163, 163L or 177, 177L; Biol 211, 212; BMBB 221 or Phys 106; life science elective (3 cr.); demonstration of computer proficiency; (3 cr.) Math 104 or 150; Stat 104
18	Humanities, ethics, and social sciences— Econ 101 or 102; psychology elective (3 cr.); ethics elective (3 cr.); international perspectives elective (3 cr.); U.S. diversity elective (3 cr.); humanities elective (3 cr.).
32	Agricultural sciences and economics— 10 credits in a selected area of agricultural sciences and economics including 6 credits at the 300-400 level; 6 cr. each in two additional areas of agricultural sciences and economics; agricultural sciences and economics electives (10 cr.)
32.5	Professional communications— AgEdS 110A, 211, 215, 315, 412 (6 cr.); select 21 cr. from JI MC 101, 342, 347, Engl 205, 302, 309, 310, 314, 411, 415, 416, Mgmt 310, 370, 371, Sp Cm 110, 212, 312, 323, 327, ComSt 102, 214, 310, 314, 317
12-13	Electives
128	Total credits

Typical Program for the First Year

Cr.	Fall
0.5	Orientation—AgEdS 110A
3	Critical Thinking and Communication—Engl 150
3	Probability and Matrices—Math 104 or Discrete Mathematics for Business and Social Sciences — Math 150
3	Principles of Micro Economics—Econ 101
3	Principles of Biology I—Biol 211
1	Principles of Biology Laboratory — Biol 211L
2	Survey of the Animal Industry—An S 114
2	Working with Animals—An S 101L
0.5	Library Instruction—Lib 160
Cr.	Spring
3	Statistics—Stat 104
3	Principles of Agronomy—Agron 114
3	Introduction to Instructional Technology—C I 201
3	Introduction to Agricultural Markets—Econ 235
3	Principles of Biology II—Biol 212
1	Principles of Biology Laboratory—Biol 212L

Curriculum in Agricultural Studies

Administered by the Department of Agricultural Education and Studies. Students are encouraged to develop one or more areas of concentration in agricultural sciences and economics.

Cr.	Degree Requirements
12.5	Interpersonal and public communication skills Engl 150, 250; written communications elective (3 cr.); speech elective (3 cr.); Lib 160
20	Mathematical, physical, and life sciences Chem 163, 163L or 177, 177L; Math 104 or 150; Stat 104; Biol 101 or 211; life science elective (6 cr.)
18	Humanities, ethics, and social sciences Econ 101; AgEdS 315; from approved lists: 3 cr. in ethics; 3 cr. in international perspectives; 3 cr. in U.S. diversity; humanities electives (3 cr.)
43.5	Agricultural sciences and economics AgEdS 110B, 215, 450; Agron 114, 154, 212; An S 114 and 101, electives (6 cr.); Econ 235, 330; Ent electives (2 cr.); 300-400 level agricultural sciences and economics electives (9 cr.); electives from the College of Agriculture (2cr.).
Other required courses	
3	Acct 284
31	Electives
128	Total credits

Typical Program for the First Year

Cr.	Fall
0.5	Orientation—AgEdS 110B
2	Survey of the Animal Industry—An S 114
2	Working with Animals—An S 101
3	Introduction to Probability and Matrices—Math 104 or Discrete Mathematics—Math 150
3	Critical Thinking and Communication—Engl 150
3	Social science elective
3	Introductory Biology—Biol 101
0.5	Library Instruction—Lib 160
Cr.	Spring
3	Principles of Agronomy—Agron 114
3	Principles of Microeconomics—Econ 101
3	Life science elective
3	Humanities elective
3	Statistics—Stat 104

Preveterinary Studies

Preparation for admission to veterinary medicine may be accomplished through the agricultural studies curriculum.

Curriculum in Agricultural Systems Technology

Administered by the Department of Agricultural and Biosystems Engineering. A minor in agricultural systems technology is available; the requirements appear under Technology Systems Management, Courses and Programs.

Students majoring in Agricultural Systems Technology choose between two options: Agricultural and Biosystems Management or Machine Systems.

Agricultural and Biosystems Management Option

- Cr. Degree Requirements**
- 12.5 Interpersonal and public communication skills**
Engl 150, 250; Sp Cm 212 or AgEdS 311; Engl 302 or 309 or 314; Lib 160
- 29 Mathematical, physical, and life sciences**
Math 142 and 160; Stat 104; Chem 163, 163L; Phys 111 and 112; and 6 cr. of life science from department-approved list
- 15 Humanities, ethics, and social sciences**
Econ 101; 3 cr. in humanities from college-approved list; 3 cr. in ethics from college-approved list, 3 cr. in International Perspectives from University-approved list; and 3 cr. U.S. Diversity from University approved list.
- 30 Technology core**
TSM 110, 111, 115, 116, 201, 210, 270, 301, 310, 363, 397, 399, 401, 415, and 416.
- 6 Business core**
Acct 284; Econ 330 or 355 or 336, or Mgmt 370 or 414.
- 33 Option core**
TSM 322, 324, 327, 330, 325, 333, 424, and 12 cr. in technical electives from department-approved list.
- 125.5 Total credits**

Machine Systems Option

- Cr. Degree Requirements**
- 12.5 Interpersonal and public communications skills**
Engl 150, 250; Sp Cm 212 or AgEdS 311; Engl 302 or 309 or 314; Lib 160
- 29 Mathematical, physical, and life sciences**
Math 142 and 160; Stat 104; Chem 163, 163L; Phys 111 and 112; and 6 cr. of life science from department-approved list.
- 15 Humanities, ethics, and social sciences**
Econ 101; 3 cr. in humanities from college-approved lists; 3 cr. in ethics from college-approved list; 3 cr. in international perspectives from university-approved list; and 3 cr. in U.S. diversity from university-approved list.
- 30 Technology core**
TSM 110, 111, 115, 116, 201, 210, 270, 301, 310, 363, 397, 399, 401, 415, and 416.
- 6 Business core**

Acct 284; Econ 330 or 355 or 336, or Mgmt 370 or 414.

- 33 Option core**
TSM 216, 240, 330, 333, 335, 337, 370, 443, 465, and 5 cr. of technical electives from department-approved list.
- 125.5 Total credits**

Typical Program for the First Year

- Cr. Fall**
- 1 Introduction to Technology—TSM 110
- 3 Trigonometry and Analytic Geometry—Math 142
- 3 Critical Thinking and Communication—Engl 150
- 5 General Chemistry—Chem 163, 163L
- 3 Life science elective
- 0.5 Library Instruction—Lib 160
- Cr. Spring**
- 1 Experiencing Technology—TSM 111
- 3 Solving Technology Problems—TSM 115
- 3 Principles of Microeconomics—Econ 101
- 4 General Physics—Phys 111
- 4 Survey of Calculus—Math 160

Curriculum in Agronomy

Students majoring in agronomy study crop, soil, and environmental sciences under one of five options: agroecology; agronomy management and business; plant breeding; research and development; or soil and environmental science. A minimum of 15 credits in agronomy courses must be earned at Iowa State.

Core Requirements

- Cr. Degree Requirements**
- 12.5 Interpersonal and public communication skills**
Engl 150, 250; Lib 160; Sp Cm 212 or AgEdS 311; Engl 302, or 309, or 314
- 6-14 Mathematical sciences**
Math 140 or 150 or 165/166 or 181/182, depending on option; and Stat 104
- 15-25 Physical sciences**
Chem 163/163L, or 177/177L and 178/178L; and 231/231L or BBMB 221 or Chem 331/331L and 332/332L; and Phys 106 or 111 or 221 depending on option
- 11-26 Biological sciences**
Biol 211, 211L, 212, 212L; other courses by option
- 15 Humanities, ethics, and social science**
3 cr. each in ethics, U.S. diversity, international perspectives, humanities, and social sciences from approved lists
- 21.5-31.5 Agronomic sciences**
Agron 105, 110, 114, 154, 206, 210, 310 or 311, 316, 354, 354L, 410 and agricultural issues course.

Options

Agroecology

The Agroecology option provides the scientific foundation for understanding and managing agricultural systems with ecological and environmental perspectives. Students may pursue graduate study or careers in sustainable agriculture. More information is available from an agronomy adviser or www.agron.iastate.edu/academic/undergraduate/agro_ecol.aspx.

Agronomy Management and Business

The Agronomy Management and Business option is designed for those individuals who seek employment as agronomists working in agribusinesses such as cooperatives, seed companies, herbicide and fertilizer dealers, or crop consulting firms. More information is available from an agronomy adviser or www.agron.iastate.edu/academic/undergraduate/mgt_bus.aspx.

Plant Breeding and Biotechnology

The Plant Breeding and Biotechnology option is a science-oriented option recommended for those who would like to work in plant breeding or plant biotechnology. More information is available from an agronomy adviser or www.agron.iastate.edu/academic/undergraduate/plantbreeding.aspx.

Research and Development

The Research and Development is recommended for individuals who plan to work toward a graduate degree, or anyone who would like a strong science orientation in their degree program. More information is available from an agronomy adviser or www.agron.iastate.edu/academic/undergraduate/res_dev.aspx.

Soil and Environmental Quality

The Soil and Environmental Quality option is designed for those individuals interested in careers in environmental science, soil science, or natural resource management. More information is available from an agronomy adviser or www.agron.iastate.edu/academic/undergraduate/soil_env.sci.aspx.

Typical Program for the First Year

- Cr. Fall**
- 0.5 Orientation in Agronomy—Agron 110
- 3 Principles of Agronomy—Agron 114
- 3 Introduction to Meteorology—Agron 206
- 5 General Chemistry—Chem 163 and 163L
- 3 Critical Thinking and Communication—Engl 150
- Cr. Spring**
- 3 Fundamentals of Soil Science—Agron 154
- 4 Principles of Biology I and Lab—Biol 211/211L
- 3 Mathematics or Statistics—Stat 104
- 0.5 Library Instruction—Lib 160
- 3 Principles of Microeconomics—Econ 101

Curriculum in Animal Ecology

- Cr. Degree Requirements
- 15.5 **Interpersonal and public communication skills**
Engl 150 and 250; Sp Cm 212; Lib 160; two additional 3-cr. courses in written or oral communication from an approved list; and communications-intensive requirement
- 9-10 **Mathematical sciences**
Math 140 and 142; Stat 101 or 104
- 13 **Physical sciences**
Chem 163, 163L or 177, 177L; 231, 231L; Phys 106
- 20 **Biological sciences**
A Ecl 312, 365; Biol 211, 211L, 212, 212L; NREM 110, 120, 211
- 15 **Humanities, ethics, and social science**
From approved lists: 3 cr. in humanities; 3 cr. in social sciences; 3 cr. in ethics, 3 cr. in U.S. diversity, and 3 cr. in international perspectives; and environmental-intensive and problem-solving intensive requirements
- R **Practical experience requirement (NREM 104)**

Students majoring in Animal Ecology are required to choose one of the following options by the end of their sophomore year: Aquatic Sciences, Fisheries, Interpretation of Natural Resources, Preveterinary and Wildlife Care, or Wildlife.

Options

- Cr.
- 34 **Aquatic Sciences**
A Ecl 418, 486, 486L; Math 160 or 165, or 181; NREM 407; remaining credits to complete 34 total from approved list
- 34 **Fisheries**
A Ecl 321, 440, 441, 486, 486L; Math 160, 165, or 181; remaining credits to complete 34 total from approved list.
- 33 **Interpretation of Natural Resources**
A Ecl 366, Biol 366, Ent 370, NREM 303, 330, 430; one course from For 356 or Biol 474; one course from Agron 154, 206, Astro 120, Geol 100, 101, or Geol 108/Env S 108; remaining credits from approved list to equal 33 total.
- 33 **Preveterinary and Wildlife Care**
An S 214, NREM 330; one course from An S 336 or Biol 354; one course from Anthr 438, BMS 329, 415 and 416, Biol 155, 335, 351, 352, 434; one course from An S 331, Biol 313, 423, or Gen 320, one course from A Ecl 366, 458, 459 (one of the 400-level courses preferred for pre-vet students); three or more credits from A Ecl 401, 442, 454, An S 319, 493, Micro 201 and 201L, or Biol 353; 3 credits of A Ecl or NREM coursework at 300-level or above; remaining credits to complete 33 total from approved lists.

- 42 **Wildlife**
A Ecl 371, 451; Biol 313 or Gen 320, Biol 366; Math 160 or 165, or 181; 6 credits from A Ecl 457, 458, 459; 6 credits from A Ecl 455, NREM 450X, 460, 385/585, 532, FOR 453, Env S 293, 482, C R P 491; 3 credits from A Ecl 454X, 515, 551, Biol 315, 336X, 354, 354L, 471X, Ent 370, EEOB 507, NREM 475X, Anthr 438; 5 credits from Biol 355, 454, 456, 474, For 356, EEOB 564, Agron 317; remaining credits to complete 42 total from approved lists

12.5-22.5 Free electives

128 Total Credits

Typical Program for the First Year

- Cr. Fall
- 4 Principles of Biology—Biol 211, 211L
- R Orientation in Natural Resource Ecology and Management—NREM 110
- 3 Critical Thinking and Communication—Engl 150
- 3 College Algebra—Math 140
- 5 General Chemistry—Chem 163, 163L
- Cr. Spring
- 4 Principles of Biology—Biol 212, 212L
- 3 Introduction to Renewable Resources—NREM 120
- 3 Statistics—Stat 101 or 104
- 0.5 Library Instruction—Lib 160
- 3 Trigonometry and Analytic Geometry—Math 142
- 3 Elective

Preveterinary Studies

Preparation for admission to veterinary medicine may be accomplished through the animal ecology curriculum. The Preveterinary and Wildlife Care option has been designed for this purpose.

Curriculum in Animal Science

Students majoring in animal science will complete the degree requirements listed below. If desired, a student may also choose a specialized option. To earn a degree in Animal Science (AnS) from Iowa State University (ISU) a minimum of 15 credits in AnS must be earned from courses taught in the AnS department at ISU. Students desiring to complete a minor in AnS must complete 17 credits in AnS courses from a list maintained in the department, and a minimum of 9 credits in AnS must be earned from courses taught in the AnS department at ISU.

- Cr. Degree Requirements
- 12.5 **Interpersonal and public communication skills**
Engl 150, 250, 302 or 309 or 314; Sp Cm 212 or AgEdS 311 or ComSt 214; Lib 160; and communications-intensive requirement*

- 10 **Mathematical and computer sciences**
Stat 101 or 104 or 226
Com S 103
Math 140 or 150 or 160 or 165 or 181 (some options may restrict choices)
- 3 **Business elective**
Econ 101 or 102 or Acct 284 (some options may restrict choices)
- 8 **Physical sciences**
Chem 163 & 163L or Chem 177 and 177L (some options may restrict choices); BBMB 221 or Chem 231 & 231L or Chem 331 & 331L (some options may restrict choices)
- 8 **Biological sciences**
Biol 211, 211L; 212, 212L; Biol 313 or Gen 320; Micro 201 & 201L or Micro 302 & 302L
- 18 **Personal development, human relations, and global awareness**
a minimum of: 3 credits in humanities; 3 cr. in social sciences; from approved lists : 3 cr. in ethics, 3 cr. in international awareness, 3 credits in U.S. multicultural awareness; and problem solving-intensive requirement;
- 36 **Animal science**
An S 101, 110, 114, 211, 214, 214L, 311, 319, 331, 352, 411; three courses from: AnS 216, 223, 224, 225, 226, 229, 235, 270 (some options may restrict choices); one course from: AnS 336, 337, 345, 360, Biol 305, 314, 352, 353, Ent 372, 374, Micro 310, VDPAM 487 (some options may restrict choices); one course from: AnS 415, 423, 424, 425, 426, 429, 434 (some options may restrict choices); one course from AnS 415, 419, 423, 424, 425, 426, 429, 434, 460, FS HN 405, 410, 420, Micro 407 (some options may restrict choices)
- 26.5 **Pre-Veterinary Medicine**
Chem 177, 177L, 178, 331, 331L, 332; BBMB 301 or Biol 314; Math 141 or 142 (if trigonometry not taken in high school) Phys 111; one course from AnS 415, 423, 424, 425, 426, 429 or 434; one course from AnS 415, 419, 423, 424, 425, 426, 429, 434, 460, FSHN 405, 410, 420, Micro 407; free electives 13.5
- 26.5 **Livestock Management**
Acct 284; AgEdS 451; Econ 101, 330, 331; An S 270; two courses from An S 223, 225, 226, 229, 235; two courses from An S 336, 337, 345, 360; one course from AnS 423, 424, 425, 426, 429, 434; one course from AnS 415, 419, 423, 424, 425, 426, 429, 434, 460, FS HN 405, 410, 420, Micro 407; VDPAM 487; free electives 8.5
- 26.5 **Animal Products**
Chem 177 & 177L; two courses from An S 223, 225, 226, 229, 235; An S 270, 360, 460; one course from 423, 425, 426, 429, 434, FS HN 405 or 410; one course from FS HN 420 or Micro 407; free electives 23.5

- 26.5 Pre-Graduate/Pre-Professional Studies**
Chem 177, 177L, 178; Chem 231 & 231L or Chem 331 & 331L; 3 courses from departmental list ; Math 160 or 165 or 181; free electives 14.5
- 26.5 Companion Animal Management**
Acct 284; business or economics electives 9; two courses from: AnS 216, 223, 225, 226, 229, 235, 270; AnS 224, 336, 424; one course from AnS 415, 419, 423, 425, 426, 429, 434, 460, FS HN 405, 410, 420, Micro 407; free electives 17.5
- 26.5 Equine Management**
Acct 284; business or economics electives 9; ; two courses from: AnS 223, 224, 225, 226, 229, 235, 270; AnS 216, 415; 6 cr. equine electives from AnS 115, 217, 306, 316, 417, 475E, BMS 421; one course from AnS 419, 423, 424, 425, 426, 429, 434, 460, FS HN 405, 410, 420, Micro 407; free electives 11.5

Typical Program for the First Year

- Cr. Fall**
- R Orientation in Animal Science—An S 110
- 2 Working with Animals—An S 101
- 3 Principles of Biology—Biol 211
- 1 Principles of Biology Lab—Biol 211L
- 3 Critical Thinking and Communication—Engl 150
- 0.5 Library Instruction—Lib 160
- 3 Mathematics—Math 140 or 150 or 160 or 165 or 181
- 3 Elective
- Cr. Spring**
- 2 Survey of the Animal Industry—An S 114
- 4 General Chemistry—Chem 177 or 163
- 1 General Chemistry Lab—Chem 177L or 163L
- 3 Communications—Sp Cm 212 or AgEdS 311 or ComSt 214
- 3 Statistics—Stat 101 or 104 or 226
- 3 Humanities elective

Preveterinary Studies

Preparation for admission to veterinary medicine may be accomplished through the animal science curriculum.

Curriculum in Biology

Administered by the Departments of Ecology, Evolution, and Organismal Biology; and Genetics, Development and Cell Biology.

- Cr. Degree Requirements***
- 9.5 Interpersonal and public communication skills**
Engl 150, 250; oral communication Sp Cm 212; Lib 160
- 7 Mathematics**
7 credits of Math or Statistics, to include one semester each of Calculus and Statistics.
- 25 Physical sciences**
25 credits selected from an approved list of chemistry, biochemistry and physics. List available on Biology Program web site.

- 24 Biological sciences core**
Biol 110, 111, 211, 211L; 212, 212L, 312, 313, 313L, 314, 314L, 315
- 20 Advanced biology courses**
20 credits in approved biology courses numbered 300 and above from department-approved list; 8 credits must be taken from biology designator; minimum of two laboratory or field courses must be included.
- 15 Humanities and social science**
3 cr. in humanities, social sciences, ethics, international perspectives and U.S. diversity chosen from an approved list. The environmental intensive requirement is met by the core requirement of Biol 312.
- 17-20 Free electives**
- 120 Total credits**

Typical Program for the First Year

- Cr. Fall**
- 0.5 Orientation in Biology—Biol 110
- 3 Critical Thinking and Communication—Engl 150
- 5 General Chemistry—Chem 163, 163L; or 177, 177L
- 4 Mathematics or Statistics—Math 160, 165 or 181; or Stat 101 or 104
- 4 Principles of Biology—Biol 211, 211L
- 0.5 Library—Lib 160
- Cr. Spring**
- 0.5 Opportunities in Biology—Biol 111
- 4 General Chemistry—Chem 164, 164L; or 178, 178L; 164L; or 178, 178L; or approved physical sciences course
- 4 Mathematics or Statistics—Math 160, 165 or 181; or Stat 101 or 104
- 4 Principles of Biology—Biol 212, 212L
- 3-6 Elective

Curriculum in Culinary Science

Administered by the Department of Food Science and Human Nutrition

Cr. Degree Requirements*

- 9.5 Communications/Library**
Engl 150, 250; Sp Cm 212 or ComSt 214; Lib 160
- 6-7 Mathematical sciences**
Math 140, 142, 160, 165, or 181 Stat 101 or 104
- 9 Physical sciences**
Chem 163;163L; 231, 231L
- 12-13 Biological sciences**
BBMB 301; Biol 211, 212; Micro 201 or 302; and Micro 201L or 302L
- 11-12 Humanities/Social sciences**
Econ 101; FS HN 342; 3 credits Humanities; 2-3 credits ENV S 120 or 201
- 44 Food science and human nutrition**
FS HN 101, 104, 110, 167, 203, 214, 265, 311, 314, 403, 405, 406, 411, 412, 420, 480, 491B, 491D
- 3 Animal science**
An S 270

- 22 Hotel, restaurant institutional management**
HRI 233, 333, 340, 380, 380L, 383, 487 and AESHM 474

0-2 Electives

122.5 Total credits

*Additional requirement: Students must fulfill international perspectives and U.S. diversity requirements by selecting coursework from approved lists.

Curriculum in Dairy Science

Students majoring in Dairy Science will complete the courses below for a professional degree or alternatively may complete the specialized option in Pre-Veterinary medicine.

Cr. Degree Requirements

- 9.5 Interpersonal and public communication skills**
Engl 150, 250; Sp Cm 212 or AgEds 311; Lib 160; and communications intensive requirement
- 9-13 Mathematical and business sciences**
TSM 115 or Com S 103 or proficiency exam; Econ 101; Math 150; Stat (3 cr.)
- 8 Physical sciences**
Chem 177, 177L; BBMB 221 or Chem 231 or 331
- 10-11 Biological sciences**
Biol 211, 211L; Biol 313 or Gen 320; Micro 201 and 201L or FS HN 273; and environmental-intensive requirement
- 15 Personal development, human relations, and global awareness**
3 cr. in humanities; 3 cr. in social sciences; from approved lists: 3 cr. in ethics, 3 cr. in international awareness, 3 cr. in U.S. multicultural awareness; and problem solving-intensive requirement
- 34 Professional dairy science**
An S 101, 110, 114, 211, 214, 214L, 235, 311, 319, 331, 337, 352, 411, 434; FSHN 101 or An S 270; minimum of two courses from list maintained in department; a mini-mum of 15 credits in this category must be earned from courses taught in the ISU Animal Science department.
- 37.5-42.5 Free electives**

Specialized Option

- 22 Pre-Veterinary Medicine**
Additional courses required for entrance to Veterinary Medicine 22; free electives 15.5-20.5
- 128 Total Credits**

Typical Program for the First Year

- Cr. Fall**
- R Orientation in Dairy Science—An S 110
- 2 Survey or the Animal Industry—An S 114
- 2 Working with Animals—An S 101
- 3 Principles of Biology—Biol 211
- 1 Principles of Biology Lab—Biol 211L

- 3 First-Year Composition—Engl 150
- 0.5 Library Instruction—Lib 160
- 3 Mathematics—Math 150
- 3 Elective
- Cr. Spring**
- 3 Technology Problems—TSM 115
- 4 General Chemistry—Chem 177
- 1 General Chemistry Lab—Chem 177L
- 3 First-Year Composition—Engl 250
- 3 Introduction to Statistics—Stat 104
- 3 Elective

Preveterinary Studies

Preparation for admission to veterinary medicine may be accomplished through the dairy science curriculum.

Curriculum in Diet and Exercise B.S./M.S.

Administered by the Department of Food Science and Human Nutrition and Health and Kinesiology.

Courses included have been approved as meeting the academic requirements of the American Dietetic Association in preparation for admission to dietetic internship programs. There is a \$30 fee for a statement of verification of completion of the approved program. Courses also are included to meet the ACSM requirements for certification at the level of Health Fitness Instructor.

- Cr. Degree Requirements***
- 9.5 Interpersonal and public communication skills**
Engl 150, 250; Lib 160; Sp Cm 212
- 38-41 Mathematical, physical, and life sciences**
Math 140, 142, 160, 165, or 181; Stat 101, 104, or 226; Chem 163 and 163L or 177, 177L, and 178; 231; 231L; Phys 106 or 111; BBMB 301; Biol 211, 212, 255, 255L, 256, 256L; Micro 201
- 15 Humanities and social science**
select 3 credits from approved humanities course list; select 3 credits from approved Ethics course list (if ethics course selected is not on the humanities list, 3 additional credits of humanities must be taken.); Psych 101, 230
- 20-22 Diet and Exercise**
Kin 252-253 or FS HN 110; Kin 258; FS HN 167, 214, 265, 360; H S 110
- 41 Diet and exercise**
H S 380; Kin 220, 259, 345, 358, 462; FS HN 403, 411, 463, 466, NutrS 561; HRI 380, 380L, 392; Kin 355, 360, 366, or 372
- 123.5 Total credits**

*Additional requirement: Students must fulfill international perspectives, U.S. diversity requirements by selecting coursework from approved lists. These courses may be used to fulfill other area requirements.

Graduate Program

- Cr. Degree Requirements**
- 39-40 Graduate level coursework
FS HN 581; NutrS 501, 561, 562, 564; Kin 501, 505, 551, 558; Kin 699 or NutrS 699A; Stat 401; Kin 550, 570, or NutrS 502.
Additional requirement: FS HN 490C for students in the FSHN Department.

Curriculum in Dietetics

Administered by the Department of Food Science and Human Nutrition.

The student is prepared for admission to dietetic internship programs and other professional experience programs approved/accredited by The American Dietetic Association. Courses included have been approved as meeting the academic requirements of The American Dietetic Association. There is a \$30 fee for a statement of verification of completion of the approved program.

- Cr. Degree Requirements***
- 9.5 Communications**
Engl 150, 250; Lib 160; ComSt 214 or Sp Cm 212
- 6-7 Mathematical sciences**
3 credits Math 140, 142, 160, 165 or 181; Stat 101 or 104
- 9-12 Physical sciences**
Chem 163 and 163L or 177, 177L, and 178; 231; 231L;
- 20-22 Biological sciences**
BBMB 301 or Biol 314; Biol 211, 212, 212L, 255, 255L; 300-level 300-level physiology course (Biol 306 or 335)
- 11-12 Humanities/Social sciences**
3 crs. Humanities course; Env S 120 or 201; FS HN 342; Psych 101
- 40 Food science and human nutrition**
FS HN 110, 167, 203, 214, 261, 340, 360, 361, 362, 403, 411, 461, 463, 464, 466, 480
- 11 Management**
HRI 380, 380L, 391, 392
- 0-7 Electives**
- 120.5 Total credits**

*Additional degree requirements: Students must fulfill international perspectives and U.S. diversity requirements by selecting coursework from approved lists.

Curriculum in Environmental Science

- Cr. Degree Requirements**
- 9.5 Communication**
Engl 150, 250; Lib 160; speech elective (3 cr.)
- 7 Mathematical sciences**
One course in statistics and one course in calculus
- 24 Physical and Life Sciences**
24 credits of approved coursework in biology, chemistry, physics, and earth sciences

- 15 Humanities, ethics, and social science**
3 cr. ethics, 3 cr. U.S. diversity, 3 cr. of international perspectives, 3 cr. of humanities, and 3 cr. of social sciences.
- 29 Environmental Science**
EnSci 110, 201, 250, 381, 382, and 15 additional credits of approved EnSci coursework.
- 35.5 Free electives**
- 120 Total credits**

Typical Program for the First Year

- Cr. Fall**
- 1 Orientation – EnSci 110
- 2 Environmental Issues – EnSci 201
- 3-4 Statistics —Stat 101 or 104
- 4 Gen Chem —Chem 177
- 1 Gen Chem Lab —Chem 177L
- 3 Communication — Engl 150
- 0.5 Library Instruction —Lib 160
- Cr. Spring**
- 3 Princ. Biology—Biol 211
- 1 Princ. Biology Lab —211L
- 4 Calculus —Math 160, 165 or 181
- 3 Gen Chem II — Chem 178
- 1 Gen Chem II Lab —Chem 178L
- 3 Humanities or social science choice

Curriculum in Food Science

Administered by the Department of Food Science and Human Nutrition.

- Option 1. Food Science and Technology**
- Cr. Degree Requirements***
- 12.5 Communications/Library**
Engl 150, 250; Lib 160; ComSt 214 or Sp Cm 212; TSM 115
- 11-12 Mathematical Sciences**
Math 165 and 166, or 181 and 182; Stat 101 or 104
- 23 Physical Sciences**
Chem 177, 177L, 178, 331, 331L, 332; Phys 111, 112
- 13 Biological sciences**
BBMB 301; Biol 211, 212; Micro 302, 302L
- 11-12 Humanities/Social Sciences**
3 credits Humanities courses; 3 credits Social Sciences courses; FS HN 342; and Env S 120 or 201
- 44 Food science and human nutrition**
FS HN 101, 110, 167, 203, 311, 351, 403, 405, 406, 410, 411, 412, 420, 421, 471, 472, 480
- 0-2 Electives**
- 120.5 Total credits**

*Additional degree requirements: Students must fulfill international perspectives and U.S. diversity requirements by selecting coursework from approved lists.

- Option 2. Food Science and Industry**
- Cr. Degree Requirements***
- 15.5 Communication/Library**
Engl 150, 250; Lib 160; JI MC 305, or 220, or 347; Sp Cm 212 or ComSt 214; TSM 115
- 7-8 Mathematical Sciences**
Math 160, 165, or 181; Stat 101 or 104

- 16 **Physical Sciences**
Chem 163 and 163L or 177, 177L and 178; 231; 231L; Phys 106
- 12-13 **Biological Sciences**
BBMB 301; Biol 211, 212; Micro 201 or 302; Micro 201L or 302L
- 11-12 **Humanities/Social Sciences**
Econ 101; FS HN 342; select 3 credits of humanities courses; and Env S 120 or 201.
- 6 **Business**
Select 6 credits from Acct 215, 284, 285; Econ 301, 320; Mgmt 310, 370, 371, 414, 472; MIS 330; Mkt 340, 447, 448
- 44 **Food science and human nutrition**
FS HN 101, 110, 167, 203, 311, 351, 403, 405, 406, 410, 411, 412, 420, 421, 471, 472, 480
- 0-5 **Electives**
- 120.5 **Total credits**

*Additional degree requirements: Students must fulfill international perspectives and U.S. diversity requirements by selecting coursework from approved lists.

Option 3. Consumer Food Science

- Cr. **Degree Requirements***
- 21.5 **Communications/Library**
Engl 150, 250; JI MC 305 or 220; select 6 cr. from JI MC 347, Engl 205, 302, 309, 313, or 314; Sp Cm 212 or ComSt 214; Lib 160; TSM 115
- 6-7 **Mathematical sciences**
Math 140, 142, 160, 165, or 181; Stat 101 or 104
- 16 **Physical sciences**
Chem 163 and 163L or 177, 177L and 178; 231, 231L; Phys 106
- 12-13 **Biological sciences**
BBMB 301; Biol 211, 212; Micro 201 or 302; and Micro 201L or 302L
- 11-12 **Humanities/Social sciences**
Econ 101; FS HN 342; 3 credits Humanities courses; and Env S 120 or 201
- 41 **Food science and human nutrition**
FS HN 101, 110, 167, 203, 214, 265, 311, 403, 405, 406, 411, 412, 420, 471, 480
- 6 **Business**
Mkt 340 and 447
- 0-3 **Electives**
- 120.5 **Total credits**

*Additional degree requirements: Students must fulfill international perspectives and U.S. diversity requirements by selecting coursework from approved lists.

Concurrent B.S. and M.S. Program:

Well qualified students in Food Science who are interested in graduate study may apply for concurrent enrollment in the Graduate College to simultaneously pursue both a bachelor of science in Food Science and a master of science degree in Food Science and Technology. For more information, refer to www.fshn.hs.iastate.edu

Curriculum in Forestry

- Cr. **Degree Requirements**
- 12.5 **Interpersonal and public communication skills**
Engl 150, 250; 314, or 302 or 309; Lib 160; Sp Cm 212
- 22 **Mathematical, physical, and life sciences**
Math 140, 150; Stat 101 or 104; Chem 163, 163L; Biol 211, 211L; Agron 154
- 15 **Humanities, ethics, and social science**
3 cr. in humanities; 3 cr. in ethics from approved list; Soc 130 or 134 and 3 cr. in U.S. diversity and 3 cr. in international perspectives
- 29 **Forestry courses**
For 201, 202, 203, 204, 205, 206, 302, 451, 454; NREM 110, 120, 211
- R **Practical experience requirement**
NREM 104

Students majoring in forestry are required to choose one of the following options at the end of their sophomore year: forest ecosystem management; sustainable material science and technology; urban and community forestry; natural resource conservation and restoration; or interpretation of natural resources.

Options

- Cr.
- 40 **Sustainable Materials Science and Technology**
Chem 231, 231L, Econ 101, For 280, 480, 481, 483, 485, 486, 487; Math 151; Mkt 340, Stat 401
- 35 **Forest Ecosystem Management**
Biol 212, 212L, For 280, 342, 356, 452; one course from NREM 385, 460; For 453; Math 151 or 181; NREM 301, 345; Pl P 416
- 37 **Urban and Community Forestry**
Biol 212, 212L; For 280, 356, 452, 475; Hort 342 or 344; one course from NREM 385, 460 or For 453; Math 151 or 181; Pl P 416; Soc 310 or 382; C R P 253 or 270
- 44 **Natural Resource Conservation and Restoration**
A Ecl 312; Biol 212, 212L, 204; For 356, 452; one course from NREM 385, 460 or For 453; Math 151 or 181; NREM 301, 330, 390, 407; Pl P 416; 3 credits from approved departmental list
- 34 **Interpretation of Natural Resources**
A Ecl 365 and 366; Biol 212, 212L, 366, Ent 370, NREM 303, 330, 430; For 452, one course from (For 453 or NREM 460 or 385); one course from Agron 206, Astro 120, Geol 100, 101, 108; select remaining credits to complete 34 credits from approved departmental list.

5.5-15.5 Free electives

- 128 **Total credits**

Typical Program for the First Year

- Cr. **Fall**
- 3 Critical Thinking and Communication—Engl 150
- R Orientation in Natural Resource Ecology and Management—NREM 110
- 3 College Algebra—Math 140
- 3 Principles of Biology I—Biol 211
- 1 Principles of Biology Laboratory I—Biol 211L
- 3 Introduction to Renewable Resources—NREM 120
- 3 Social Science—Soc 130 or 134
- 16
- Cr. **Spring**
- 3 Foundations of Soil Science—Agron 154
- 0.5 Library—Lib 160
- 3 or 4 Statistics—Stat 101 or 104
- 4 General Chemistry I—Chem 163
- 1 General Chemistry Lab I—Chem 163L
- 3 or 4 Wood Properties and Identification—For 280 or U.S. Diversity/International Perspectives

14.5 or 16.5

Curriculum in Genetics

Undergraduate study in genetics is jointly administered by the Department of Biochemistry, Biophysics, and Molecular Biology, the Department of Genetics, Development, and Cell Biology, and the Department of Ecology, Evolution, and Organismal Biology.

- Cr. **Degree Requirements**
- 12.5 **Communications**
Engl 150, 250; an advanced English writing course (Engl 302-316); oral communication (AgEdS 311, Sp Cm 212; Lib 160)
- 11 **Math**
Must include at least one course from both calculus and statistics chosen from Math 160, 165, 166, 181, 182; Stat 101 or 104, 401, 402, 403
- 3 **Computer Studies**
Three credits in computer science or computer applications chosen from an approved list. See department for list.
- 31 **Physical sciences**
Chem 177, 177L, 178, 178L (or 211), 331, 331L, 332, 332L; BBMB 404 or 420; Chem 211 or 321 or BBMB 405 or 411; Physics 111, 112 or 221, 222
- 23 **Biological sciences**
Biol 211, 211L, 212, 212L, 313, 313L, 314, 314L; Micro 302; Biol 315
- 15 **Humanities, ethics, and social sciences**
15 credits including at least 3 cr. each in the humanities, social sciences, ethics, international perspectives and U.S. diversity chosen from an approved list.
The environment-intensive and problem solving-intensive college requirements can be satisfied by selection of appropriate courses. See department for lists.

- 9.5 **Genetics**
Gen 110, 410, 411, 460 or 462, 491
- 9 **Support electives**
Choose 9 credits from approved list.
See department for list.
Biol (A Ecl) 312 must be included in the program
- Electives**
Additional electives sufficient to equal the 128 credits required for graduation.
- 128 **Total credits**

Typical Program for the First Year

- Cr. **Fall**
- 5 General Chemistry—Chem 177, 177L
- 3 English—Engl 150
- 4 Calculus—Math 165 or 181
- 4 Principles of Biology—Biol 211, 212L
- 0.5 Orientation and Career Opportunities—Gen 110
- 0.5 Library Instruction—Lib 160
- Cr. **Spring**
- 4 General Chemistry—Chem 178, 178L
- 3 Statistics 101 or 104
- 4 Calculus—Math 161 or 166 or 182
- 4 Principles of Biology—Biol 212, 212L

Curriculum in Global Resource Systems

Administered by a supervisory committee in the College of Agriculture and Life Sciences. Students choose a region of the world, either industrialized or developing, to develop an expertise; they choose a language to learn and develop proficiency through the intermediate level; they choose and possess an area of technical expertise by completing a minor or certificate program in the College of Agriculture and Life Sciences; they complete a required internship in an international setting; and they select and complete a senior research project with faculty mentoring.

- Cr. **Degree Requirements**
- 12.5 **Interpersonal and Public Communications Skills**
- 3 Critical Thinking and Communication—Engl 150
- 3 Written, Oral, Visual, and Electronic Composition—Engl 250
- 0.5 Library Instruction—Lib 160
- 3 Report and Proposal Writing—Engl 309 or
- 3 Business Communication—Engl 302 or
- 3 Technical Communication—Engl 314
- 3 Fundamentals of Public Speaking—Sp Cm 212 or
- 3 Presentation and Sales Strategies for Agricultural Audiences—AgEds 311

6-8 credits

- Cr. **Mathematical Sciences**
- 3-4 Mathematics (Math 140 or higher course number)
- 3-4 Statistics—101 or 104

15 credits

- Cr. **Humanities, Ethics, and Social Science**
- 3 Humanities (from approved list)*

- 3 Social Sciences—Econ 101 or 102
- 3 International Perspectives from approved list*
- 3 U.S. Diversity from approved list
- 3 Ethics (from approved list)

* Requirement embedded within other curriculum requirements

27-35 credits (depending upon language study)

- Cr. **Global Competency**
- 12-20 Students will emphasize a region of the globe. World Language proficiency through intermediate levels. Complete 100 and 200 levels of a single college-level world language.
- 15 Coursework in culture, history, politics and economics in which students emphasize a global region outside the United States, up to 3 credits may be earned through travel courses. Courses in the WLC Language and Cultures for Professions are also eligible.

15 - 18 credits

- Cr. **Physical and Life Sciences**
- 5 General Chemistry—Chem 163, 163L; or 177, 177L
- 4 Principles of Biology—Biol 211, 211L
- 3 300-level or higher life sciences course

One of the following is required, two are recommended:

- 3 Environmental Geology—Geol 101
- 3 Fundamentals of Soil Science—Agron 154 or
- 3 Soils for Horticulture Scientists—Agron 155
- 3 Introduction to Meteorology—Agron 206
- 3 World Climates—Agron 406

22 credits

- Cr. **Global Resource Systems**
- 1 Orientation—Globe 110
- 3 Global Resource Systems (1Cr.)—Globe 201
- 3 Issues in Global Resource Systems—Globe 211
- 3 Resource Systems of Industrialized Nations—Globe 301
- 3 Resource Systems of Developing Nations—Globe 302
- 3 - 12 Internship Global or United States
- 3 Senior Research—Globe 401
- 3 Responses to Global Resource System Challenges—Globe 402

15 -18 credits

Cr. **Technical Concentration**

15-18 credits: Satisfied by any of the 23 minors or a certificate offered in the College of Agriculture and Life Sciences.

14 - 16 credits: Free Electives

128.5 Total Credits

Curriculum in Horticulture

Students majoring in horticulture will select an option in which to specialize before reaching junior standing and will fulfill the requirements described below under Specialization Options.

A horticulture minor is available. The requirements appear under *Horticulture, Courses and Programs*.

Cr. **Degree Requirements**

- 12.5 **Interpersonal and Public Communication Skills**
Engl 150, 250, 302 or 314; Lib 160; Sp Cm 212 or AgEdS 311; and a communications-intensive requirement (see department for procedure)
- 6-9 **Mathematical sciences**
Math 140 or 150 or 165 or 181; and Stat 101 or 104 or 226 or 401
- 13 **Physical sciences**
Chem 163, 163L; or 177, 177L; and 231, 231L, or 331, 331L; and one complete course from: Chem 164, 164L; 178, 178L; or Phys 106 or 111. A student must take either (1) Chem 163/163L and 164/164L series and Chem 231/231L series or (2) Chem 177/177L and 178/178L series and Chem 331/331L. A student may take Phys 106 or 111 instead of Chem 164/164L or 178/178L.
- 18 **Biological sciences**
Biol 211, 211L, 212, 212L select 10 credits from the following group: Agron 260, 316, 317, 354, 354L; Biol 312, 314, 314L, 330, 355, 366, 454, 474; Ent 370, 375, 376; For 416; Pl P 391, 408; Gen 320 or Biol 313, 313L.
- 15 **Humanities, ethics, and social sciences**
One 3-credit course from an approved list in each of the following areas: humanities, ethics, social science, U. S. diversity, and international perspectives; see department for procedure in meeting problem-solving, environmental-intensive, and communication-intensive requirements.
- 3 **Soil science**
Agron 154 or 155
- 30 **Horticulture**
Hort 110, 221, 321, 497; select a minimum of 22 credits from the following group: Hort 233, 240, 280, 282, 283, 322, 330, 332, 338, 341, 342, 351, 351L, 354, 354L, 380, 381, 391, 398, 422, 423, 424, 434, 435, 442, 444, 445, 446, 451, 452, 453, 454, 461, 471, 471L, 475, 480, 481, 484, 490, 491, 493, 495, 496, 497, 511, 551. Transfer students may transfer up to 10 credits of 200- and 300-level courses in the horticulture area.
- Specialization Options**
(A minor in an approved area of study may be substituted for the Specialization Option with permission of student's adviser)
- 12 **Environmental horticulture option:**
Hort 424 must be among the courses that fulfill the horticulture requirement. Other recommended course is Hort 484. The student must

take Biol 312 and 9 or more credits from the following group: Agron 260, Biol 355, Econ 334, Ent 375, Env S 293, 324, 382, 450, 460, 491; TSM 324, 424.

- 12 **Fruit and vegetable production and management option:**
Hort 422, 445, 461, 471 and 471L must be among the courses that fulfill the horticulture requirement. Acct 284; and 9 or more credits from the following group: Acct 215, 285, 316; Com S 103; Econ 230, 334; FS HN 272, 403, 405, 471, 472; Mgmt 310, 313, 370, 371; Mkt 340, 442, 446, 447; TSM 270.
- 12 **Greenhouse production and management option:**
Hort 233, 322, 330, 332, 422, 434, 435 and 445 must be among the courses that fulfill the horticulture requirement. Acct 284; and 9 or more credits from the following group: Acct 215, 285, 316; Com S 103; Econ 334; Ent 375; Mgmt 310, 313, 370; Mkt 340, 442, 446, 447.
- 15 **Horticultural communications and public education:**
Students in this option must take Engl 314 under Interpersonal and Public Communications Skills and a minimum of 12 credits from the following group: ComSt 102, 214, 317; Engl 220, 303, 305, 313; JI MC 201, 220, 310, 341, Sp Cm 312, 313.
- 12 **Landscape Design, Installation and Management option:**
Hort 240, 280, 330, 341, 342, 351, 380, 381, 444, 446, 480 and 481 must be among the courses that fulfill the horticulture requirement. Up to 3 credits can be used in the biological sciences area. Another recommended course is Hort 445. Acct 284; and 9 or more credits from the following group: Acct 215, 285, 316; Mgmt 310, 313, 370, 371; Mkt 340, 343, 442, 447; TSM 324.
- 12 **Nursery crops production and garden center management option:**
Hort 240, 322, 330, 341, 342, 351, 442, and 445 must be among the courses that fulfill the horticulture requirement. Acct 284; and 9 or more credits from the following group: Acct 215, 285, 316; Agron 206; Com S 103; Econ 230, 334; EnSci 446 or 461; Mgmt 310, 313, 370, 371; Mkt 340, 442, 446, 447; TSM 270.
- 12 **Public garden management and administration option:**
Hort 233, 240, 282, 322, 330 and 445 must be among the courses that fulfill the horticulture requirement. Other recommended courses are Hort 280, 332, 341, 342, 351, 351L, 380 and 381. The student must select a minimum of 12 credits from the following: Acct 284, 285, 316; Econ 334; Engl 303, 309, 313, 415; EnSci 446 or 461; Fin 301; JLMC 220; Mgmt 310, 313, 370, 371, 471; Sp Cm 312, 313.

- 12 **Science option:**
Those who choose the Science Option must take: Biol 330 for part of the biological sciences requirement; Math 165 or 181 for the mathematical sciences requirement; Chem 177, 177L, 178, 178L, 331, 331L, 332, 332L, Phys 111 and 112 for the physical sciences requirement. BBMB 301 or 404, Math 166 or 182; and 5 or more credits from the following group: BBMB 311, 404, 405, 411; Biol 313, 313L, 314, 314L, 315; Chem 211, 211L, 316, 316L, 321L, 322L, 324; Com S 107, 207; Gen 409, 410.
- 12 **Turfgrass management option:**
Hort 240, 351, 351L, 445, 451, 452, 453 and 551 must be among the courses that fulfill the horticulture requirement. Other recommended course: Hort 330. Acct 284 and 9 or more credits from the following group: Acct 285, 316; Agron 206, 260, 317, 338, 356, 360, 459; Com S 103; Econ 334; Ent 375; Env S 201, 324; EnSci 446 or 416; HRI 289; Mgmt 370, 371; PI P 391; TSM 270, 324, 424; additional business courses may be used with permission of adviser.
- 14-18 **Electives**
- 128.5 **Total credits**

Typical Program for the First Year

- Cr. Fall
- 3 Humanities or Free Elective
- 5 General Chemistry—Chem 163, 163L or 177, 177L
- 3 First-Year Composition—Engl 150
- 1 Orientation in Horticulture—Hort 110
- 0.5 Library Instruction—Lib 160
- 3 Fundamentals of Algebra for Science and Higher Mathematics—Math 140
- 2 Home Horticulture—Hort 121
- Cr. Spring
- 3 General Biology—Biol 211
- 3-4 Principles or Introduction to Statistics—Stat 101, 104
- 3 Humanities or social science from an approved list
- 3 Soils for Horticultural Scientists—Agron 155
- 3 Principles of Horticulture—Hort 221

Curriculum in Industrial Technology

Administered by the Department of Agricultural and Biosystems Engineering.

An undergraduate certificate in occupational safety is available; the requirements appear under Technology Systems Management courses and programs. A minor in Industrial Technology is available; the requirements appear under Technology Systems Management courses and programs.

Students majoring in Industrial Technology choose between two options: Manufacturing or Occupational Safety.

Manufacturing Option

Cr.Degree Requirements

- 12.5 **Interpersonal and public communications skills**
Engl 150, 250; Sp Cm 212 or AgEds 311; Engl 302 or 309 or 314; Lib 160
- 29 **Mathematical, physical, and life sciences**
Math 142 and 160; Stat 104; Chem 163, 163L; Phys 111 and 112; and 6 cr. of life science from department-approved list
- 15 **Humanities, ethics, and social sciences**
Econ 101; 3 cr. in humanities from college-approved list; 3 cr. in ethics from college-approved list; 3 cr. in international perspectives from university-approved list; and 3 cr. in U.S. diversity from university-approved list.
- 30 **Technology core**
TSM 110, 111, 115, 116, 201, 210, 270, 301, 310, 363, 397, 399, 401, 415, and 416.
- 6 **Business core**
Acct 284; Econ 330 or 355 or 336, or Mgmt 370 or 414.
- 33 **Option core**
TSM 216, 240, 337, 340, 370, 440, 443, 444, 445, 465, and 3 cr. of technical electives from department-approved list
- 125.5 **Total credits**

Occupational Safety Option

Cr.Degree Requirements

- 12.5 **Interpersonal and public communications skills**
Engl 150, 250; Sp Cm 212 or AgEds 311; Engl 302 or 309 or 314; Lib 160
- 29 **Mathematical, physical, and life sciences**
Math 142 and 160; Stat 104; Chem 163, 163L; Phys 111 and 112; Biol 155 and 3 cr. of life science from department-approved list.
- 15 **Humanities, ethics, and social sciences**
Econ 101; 3 cr. in humanities from college-approved list; 3 cr. in ethics from college-approved list; 3 cr. in international perspectives from university-approved list; and 3 cr. in U.S. diversity from university-approved list.
- 30 **Technology core**
TSM 110, 111, 115, 116, 201, 210, 270, 301, 310, 363, 397, 399, 401, 415, and 416
- 6 **Business core**
Acct 284; Econ 330 or 355 or 336, or Mgmt 370 or 414.
- 33 **Option core**
H S 105; I E 271; TSM 240, 272, 276, 370, 372, 470, 471, 477, and 8 cr. of technical electives from department-approved list.
- 125.5 **Total credits**

Typical Program for the First Year

- Cr. Fall
- 1 Introduction to Technology—TSM 110
 - 3 Trigonometry and Analytic Geometry—Math 142
 - 3 Critical Thinking and Communication—Engl 150
 - 5 General Chemistry—Chem 163, 163L
 - 3 Life science elective
 - 0.5 Library Instruction—Lib 160
- Cr. Spring
- 1 Experiencing Technology—TSM 111
 - 3 Solving Technology Problems—TSM 115
 - 3 Principles of Microeconomics—Econ 101
 - 4 General Physics—Phys 111
 - 4 Survey of Calculus—Math 160

Curriculum in International Agriculture

Administered by an Interdepartmental Committee. International agriculture can be taken only as a secondary major in conjunction with a primary major in the College of Agriculture and Life Sciences. A minor is available to interested students regardless of their major.

- Cr. Degree Requirements
(Additional prerequisites may be required for some courses.)
- 12.5 Interpersonal and public communication skills
Engl 150, 250; Sp Cm 212 or AgEdS 311; Lib 160; electives (3 cr.) select from Engl 302 or 314, or JI MC 205
- 19 Mathematics, physical, and life sciences
Math 150, Chem 163, 163L, or Chem 177, 177L, math or physical science electives select from BBMB, Chem, Com S, Math, Phys, or Stat (5 cr.); biological sciences electives select from Biol, Gen, Micro, or PI P (6 cr.) and demonstration of computer proficiency (See primary major department.)
- 15 Humanities, ethics, and social sciences
Soc 130 or 134, or Econ 101; 3 cr. in ethics; 3 cr. in U.S. diversity; 3 cr. in international perspectives
- 15 International Agriculture
Internship in International Agriculture or Study Abroad Program or Foreign Language (6cr.)
- 3 Agron 342
Select courses with international agriculture focus in any major in the College of Agriculture and Life Sciences (6 cr.) (See Supervisory Committee list)
- 66.5 Primary major requirements and free electives
- 128 Total credits

Program for the First Year

Because international agriculture is a secondary major, the courses taken by the student during the first year will vary, depending on the primary major (see typical program for the primary major).

Curriculum in Insect Science

- Cr. Degree Requirements
- 12.5 Interpersonal and public communication skills
Engl 150, 250, 314; Sp Cm 212; Lib 160
- 3 Mathematical and physical sciences
Stat 104
- 14 Life sciences
Biol 211, 211L, 212, 212L, 312; Micro 201, 201L
- 15 Humanities, ethics, and social science
Econ 101; 3 cr. in humanities; from approved lists: 3 cr. in ethics; 3 cr. in international perspectives; 3 cr. in U.S. diversity requirement
- 19 Entomology
Ent 110, 201, 211, 370, 374, 376; 490E; Ent electives; for students entering entomology with one year or more of college-level biological sciences courses, Ent 201 and 211 are waived, and the group requirement reduced to 16 cr.

Students majoring in Entomology are required to choose one of the following options by the end of their sophomore year; Agricultural and Horticultural Insect Management, or Insect Biology.

Agricultural and Horticultural Insect Management Option

- Cr. Degree Requirements
- 5 Mathematics
Math 140, 141
- 13 Physical Sciences
Chem 163, 163L, 231, 231L; Phys 106
- 6 Biological Sciences
BBMB 301; Biol 330
- 12 Agricultural Sciences
Agron 114 or Hort 221; Agron 154 or 155, 317; PI P 408
- 5 Entomology
Ent 283, 375
- 6 Social Sciences
Acct 215; Econ 235
- 17.5 Free electives

Insect Biology Option

- Cr. Degree Requirements
- 4 Mathematics
Math 181
- 28 Physical Sciences
Chem 177, 177L, 178, 178L, 211, 211L, 331, 331L, 332; Phys 111, 112
- 17-18 Biological Sciences
Biol 313, 313L, 314, 314L, 315; 330 or 335; 364
- 14.5-15.5 Free electives

Typical Program for the First Year

- Cr. Fall
- 3 Critical Thinking and Communication—Engl 150
 - 3 Principles of Biology—Biol 211
 - 1 Laboratory in Principles of Biology—Biol 211L
 - 4 General Chemistry—Chem 163 or 177

- 1 Laboratory in General Chemistry—Chem 163L or 177L
 - 4 Fundamentals of Algebra for Science and Higher Mathematics—Math 140 or Calculus and Differential Equations—Math 181
 - R Orientation in Entomology—Ent 110
- Cr. Spring
- 3 Introduction to Statistics—Stat 104
 - 4 General Chemistry—Chem 231, 231L, or 178, 178L
 - 4 Principles of Biology—Biol 212, 212L
 - 1 Introduction to Insects—Ent 201
 - 2 Insects and Society—Ent 211
 - 0.5 Library Instruction—Lib 160

Curriculum in Microbiology

www.micro.iastate.edu
Administered by an interdepartmental committee

- Cr. Degree Requirements
- 12.5 Interpersonal and public communication skills
Engl 150, 250; Engl 302 or Engl 309 or Engl 314; Sp Cm 212; Lib 160
- 10-12 Mathematical sciences
Stat 101 or 104 required; 2 semesters of math with at least one semester of calculus
- 26-29 Physical sciences
Chemistry—Chem 177, 177L, 178
Organic Chemistry: Chem 331, 331L, 332.
Biochemistry—BBMB 404 and 405 (recommended) or 301
Physics: Phys 111, 112.
- 16 Biological sciences
Biol 211, 211L, 212, 212L, and 313, 313L, 314, 314L.
- 15 Humanities, ethics, and social sciences
Minimum of 3 credits each in courses in humanities and social sciences. Also, 3 credits each in ethics, international perspectives, and U.S. diversity courses selected from approved lists.
- 28.5 Microbiology
Required: Micro 110, 302, 310, 320, 430 or 477 or 456, 450, 451.
Required labs: Micro 302L, 310L or 475L, 440. A minimum of 9 credits of microbiology courses at a 400-level and above or from departmental approved list with no more than 3 credits from laboratory courses.
- 15-20 Electives
- 128 Total credits

Typical Program for the First Year

- Cr. Fall
- 4 General Chemistry—Chem 177
 - 1 Laboratory in General Chemistry—Chem 177L
 - 3 First-Year Composition—Engl 150
 - 3 Principles of Biology—Biol 211
 - 1 Laboratory in General Biology—Biol 211L
 - 3 Humanities, ethics, or social science
 - 0.5 Library 160
 - R Orientation in Microbiology—Micro 110

- Cr. Spring**
 3 General Chemistry—Chem 178
 3 Principles of Biology—Biol 212
 1 Laboratory in General Biology—
 Biol 212L
 3 Biology of Microorganisms—
 Micro 302
 1 Microbiology Laboratory—
 Micro 302L
 3 Statistics 101 or 104
 3 Humanities, ethics or social science

Preveterinary Studies

Preparation for admission to veterinary medicine may be accomplished through the microbiology curriculum.

Curriculum in Nutritional Science

Administered by the Department of Food Science and Human Nutrition.

- Cr. Degree Requirements***
12.5 Communications/Library
 Engl 150, 250; Lib 160; ComSt 214 or Sp Cm 212; Engl 314
7-12 Mathematical sciences
 Math 160, 165-166, or 181-182
 Calculus (2 semesters recommended); Stat 101 or 104
24 Physical sciences
 Chem 177, 177L, 178, 331, 331L, 332, 332L; Phys 111, 112
26-27 Biological sciences
 Biol 211, 211L, 212, 212L, 313, 314, 255, 255L, 335; Micro 201 or 302; Micro 201L or 302L
11-12 Humanities/Social sciences*
 FS HN 342; select 3 crs. of humanities courses; select 3 crs. of social science courses; and Env S 120 or 201
34-35 Food science and human nutrition
 FS HN 110, 167, 203, 214 or 311, 265, 360, 361, 362, 461, 480, 492; select at least 9 additional credits from FS HN 403, 412, 419 or 519, 463, 464, 466, 490C, 499, 575; NutrS 501, 502, 562, 565
0-2 Electives
120.5 Total credits

*Additional degree requirements: Students must fulfill international perspectives and U.S. diversity requirements by selecting coursework from approved lists.

Concurrent B.S. and M.S. Program: Well qualified students in Nutritional Science who are interested in graduate study may apply for concurrent enrollment in the Graduate College to simultaneously pursue both a bachelor of science in Nutritional Science and a master of science degree in Nutritional Sciences. For more information, refer to www.fshn.hs.iastate.edu

Curriculum in Public Service and Administration in Agriculture

Administered by the Department of Sociology.

- Cr. Degree Requirements**
12.5 Interpersonal and public communication skills
 Engl 150, 250; JI MC 205; Sp Cm 212; Lib 160; communication-intensive requirement
18 Mathematical, physical and life sciences
 Math 150; Stat 101; electives in physical sciences (5 cr.); Biol 101; electives in biological sciences (3 cr.) (To fulfill the College's environmental intensive requirement, students are encouraged to choose Environmental Studies 120 or 173 as the elective in the biological sciences; demonstration of computer proficiency) (see Sociology Department for requirements).
12 Humanities, ethics, and social sciences
 Humanities elective (3 cr.); from approved lists: 3 cr. in ethics; 3 cr. in U.S. diversity; 3 credits in international perspectives. The 3-credit College of Agriculture and Life Sciences requirement in the social sciences is included as part of the Public Service and Administration Core as are the environmental-intensive requirement and problem solving-intensive requirement.
46 Public service and administration core
Economics: 101, 102, 344 or Acct 284, 336; AgEds 451
Political science: 215, 310, 371, 475, and 3 additional credits of political science courses at the 300-level or above. **Sociology:** 110, 130, 325 or 382, 415, 420 or 380, and 464
9 Agricultural sciences
15 Required area of concentration
15.5 Free electives
128 Total credits

Typical Program for the First Year

- Cr. Fall**
 3 First-Year Composition—Engl 150
 3 Introductory Biology—Biol 101
 3 Mathematics for Business and Social Sciences I—Math 150
 3 Rural Institutions and Organizations—Soc 130
 3 Principles of Microeconomics—Econ 101
 R Orientation to Public Service and Administration in Agriculture—Soc 110
Cr. Spring
 3 Principles of Macroeconomics—Econ 102
 3 American Government: Institutions and Policies—Pol S 215
 3 Fundamentals of Speech Communication—Sp Cm 212
 6 Agricultural Science
 0.5 Library Instruction—Lib 160

Curriculum in Seed Science

Administered by the Departments of Agricultural and Biosystems Engineering, Agronomy, Horticulture, and Plant Pathology. Must be taken as a secondary major in conjunction with a primary major. The seed science program is designed for students with career interests in one or more aspects of the seed industry. Areas of study include: seed production, conditioning, pathology, physiology, quality control, and marketing, as well as seed plant designs.

- Cr. Degree Requirements**
12.5 Interpersonal and public communication skills
 Engl 150, 250; Sp Cm 212 or AgEdS 311; Lib 160; Engl 302 or 309 or 314 or Sp Cm 312
38 Mathematical, physical, and life sciences
 Math 140 or 150; Stat 101 or 104; Chem 163, 163L; BBMB 221 or Chem 231, 231L; Phys 106 or 111, or Chem 164, 164L; Biol 211, 211L; Biol 212, 212L; Ent 376; Gen 320 or Biol 313; Agron 317; PI P 408; and demonstration of computer proficiency (see department of primary major for procedures)
15 Humanities, ethics, and social science
 3 cr. each of humanities, social sciences, ethics (from an approved list), U.S. diversity (from an approved list), and international perspectives
21 Agricultural sciences
 Agron 114 or Hort 221; Agron 154, 206, 354; Agron or Hort electives (6 cr.); TSM electives (3 cr.)
9 Economics and business
 Econ 101, 235; and one course from the following group: Acct 284; Econ 102, 330, 336; Mgmt 370; Mkt 340
10 Seed science
 Agron 338, 421, 491, and 2 cr. of Agron, Hort, PI P or TSM electives at the 300-400 level
22.5 Primary major requirements and free electives
128 Total credits

Typical Program for the First Year

Because seed science is a secondary major, the courses taken by the student during the first year will vary, depending on the primary major (see typical program for the primary major).

College of Business

Labh S. Hira, Dean
 Michael R. Crum, Associate Dean
 Kay M. Palan, Associate Dean
www.bus.iastate.edu

Departments of the College

Accounting
 Finance
 Logistics, Operations and Management
 Information Systems
 Management
 Marketing

Objectives of the Curriculum in Business

The instructional objective of the College of Business is to provide a high quality professional education in business. Such an education should provide the student with: (1) an appreciation of the evolution of the profession and an awareness of the ethical, global, technological, economic, political and social forces shaping its future; (2) an understanding of the major functional areas of business with the opportunity for specialization for a career in business; (3) an ability to recognize and appreciate the affect of diversity in the work place; (4) an opportunity for advanced study.

A comprehensive education in business includes a broad foundation in the liberal arts, courses in the major functional areas of business activity, proficiency in analytical methods, and the ability to identify problems and arrive at logical solutions. In addition, a professional education is designed to inspire students to assume business and community leadership.

The curriculum in business is accredited by the International Association for Management Education (AACSB), the national business accrediting agency.

Organization of Curriculum

The undergraduate curriculum in business is divided into two phases: a general education (pre-business) program and a professional program. The pre-business requirements provide a broad foundation in the liberal arts. The professional program includes two parts: (1) the business core which provides a common body of knowledge in all the functional areas in business, and (2) a major area of study. The eight majors offered for the degree bachelor of science (B.S.) are accounting; finance; management; management information systems; marketing; logistics and supply chain management; operations and supply chain management; and business economics. The college also offers a secondary major in international business. Elective courses are part of the curriculum.

Bachelor of Science

The bachelor of science (B.S.) degree offers a high quality professional education in business. It prepares students for professional careers in specialized functions of business and government. Candidates for this degree must satisfy

the requirements established by the College of Business and also the requirements for individual majors specified by the departments of the College. All candidates for the B.S. degree are required to complete one of the following majors: accounting; finance; management; management information systems; marketing; logistics and supply chain management; operations and supply chain management; or business economics.

Required High School Preparation

Students entering the pre-business curriculum must present evidence of the following high school preparation:

- a. Four (4) years of English/Language Arts, emphasizing writing, speaking, and reading as well as an understanding and appreciation of literature.
- b. Three (3) years of mathematics, including one year each of algebra, geometry, and advanced algebra.
- c. Three (3) years of science, including one year each of courses from two of the following fields: biology, chemistry, and physics;
- d. Two (2) years of social studies.

Admission Standards to Professional Programs

All new entering students are enrolled in the pre-business curriculum. To enter the professional program in the College of Business, students must complete any Engl 101 courses, Engl 150, and the following foundation courses or their approved substitutions: Math 150, Econ 101, Econ 102, Stat 226, Acct 284, and BusAd 101. See Curriculum in Business.

In addition, all students must achieve an Iowa State University cumulative grade point of 2.5 or a grade-point average of 2.5 in the foundation courses. Admission into the professional program is a prerequisite for pre-business students to gain admission into upper-level business classes.

Students who meet the following requirements qualify for early admission to the professional program. First Semester Freshman: ACT score of 30 or higher, or ranked in the top 5% of high school class, or National Merit/Achievement Finalist, or member of the Freshman Honors Program. All other Students: minimum ISU cumulative GPA of 3.35 in at least 12 credits, or full member of the University Honors Program.

If using the foundation courses for admission to the Professional Program, both transfer grades and Iowa State University grades are used to compute the grade point average. If foundation courses initially taken at Iowa State University need to be repeated, they must be

repeated at Iowa State University. With the exception of Acct 285 and MIS 330, pre-business students do not have access to business core classes. To facilitate registration, qualified students may be conditionally admitted during the semester in which they complete the admission requirements.

Admission requirements are subject to change. Applications and the current requirements for admission to the College of Business are available on the Web at <https://apps.bus.iastate.edu/ProfessionalProgram/> or from the Undergraduate Programs Office in the College of Business.

Academic Standards and Graduation Requirements

Policies for students enrolled in the College of Business may be obtained on the Web at <http://www.business.iastate.edu/undergraduate/> or from the Undergraduate Programs Office in the College of Business.

Students are responsible for knowing and adhering to these College of Business policies as well as the university regulations found in this catalog. The following policies are in effect for students graduating from a professional curriculum in business with a B.S. degree under the 2009-2011 catalog:

- (1) A minimum of 122 semester credits are required.
- (2) At least 50 percent of the required business credits must be earned at Iowa State. All 300 level and higher business credits must be earned at a four-year college.
- (3) At least 50% of the 122 credits required for graduation must consist of general education (non-business credits).
- (4) A minimum of 12 credits of the last 32 credits earned in residence must be applied to the business core and/or the major.
- (5) The major departments reserve the right to determine the appropriate section of the degree program to which transfer credits will be assigned.
- (6) Students must achieve Communication proficiency by earning a grade of C or better in two of the three required English courses.
- (7) A student must earn a grade of C or higher in a minimum of 30 credits applied to the business core and the major.
- (8) A student must earn at least 42 credits of 300 level and higher coursework from a four-year institution.
- (9) Business majors may not take business courses Pass-Not Pass (P/NP).
- (10) General education courses may not be taken P/NP.
- (11) No more than 9 elective credits may be taken P/NP.

Curriculum in Business

The college offers programs of study leading to the degree bachelor of science with a major in accounting; finance; management; management information systems; marketing; logistics and supply chain management; operations and supply chain management; or business economics. The college also offers a secondary major in international business. Total credits required: 122

Pre-business Curriculum

- | | |
|-------------|--|
| Cr. | |
| 18.5 | Foundation Courses |
| R | BusAd 150 ³ |
| 3 | BusAd 250 |
| 3 | Math 150 ^{1, 2} |
| 3 | Econ 101 |
| 3 | Econ 102 |
| 3 | Stat 226 ² |
| 3 | Acct 284 |
| 0.5 | BusAd 101 |
| 12.5 | Communications |
| 3 | Engl 150 |
| 3 | Engl 250 |
| 3 | Engl 302 |
| 3 | Sp Cm 212 |
| 0.5 | Lib 160 |
| 7 | Supporting courses¹ |
| 0.5 | BusAd 201 |
| 0.5 | BusAd 301 |
| 3 | Acct 215 |
| 3 | Math 151 ^{1, 2} |
| 24 | General Education Requirements |
| 6 | Global/International Perspectives ⁴ |
| 9 | Humanities |
| 3 | Phil 230 |
| 6 | Select from approved list |
| 3 | Natural science |
| 6 | Social science |
| | U.S. diversity course ⁵ |
- 1 Acct, Fin, and Bus Econ majors will also take State 326 as part of the supporting courses. Bus Econ majors will take Math 160 instead of 150, and Econ 207 instead of Math 151. See the Undergraduate Programs Office in the College of Business.
- 2 Students not adequately prepared in mathematics may have to take remedial courses in addition to courses listed above. Remedial mathematics courses may not be used to satisfy credit requirements for graduation in the business curricula.
- 3 Students without adequate computer background may take Com S 103 to satisfy the computer literacy requirement.
- 4 Students may satisfy this requirement either by taking six credit hours from the University International Perspectives list, or three credit hours from the International Perspectives list and three credit hours from the College of Business Global Perspectives list. Approved list of courses is available on the web at <http://www.business.iastate.edu/undergraduate/> or from the Undergraduate Programs Office in the College of Business.
- 5 Courses for this requirement may also be used to fulfill other curriculum requirements or electives and therefore credits are not included in the sum needed.

Professional Program

- | | |
|-----|----------------|
| Cr. | |
| 24 | Business Core |
| | Block A |
| 3 | Acct 285 |
| 3 | MIS 330 |
| | Block B |
| 3 | Fin 301 |
| 3 | OSCM 320 |
| | Block C |
| 3 | Mgmt 370 |
| 3 | Mkt 340 |
| 3 | LSCM 360 |
| | Block D |
| 3 | Mgmt 478 |
- Scheduling note for core courses: Block A, B, C may be taken in any order in sequential semesters. Blocks A, B, C must be completed prior to enrollment in Block D, Mgmt 478, in the student's final semester.
- 18-21 Business Major**
- Select one:
- 18 Accounting**
- 18 Acct 383, 384, 386, 387, 485, 497
- 21 Finance**
- 6 Fin 310, 320
- 12 Select from Fin 327, 330, 361, 371, 415, of which six credits must be at the 400 level
- 3 Select from department-approved list
- 18 Management**
- 12 Mgmt 371, 377, 414, 471
- 6 Select from department-approved list
- 21 Management Information Systems**
- 15 MIS 331, 432, 433, 435, 438
- 6 Select from department-approved list
- 18 Marketing**
- 9 Mkt 443, 444, 447
- 6 Select from Mkt 343, 410, 442
- 3 Select from department-approved list
- 18 Logistics and Supply Chain Management**
- 15 LSCM 460, 461, 485, 486, 487
- 3 Select from department-approved list
- 18 Operations and Supply Chain Management**
- 15 OSCM 422, 424, 485, 486, 487
- 3 Select from department-approved list
- 18 Business Economics**
- 9 Econ 301, 353, 431, 492
- 9 Select from departmental approved list
- 9-15 Elective Courses**
- Select courses to broaden or complement required courses to meet degree requirement of 122 credits. (See adviser).

CPA Note: See Accounting Curriculum for information on the additional requirements for students who wish to be candidates for the CPA exam.

Sample Four-Year Plan of Study

- | | |
|-------|---|
| Cr | |
| | Freshman Year |
| 0.5-1 | Bus Ad 101/102 |
| R | Bus Ad 150 |
| 3 | English 150 |
| 3 | Bus Ad 250 |
| 6 | Econ 101 and 102 |
| 6 | Math 150 and 151 |
| 4 | Computer Science 103 (Placement out via assessment) |
| 0.5 | Library 160 |
| 3 | International Perspectives |
| 3 | Humanities |
| 6 | Social Science |
| 35.5 | |
| Cr. | Sophomore Year |
| 0.5 | Bus Ad 201 |
| 0.5 | Bus Ad 301 |
| 3 | Acct 284 |
| 6 | Acct 285, MIS 330 (Block A) |
| 3 | Stat 226 |
| 3 | Acct 215 |
| 3 | Speech Communications 212 |
| 3 | Engl 250 |
| 3 | International Perspective/Global Perspective |
| 3 | U.S. Diversity |
| 3 | Philosophy 230 |
| 31 | |
| Cr. | Junior Year |
| 6 | Fin 301, OSCM 320 (Block B) |
| 9 | Mkt 340, LSCM 360, Mgmt 360 (Block C) |
| 6 | Major Courses |
| 3 | Humanities |
| 6 | General Electives |
| 30 | |
| Cr. | Senior Year |
| 3 | Mgmt 478 (Block D) |
| 3 | English 302 |
| 12-15 | Major Courses |
| 3 | Global Perspective |
| 6 | General Electives |
| 30 | |
| | Block A |
| | Acct 285 |
| | MIS 330 |
| | Block B |
| | FIN 301 |
| | OSCM 320 |
| | Block C |
| | Mkt 340 |
| | LSCM 360 |
| | Mgmt 370 |
| | Block D |
| | Mgmt 478 |
| | Block A, Block B, and Block C are prerequisites for Block D |

Advising System

The Undergraduate Programs staff, under the leadership of the Director for Undergraduate Programs, facilitates student progress toward graduation while supporting the academic standards of the College of Business and Iowa State University. To accomplish this, the Undergraduate Programs staff provides services for all College of Business students, including academic advising, learning opportunities, and teaching and developmental activities.

Students in the College of Business have advisers located in the Undergraduate Programs Office. The adviser assists students with developing an academic program; accessing pertinent university resources; and meeting their educational objectives.

The college offers an orientation program for entering students. All entering students and family members are encouraged to attend orientation. During orientation the adviser and the student prepare an appropriate schedule and the student registers for courses. Placement assessments may be required in Mathematics and English to assist in placing students in the appropriate level of courses if this cannot be determined by ACT/SAT scores, high school preparation classes or transfer courses.

Honors

Entering freshmen who meet one of the following criteria, and have a minimum English ACT of 24, will be invited to apply for membership in the Freshman Honors Program: earned an ACT composite of 30, or ranked in the top 5% of their high school classes; or selected as a National Merit or National Achievement finalist.

Enrolled students who have completed 12 graded credits at Iowa State University and earned a 3.35 can be admitted as a full member of the Honors Program. To qualify for full membership, students must have declared a major, developed a program of study, and have a minimum of 48 credits remaining before graduation. Special advisers will assist honors students in developing an appropriate program of study.

Internships

Credit and non-credit internships in business may be approved for College of Business students in all majors including pre-business. Credit hours and requirements vary. Arrangements must be made in the college prior to the beginning of the internship. An internship adviser from the Career Services Center will assist students in making these arrangements.

Multiple Majors

Undergraduates pursuing a degree in the College of Business may complete additional majors in the College of Business. Those desiring additional majors outside the college should refer to the catalog section of the appropriate college and department for the additional major requirements. A multiple major in business economics and agricultural business or economics is not permitted. A major in business economics with a minor in economics is not permitted.

Undergraduates with a primary major outside the College of Business who want a second major in business must meet the admission requirements for the professional program as well as complete the following requirements: the business core courses; the major specialization; computer proficiency; Acct 215; and Math 151.

All students pursuing multiple majors or multiple degrees within the College of Business are required to have a minimum of 15 credits of coursework in each additional major that is not used in the other majors.

Students are limited to three business majors/degrees within the College of Business, or a total of three business major/minors within the college. This limit is on business majors/degrees/minors only, and does not apply to multiple majors/degrees/minors taken outside the College of Business.

Students are limited to three business majors/degrees within the College of Business, or a total of three business major/minors within the college. This limit is on business majors/degrees/minors only, and does not apply to multiple majors/degrees/minors taken outside the College of Business.

Curriculum Changes

Iowa State University students who want to change their curriculum to the College of Business must attend a curriculum change meeting. See Changing Curriculum or Major for more details on this process. Students on Academic Probation will not be allowed to change curriculum to the College of Business during enrollment period three. See Making Schedule Changes.

International Business Secondary Major

A student in the College of Business may earn a secondary major in International Business. The requirements for this major include 12 credits in international business courses, one year of the same university-level foreign language (minimum 6 credits) and an approved international experience (minimum 3 months). Students who pursue this secondary major will be required to complete the requirements for a primary major in Business. Fifteen of the 18 credits required for the International Business major may not be used for the primary major.

Minor

The College of Business offers a structured minor in general business to students outside the College. The minor requires a minimum of 15 credits, not including pre-requisite courses. Requirements for the minor are ACCT 284, Acct 285 or ACCT 215 or BUSAD 250 (6 credits), three courses selected from Fin 301, Mgmt 370, MIS 330, Mkt 340, LSCM 360, or OSCM 320 (9 credits). The minor must include at least 6 credits in courses numbered 300 or above taken at Iowa State University. A "C" average or higher is required in all courses used to satisfy the minor requirements. All requirements for the minor must be taken for a grade.

Students with a major in the College of Business may qualify for a minor specialization in one of the college's departments by taking at least 15 credit hours in the minor specialization, nine hours of which may not be used to satisfy any other department, college, or university requirement. The minor must include at least 6 credits in courses numbered 300 or above taken at Iowa State University with a grade of C or higher. Students with declared majors have priority over students with declared minors in courses with space constraints.

Students with a major outside the College of Business are eligible for a general business minor only—not a specialization in a business department.

Students are limited to three business majors/degrees within the College of Business, or a total of three business major/minors within the college. This limit is on business majors/degrees/minors only, and does not apply to multiple majors/degrees/minors taken outside the College of Business.

Entrepreneurial Studies Cross-Disciplinary Minor

The College of Business participates in a cross-disciplinary minor in Entrepreneurial Studies. This minor is available to any undergraduate student. Requirements for the minor include Mgmt 310, Mgmt 313 (6 credits), two business-oriented electives from an approved list (6 credits), and an experiential learning component (3 credits). The approved list of courses is available in the Undergraduate Programs Office in the College of Business and on the web at <http://www.business.iastate.edu/undergraduate/minors/entrepreneurship>.

Non-degree Seeking Students

Students who wish to take courses in the College of Business, but are not seeking an undergraduate degree, should apply to the college as non-degree seeking students. Non-degree seeking students are eligible to take up to 9 credits in 300-level and above business courses without meeting the college's admission requirements.

Upper Division Courses for Students Outside the College

Students from outside the College of Business are eligible to take up to 9 credits of 300-level and above business courses without meeting the college's admission requirements, as long as they meet course prerequisites.

Graduate Study

Four programs are offered at the graduate level: a master of business administration (M.B.A.) program, a master of accounting (M.Acc.), a master of science (M.S.) in business, and a master of science in information systems (M.S.I.S.). These programs are intended to meet distinct sets of educational objectives.

The M.B.A. is the professional management education program for those pursuing careers in business. The purpose of this professional program is to provide professional business education by preparing students to understand the impact of technology on business organizations in a global environment. The M.B.A. program consists of a 48-credit curriculum leading to a non-thesis, non-creative component master of business administration. Students may pursue a specialization in accounting, agribusiness, family financial planning, finance, information systems, international business, supply chain management or marketing.

The master of accounting (M.Acc.) is a 32-hour degree. The program requires 15 hours of graduate accounting courses, at least 9 hours of non-accounting graduate electives, a communications course, and an international course from an approved list. The M.Acc. is appropriate for any student wanting to pursue a variety of accounting careers. Additionally, the program is designed to help interested candidates meet the 150-hour education requirement for CPA certification in Iowa.

The master of science in information systems (M.S.I.S.) is designed to provide students with strong technical skills and a broad background in business needed to effectively develop and manage information systems projects. Using the latest software, students will apply information systems theory and concepts to modern information systems development. Program requirements range from 30-40 credits depending upon the student's background. The M.S.I.S. curriculum includes business foundation courses, information systems core courses and electives, and a research requirement (creative component).

The M.S. program, consisting of 30 minimum credits, is oriented toward further business specialization at the master's level for students with undergraduate degrees or academic backgrounds in business. The program is intended to serve those students who desire specialized study of an area within business. Students in the program must complete a thesis. This program is also a suitable vehicle for students planning to pursue a Ph.D. in business.

Double degree programs are offered with architecture (M.Arch./M.B.A.), community and regional planning (M.B.A./M.C.R.P), informational systems (M.B.A./M.S.I.S), and statistics (M.B.A./M.S.-Statistics). The Department of Logistics, Operations, and Management Information Systems in the College of Business participates in the following graduate level interdepartmental programs: Information Assurance, Human Computer Interaction, Seed Science and Business, and Transportation. The College of Business also offers a business administration minor to students with majors outside the college. A concurrent B.S./M.B.A. is available to eligible engineering undergraduate students majoring in civil engineering, computer engineering, electrical engineering, industrial engineering, and mechanical engineering.

Ph.D in Business and Technology

The College of Business offers graduate work leading to the Doctor of Philosophy degree in business and technology, with one of three specializations—customer management (CM), supply chain management (SCM), or management information technology (MIT). Many departments in the college (Logistics, Operations, Management Information Systems, Marketing and Management), and the departments of Statistics, Economics, Psychology, and Sociology cooperate in providing coursework toward this degree. The program will prepare individuals for academic careers in research, teaching, and public service at institutions of higher learning in the United States and other countries. The PhD program consists of a 44 credit course curriculum followed by 12 credit thesis or dissertation. Students do not need to have an undergraduate degree or master's degree in business in order to qualify for enrollment in the PhD program. However, students without a graduate degree in business will be required to complete 18 credit hours of business foundation courses. For more details or application information see the Business Administration Department listing in this catalog.

College of Design

Mark C. Engelbrecht, Dean
 Kate Schwennsen, Associate Dean
 Timothy O. Borich, Associate Dean
www.design.iastate.edu

Departments of the College

Architecture
 Art and Design
 Community and Regional Planning
 Landscape Architecture

Objectives of the Curricula in Design

The College of Design is among a small, elite number of comprehensive design schools offering outstanding opportunities for both disciplinary and interdisciplinary education.

The College of Design strives to provide each student with a broad educational background and preparation in a specific environmental design or art discipline. Each program is designed to develop knowledge and appreciation of the physical and cultural environment, to stimulate creative thinking and analysis, and to prepare students for participation in a wide variety of careers.

The college's programs also encompass many opportunities for individualized study and extracurricular activities such as visiting lectures and symposia, workshops, gallery exhibits, practicum and internship programs, field trips, and international study programs.

Graduates of the college are employed in private firms, government, industry, and education, or are self-employed as designers or artists. Opportunities for graduates include careers as architects, landscape architects, community and regional planners, graphic designers, interior designers, studio artists, arts administrators and environmental designers.

Graduate Curricula

The College of Design offers graduate study in the areas shown below. Graduate study is conducted through the Graduate College. Details are found in the Graduate College section of this catalog.

Majors

Architecture
 Architectural Studies
 Art and Design
 Community and Regional Planning
 Graphic Design
 Integrated Visual Arts
 Interior Design
 Landscape Architecture
 Transportation*

Double Degree Programs

Architecture / Business
 Architecture / Community and Regional Planning
 Community and Regional Planning / Landscape Architecture
 Community and Regional Planning / Public Administration

Minor

Gerontology*

*The College of Design participates in this interdepartmental graduate program.

Undergraduate Curricula Majors

Architecture
 Art and Design
 Community and Regional Planning
 Graphic Design
 Interior Design
 Integrated Studio Arts
 Landscape Architecture

Secondary Majors

Environmental Studies*
 International Studies*

Minors

Design Studies
 Digital Media
 Entrepreneurial Studies*
 Environmental Studies*
 Gerontology*
 International Studies*
 Technology and Social Change*

*The College of Design participates in these interdepartmental secondary majors and minors.

Organization of Curricula

The undergraduate curricula in design are divided into two phases: a pre-professional Core Design Program and a professional program. The Core Design Program grounds the undergraduate degree programs, provides a rich, rigorous inclusive base for the curricula. It creates shared language, experience, and community for programs, faculty and students and exposes students to all design disciplines, allowing them to make more informed degree choices, apply to multiple programs, and experiment with interdisciplinary work.

For students entering the Core Design Program, the college highly recommends purchase of a digital camera.

The intense, discipline-specific professional curricula that follow the Core focus on developing students' ability and knowledge in their major. Within the major area, students advance creative and professional skills through classroom and studio work, critiques of student projects, discussion with professional practitioners, and field studies.

General education, contained in both the Core and the professional programs, is composed to insure that students receive a well-rounded undergraduate education.

High School Preparation

Courses in fine arts and design that develop visualization and freehand drawing abilities are highly recommended though not required for entrance. Students planning to enroll in an academic program in the College of Design must complete the following high school requirements: 4 years of English, including coursework in composition and literature and up to 1 year of speech and/or journalism, to develop communication skills and critical reading/writing ability; 3 years of mathematics to develop problem solving skills, including 1 year each of algebra, geometry, and advanced algebra; 3 years of science, including at least two of the following: 1 year of biology, 1 year of chemistry, or 1 year of physics; 2 years of social studies, including at least 1 year of U.S. history and 1 semester of U.S. government.

Admission Standards to Enrollment Managed Professional Programs

Admission into the enrollment managed professional programs of Architecture, Community and Regional Planning, Graphic Design, Interior Design, and Landscape Architecture requires a separate application after completing the Core Design Program, depends on available resources, and is subject to review by faculty committee. Applicants are reviewed on the basis of a portfolio of original work, scholarship performance, and a written essay.

Advising

Each student receives personal assistance from an academic advisor within the student's curriculum area. Students enrolled in the college's Core Design Program are advised by professional advisers. Once admitted to professional programs, students are assigned to faculty advisers. Advisers help students develop a program of study, access pertinent university resources as well as provide information on career choice.

The college's career services office works with students to develop their career goals as well as prepare and search for employment.

Honors Program

The College of Design participates in the Honors Program which provides opportunities for outstanding students to individualize their programs of study. See *Index, Honors Program*.

Requirements in the College of Design

All students in the College of Design are expected to meet the following requirements of the college.

Core Design Program

Cr.	Fall/Spring
4	Dsn S 102
4	Dsn S 131
3	Dsn S 183
6	Social Science/Humanities Electives*
6	Math/Science Electives**
6	English 150/250
0.5	Library 160
29.5	**

* General education credits in the Core Design Program may count toward the minimum credits.

** Students applying to Architecture for admission must take Math 142 and Physics 111 in the first year. These two courses total seven credits for a total of 30.5 core credits.

General Education Minimum Credits.

- 6 **Biological sciences, physical sciences and mathematics**
Includes courses in the fields of agronomy, astronomy and astrophysics, biology, botany, chemistry, civil engineering, computer science, geology, mathematics, physics, statistics, and zoology.
- 9.5 **Communications**
Engl 150*, 250*, Lib 160. Includes courses in the fields of English (composition), and speech communication (interpersonal and rhetorical).
- 6 **Humanities**
Includes courses in the fields of classical studies, English (literature), foreign languages, history, philosophy, religious studies, as well as history/theory/literature courses in dance, music, theater, journalism, African American studies, American Indian studies, environmental studies, Latino/a studies, women's studies, and university studies.
- 6 **Social sciences**
Includes courses in the fields of African American studies, American Indian studies, anthropology, economics, environmental studies, geography, human development and family studies, Latino/a studies, political science, psychology, sociology, and women's studies.
- 9 **Additional credit hours selected from any of the above areas.**
Six credits must be at the 300 level or above.
- 9 **Selected from the above areas.**
Six credits must be at the 300 level or above.
- 36.5 **Minimum credits**

See departmental curricula for specific course requirements within the general education areas.

*To meet requirements for graduation, a minimum grade of C- must be received.

Minor in Design Studies

The undergraduate minor in Design Studies is constructed to facilitate design awareness among interested students and to provide a vehicle for interdisciplinary study within the College of Design. This minor is open to all undergraduate students at Iowa State University.

This minor requires fifteen credits of course work: three credits of history selected from College of Design course offerings and twelve additional credits selected from College of Design course offerings.

At least six of the fifteen credits must be taken at Iowa State University in courses numbered 300 or above. At least nine of the fifteen credits must not be used to meet any other college or university requirements except the credit requirement for graduation.

Students enrolled in the College of Design may not use courses in their major or in the Core Design Program to satisfy this minor.

Minor in Digital Media

Manipulation of digital media has emerged as an essential skill for design inquiry alongside traditional methods of building models and drawing sketches. To familiarize students with the use of digital media in the design process, the College of Design offers an undergraduate Minor in Digital Media. This minor is open to all undergraduate students at Iowa State University.

This minor requires 15 credits, including at least 6 credits taken at Iowa State University in courses numbered 300 or above. The minor must include at least 9 credits that are not used to meet any other department, college, or university requirement; and at least 3 credits from the listed courses numbered 200. Courses taken for this minor may not be taken on a pass-not pass basis.

Students enrolled in the College of Design may not use courses in their major or in the Core Design Program to satisfy this minor.

Curriculum in Architecture

The Department offers undergraduate and graduate degree programs:

A 138-credit undergraduate professional program, preceded by a 28-credit preprofessional program, leading to the bachelor of architecture degree.

A 100-credit graduate professional program leading to the Master of Architecture. Applicants holding B.S. or B.A. degrees in Architecture or other affiliated design fields may be given advanced standing in this program. (M.Arch.)

A 30-credit post-professional graduate program leading to the Master of Architecture. (M.Arch. II)

A 30-credit interdisciplinary graduate research program leading to the Master of Science in Architectural Studies. (M.S.A.S.)

For more complete graduate program descriptions see Graduate Study under Architecture in the Courses and Programs section.

In the United States, most state registration boards require a degree from an accredited professional degree program as a prerequisite for licensure. The National Architectural Accrediting Board (NAAB), which is the sole agency authorized to accredit U.S. professional degree programs in architecture, recognizes three types of degrees: the Bachelor of Architecture, the Master of Architecture, and the Doctor of Architecture. A program may be granted a 6-year, 3-year, or 2-year term of accreditation, depending on the extent of its conformance with established educational standards.

Master's degree programs may consist of a preprofessional undergraduate degree and a professional graduate degree that, when earned sequentially, constitute an accredited professional education. However, the preprofessional degree is not, by itself, recognized as an accredited degree.

Preprofessional Program

First Year

Cr.	Fall/Spring
4	Dsn S 102 (Studio)
0.5	Dsn S 115
3	Dsn S 183 (Cultures)
3	Engl 150
3	Math 142
4	Physics 111
6	Social sciences/humanities Electives*
4	Dsn S 131 (Representation)
0.5	Lib 160
28	

Professional Program

Second Year

Cr.	Fall
6	Arch 201 Studio 1
3	Arch 230 Comm.
3	Arch 221 Hist
3	Arch 240 Mat'l/Assemblies 1
3	Engl 250
18	
Cr.	Spring
6	Arch 202 Studio 2
3	Arch 222 Hist.
3	Arch 242 Struct. 1
3	Arch 357 Env Forces 1
3	Social Science/Humanity Option*
18	

Third Year

Cr.	Fall
6	Arch 301 Studio 3
3	Arch 271 Env. Theory
3	Arch 344 Struct. 2
3	Arch 458 Env. Control
3	Social Science/Humanity Option*
18	
Cr.	Spring
6	Arch 302 Studio 4
3	Arch 346 Struct. 3
3	Arch 448 Mat'l/Assemblies 2
3	SAC Elective*
3	General Elective
18	

Fourth Year**Cr. Fall**

- 6 Arch 401 Studio 5
- 3 Arch 482 Prof. Practice
- 3 University Communication Elective*
- 3 SAC Elective*
- 3 General Elective*

18**Cr. Spring**

- 6 Arch 402 Studio 6
- 3 SAC Elective*
- 3 SAC Elective*
- 3 Prof. Elective*

15**Fifth Year****Cr. Fall**

- 6 Arch 403 Studio 7
- 3 Professional Elective
- 3 General Elective
- 3 General Elective
- 3 General Elective

18**Cr. Spring**

- 6 Arch 404 Studio 8
- 3 Prof. Elective*
- 3 General Elective
- 3 General Elective

15 Electives

*from approved departmental lists

166 Total credits**Curriculum in Art and Design—B.A.**

Administered by the Department of Art and Design and leading to a 120.5 credit undergraduate Bachelor of Arts degree including a 29.5 credit pre-professional program (college core).

This curriculum offers two concentrations: Art and Culture, and Art and Design History and Theory. Both concentrations are combined with an applied career minor or approved program.

Consideration for admission into the B.A. curriculum is based upon department resources, GPA earned in the college Core Courses and the freshman year.

Transfer students with studio credits from other programs, colleges and universities must present for department review a portfolio of work done in those courses in order to have the credits apply toward studio requirements. Students are required to present this portfolio upon admission and prior to registration for classes. Arrangements for this process must be made with department advisers.

Cr. Degree Requirements**36.5 General education****6 min. Biological and physical sciences and mathematics**

Select from Astro 120, 150, Biol 101, 173, 211, 212, Bot 111, 265, Chem 160, 163, 163L, Com S 103, 107, Geol 100, 101, Gen 260, Math 104 or 150, 105, 140, 141, 151, Mteor 206, Phys 101, 106, Stat 101, 104 or any higher level course in these disciplines for which these courses are prerequisite

9.5 min. Communications

- 6 Engl 150 and 250
- 3 Select from CmDis 286, ComSt 101, 102, Sp Cm 212

0.5 Lib 160**6 min. Humanities**

Select from Af Am 201, 252, Am In 310, Cl St – all courses, Dance 270, 360, Engl 201, 230, 231, 237, 335, 340, 346, 347, 348, 353, 354, 360, 361, 362, 363, 364, 373, 374, 375, 376, 377, 378, 379, 384, 389, WLC 101, 102, 110, 201, 202, 301, 302, Hist—all courses, Music 102, 302, 304, 383, 384, Phil—all courses, Relig—all courses, T C 354, 355, Thtr 106, 110, 252, 465, 466, W S 336, 340, 345, 377, 422

6 min. Social sciences

Select from Anthr 201, 202, 306, Econ 101, 102, Pol S 215, 230, 241, 251, Psych 101, 230, Soc 130 or 134, or any higher level course in these disciplines for which these courses are prerequisite, or select from Am In 210, Env S 201, 223, HD FS 102, 239, 276, 283, 349, 367, 370, 373, 377, 378, 380, 395, JI MC 101, 205, 320, 453, 474, 476, W S 201, 301, 321, 323, 327, 346, 350, 385, 386, 401

9 min. Selected from the above areas

and/or from CmDis 275, 286, ComSt 101, 102, 214, 310, 311, 314, 317, 318, Engl 205, 219, 220, 302, 303, 304, 305, 306, 309, 310, 314, 315, 316, Fin 361, 371, L A 271, Mgmt 370, Mkt 340, Sp Cm 212, 305, 312, 321, 322, 323, 325, 327. Six credits must be at the 300 level or above.

6 min. General design education

- 3 Select a history course from Arch, Art H, Dsn S, or L A.
- 3 Select from Art H 181, 426, 446, or other approved design studies course
- 11 College of Design Core (4 cr); Dsn S 131 (4 cr); Dsn S 183 (3 cr)
- 12 Art History
- 6 Art H 280 & 281 Art History I & II
- 6 selections 300 level or above
- 12 Art and Culture Concentration
- 12 Design and Art Options
- Select from all 200-level courses in Art, ArtIS, graphic design, and interior design, or approved list of courses in architecture, landscape architecture, community and regional planning, and textiles and clothing that are open to nonmajors.
- 30 Applied minor* or approved program of study (at least 6 credits 300 or above courses). See department for specific curriculum sheets with course information.
- 13 Electives
- 120.5 Total credits
- History and Theory Concentration**
- 15 Art and Design Options
- Select 12 credits from Art H 300-400 level courses, graphic design history, or interior design history courses; 3 credits Art 498 (Museum/Gallery Internship)
- 30 Applied minor* or approved program of study (at least 6 credits must be world language courses). See department

for specific curriculum sheets with course information.

10 Electives**120.5 Total credits**

*A second major or minor must be approved by the department offering the program of study. See university guidelines for structuring and declaring a second major and/or minor. Credit hours not applied toward a formal second major or minor must be used in a coherent program approved by the Department of Art and Design. Approval for these 30 credits must be documented in writing following completion of 75 credits and before completion of 100 credits toward the B.A. degree.

Curriculum in Community and Regional Planning

The Department of Community and Regional Planning administers the 129 credit undergraduate program leading to the Bachelor of Science. The curriculum is designed to prepare students to enter the profession of planning ready to work in a variety of professional settings. Students have the opportunity to work with their faculty advisers to define their own areas of interest, which may include a minor.

Consideration for admission into the Community and Regional Planning professional program takes place either through review of the performance in the College of Design's first year CORE design program, or through transfer from another curricula or accredited institution. If applying through the CORE program, admission is based upon a student's cumulative GPA for all courses earned during the first year, portfolio work submitted upon completion of the CORE courses, and an essay submission. In either case, predictors of success in the program include the quality of prior work and interest in the field. Community and Regional Planning emphasizes responsibility and citizenship, writing and analytical ability, and critical thinking. Students entering the CRP professional program from outside the College of Design should provide a similar portfolio of their work for evaluation.

Cr. Degree Requirements**12.5 Communications**

Engl 150, 250, 309 or 314; Lib 160; Sp Cm 212

9 Humanities**7 Mathematics**

Stat 101; Math

6 Natural sciences**18 Social sciences**

Econ 101 or 102; Pol S 215; Soc 134; options

11.5 Design core

Dsn S 102; Dsn S 115; Dsn S 131; Dsn S 183

28 Community and Regional**Planning Core**

C R P 253, 272, 274, 332, 383, 391, 432, 492, 494, 498

12 Core Planning Electives —

choose 4 from:

- 416 Urban Design and Practice
- 417 Urban Revitalization
- 425 Growth Management
- 429 International Planning
- 435 Planning in Small Town
- 442 Site Development

- 445 Transportation Policy Planning
- 451 Introduction to Geographic Information Systems
- 455 Community Economic Development
- 481 Regional and State Planning
- 484 Sustainable Communities
- 491 Environmental Law and Planning
- C E 350 Introduction to Transportation Planning
- 11 Other Planning and Planning Related Courses
- 14 General Electives
- 129 Total credits

Curriculum in Graphic Design

Administered by the Department of Art and Design and leading to a 123.5 credit undergraduate Bachelor of Fine Arts in Graphic Design including a 29.5 credit pre-professional program (the college core).

Consideration for admission into the graphic design is based on department resources; GPA earned in the College Core courses and the freshman year; as well as portfolio, all of which are submitted at the end of the freshman year.

On admission to the program, the faculty strongly recommend the purchase of a laptop computer and software. Specifications for the laptop computer and software are available at www.design.iastate.edu under the "Students" link.

Transfer students with studio credits from other programs, colleges, and universities must present for departmental review a portfolio of work done in those courses in order to have the credits apply toward studio requirements. Students are required to present this portfolio upon admission and prior to registration for classes. Arrangements for this process must be made with department advisers.

- Cr. Degree Requirements**
- 39.5 General education**
- 6 Biological and physical sciences and mathematics**
Select from Astro, Biol, Bot, Chem, Com S, Geol, Gen, Math, Mteor, Stat, Phys.
- 9.5 Communications**
- 6 Engl 150 and 250
- 3 Select from CmDis 286, ComSt 101, 102, Sp Cm 212
- 0.5 Lib 160
- 6 Humanities**
Select from all courses in Af Am, Am In, Ci St, Dance, Engl, WLC, Hist, Music, Phil, Relig, T C, Thtre. Select from W S 336, 340, 345, 422
- 6 Social sciences**
Select from all courses in Anthr, Econ, Pol S, Psych, Soc, Am In, Env S, HD FS, JI MC. (all courses except 315, 342, 342L, 343L). Select from W S 201, 302, 321, 323, 327, 346, 350, 385, 386, 401.
- 12 Selected from the above areas and/or from Advrt (all courses except 436) CmDis, Fin, Mgmt, Mkt, Sp Cm. Six credits must be at the 300 level or above.

- 11 Design Core**
(4 cr); Dsn S 131 (4 cr); Dsn S 183 (3 cr)
- 21 General Design Education**
- 6 History of Art I, II, Art H 280, 281
- 3 Drawing, Art 230
- 6 Select a history course from ArtGr 388, Arch, Art H, Dsn S, or L A.
- 6 Studio Options:** Select from ArtIS, ArtID, LA, Arch or other approved studio course.
- 46 Graphic design**
- 3 Design Through Photography ArtIS 229 or ArtIS 227
Graphic Design Studio I and II—ArtGr 270, 271
- 4 Graphic Technology I and II—ArtGr 275, 276
- 1 Theories and Principles of Graphic Design—ArtGr 291
- 1 Graphic Design Internship Seminar—ArtGr 377
- 6 Graphic Design Studio III and IV—ArtGr 370, 371
- 3 Graphic Design History/Theory/Criticism I, ArtGr 387
- 2 Graphic Design Materials and Processes—ArtGr 372
- 3 Graphic Design Studio V—ArtGr 470
- 3 Graphic Design Professional Presentation—ArtGr 482
- 3 Graphic Design Professional Practices—ArtGr 481
- 8 Select four 2-credit options from approved program list.
One option will be taken with ArtGr 370, 371, 470, 482
- 3 Select from: Art and Design in Europe—Art 495G
Graphic Design Internship—ArtGr 480
- 6 Electives
- 123.5 Total credits**

Curriculum in Integrated Studio Arts—B.F.A.

Administered by the Department of Art and Design and leading to a 120.5 credit undergraduate Bachelor of Fine Arts in Integrated Studio Arts including a 29.5 credit pre-professional program (the college core).

Consideration for admission into the Integrated Studio Arts program is based upon departmental resources; GPA earned in the College Core courses and in the freshman year; as well as a portfolio, all of which are submitted at the end of the freshman year.

Transfer students with studio credits from other programs, colleges, and universities must present for department review a portfolio of work done in those courses in order to have the credits apply toward studio requirements. Students are required to present this portfolio upon admission and prior to registration for classes. Arrangements for this process must be made with department advisers.

On admission to the program, if the student wishes to pursue studies in digital media and or photography, the faculty strongly recommend the purchase of a laptop computer

and software. Specifications for the laptop computer and software are available at www.design.iastate.edu under the "Students" link

- Cr. Degree Requirements**
- 36.5 General education**
- 6 min Biological and physical sciences and mathematics**
Select from Astro 120, 150, Biol 101, 173, 211, 212, Bot 111, 265, Chem 160, 163, 163L, Com S 103, 107, Geol 100, 101, Gen 260, Math 104 or 150, 105, 140, 141, 151, Mteor 206, Phys 101, 106, Stat 101, 104, or any higher level course in these disciplines for which these courses are prerequisite
- 9.5 min. Communications**
- 6 Engl 150 and 250
- 3 Select from CmDis 286, ComSt 101, 102, Sp Cm 212
Lib 160
- 6 min. Humanities**
Select from Af Am 201, 252, Am In 310, Ci St—all courses, Dance 270, 360, Engl 201, 230, 231, 237, 335, 340, 346, 347, 348, 353, 354, 360, 361, 362, 363, 364, 373, 374, 375, 376, 377, 378, 379, 384, 389, WLC 101, 102, 110, 201, 202, 301, 302, Hist—all courses, Music 102, 302, 304, 383, 384, 472, Phil—all courses, Relig—all courses, T C 354, 355, Thtre 106, 110, 252, 465, 466, W S 336, 340, 345, 377, 422
- 6 min. Social sciences**
Select from Anthr 201, 202, 306, Econ 101, 102, Pol S 215, 230, 241, 251, Psych 101, 230, Soc 130 or 134, or any higher level course in these disciplines for which these courses are prerequisite, or select from Am In 210, Env S 201, 223, HD FS 102, 239, 276, 283, 349, 367, 370, 373, 377, 378, 380, 395, JI MC 101, 205, 320, 453, 474, 476, W S 201, 301, 321, 323, 327, 346, 350, 385, 386, 401
- 9 min. Selected from the above areas and/or from CmDis 275, 286, ComSt 101, 102, 214, 310, 311, 314, 317, 318, Engl 205, 219, 220, 302, 303, 304, 305, 306, 309, 310, 314, 315, 316, Fin 351, 357, Mgmt 370, Mkt 340, Sp Cm 212, 305, 312, 321, 322, 323, 325, 327. Six credits must be at the 300 level or above**
- 11 College of Design Core**
Dsn S 102 (4 cr); Dsn S 131 (4 cr); Dsn S 183 (3 cr)
- 30 ISA Core**
- 2 ArtIS 200 Studio Introduction (students must take all sections ArtIS 205, 207, 209, 211)
- 3 ArtIS 208 Color Studio
- 3 Art 230 Drawing II
- 6 ArtH280and281ArtHistoryI&II
- 3 ArtIS310SourcesofVisualDesign
- 24 ISA Concentration**
Select eight (8) courses from two and three dimensional ArtIS studio offerings (ArtIS 200, 300 and 400 levels). Students will be assigned an adviser who will assist them in developing their studio concentration

plan.

9	Art History Select from 300 level or above courses
3	Professional Practice
2	ArtIS 399 BFA Professional Practice I
1	ArtIS 499 BFA Professional Practice II
10	Electives
120.5	Total credits

Curriculum in Interior Design

Administered by the Department of Art and Design and leading to a 127.5 credit undergraduate Bachelor of Fine Arts in Interior Design including a 29.5 credit pre-professional program (the college core).

Consideration for admission in the Interior Design program is based upon departmental resources; GPA earned in the College Core and the freshman year; as well as a portfolio, all of which are submitted at the end of the freshman year.

A 34 graduate credit program leading to the master of arts, for students planning to undertake professional or design research-orientated pursuits (NOTE: Applicants without a previous undergraduate degree in interior design may be required to complete up to 40 additional credits of deficiency work).

A 60 graduate credit post-professional graduate program leading to the degree master of fine arts.

For more complete graduate program descriptions see Graduate Study under Interior Design in the Courses and Programs section.

Consideration for admission into the undergraduate Interior Design curriculum requires completion of 29.5 credit freshman design core program, including the following courses: Dsn S 102, Dsn S 131, Dsn S 183, 6 credits of Social Science/Humanities, 6 credits of Math/Science, English 150 or 250 and Library 160. Admission is based on department resources and will be determined by a formal review at the end of the freshman foundation year.

Transfer students with studio credits from other programs, colleges, and universities must present for departmental review a portfolio of work done in those courses in order to have the credits apply toward studio requirements. Students are advised to present portfolio upon admission and prior to registration for classes. Arrangements for this process must be made with department advisers.

Cr.	Degree Requirements
36.5	General education total including:
6	Biological and physical sciences and mathematics
	Math 104 or 105 or 140 or 150.
	Select from Astro 120, 150, Biol 111, 173, 211, 212, Bot 111, 265, Chem 160, 163, 163L, Com S 103, 107, Geol 100, 101, Gen 260, Math 104 or 150, 105, 140, 141, 151, Mteor 206, Phys 101, 106; Stat 101, 104 or any higher level course in these disciplines for which these courses are prerequisite
9.5	Communications
	Engl 150 and 250; Lib 160
	Select from CmDis 286; ComSt 101, 102, Sp Cm 212
6	Humanities
	Select from Af Am 201, 252; Am In 310, Ci St – all courses, Dance 270, 360, Engl 201, 230, 231, 237, 335, 340, 346, 347, 348, 353, 354, 360, 361, 362, 363, 364, 373, 374, 375, 376, 377, 378, 379, 384, 389, WLC 101, 102, 110, 201, 202, 301, 302, Hist—all courses, Music 102, 302, 304, 383, 384, 472, Phil—all courses, Relig—all courses, T C 354, 355, Thtre 106, 110, 252, 465, 466, W S 336, 340, 345, 377, 422
6	Social sciences
	Select from Anthr 201, 202, 306; Econ 101, 102, Pol S 215, 230, 241, 251, Psych 101, 230, Soc 130 or 134, or any higher level course in these disciplines for which these courses are prerequisite, or select from Am In 210, Env S 201, 223, HD FS 102, 239, 276, 283, 349, 367, 370, 373, 377, 378, 380, 395, JI MC 101, 205, 320, 453, 474, 476, W S 201, 301, 321, 323, 327, 346, 350, 385, 386, 401
9	Select from the above areas and/or
	CmDis 275, 286, ComSt 101, 102, 214, 310, 311, 314, 317, 318, Engl 205, 219, 220, 302, 303, 304, 305, 306, 309, 310, 314, 315, 316, Fin 361, 371, Mgmt 370, Mkt 340, Sp Cm 212, 305, 312, 321, 322, 323, 325, 327. Six credits must be at the 300 level or above.

11	Design Core Dsn S 102 (4 cr); Dsn S 131 (4 cr); Dsn S 183 (3 cr)
6	Select 2 history courses from Arch, Art H, Dsn S or LA
61	Interior Design Concentration, including:
2	Fundamentals of Interior Design—ArtID 250
2	Human Factors in Interior Design—ArtID 251
3	Interior Design History/Theory/Criticism I—ArtID 355
3	Interior Design History/Theory/Criticism II—ArtID 356
2	Graphic Communication for Interior Design I—ArtID 261
2	Graphic Communication for Interior Design II—ArtID 262
2	Graphic Communication for Interior Design III—ArtID 263
4	Interior Design Studio I—ArtID 265
4	Interior Design Studio II—ArtID 267
4	Interior Design Studio III—ArtID 365
4	Interior Design Studio IV—ArtID 367
4	Interior Design Studio V—ArtID 465
4	Interior Design Studio VI—ArtID 467
3	Advanced Studies in Interior Design—ArtID 469
3	Interior Design Systems I: Materials—ArtID 350
3	Interior Design Systems II: Furniture & Millwork—ArtID 351
3	Interior Design Systems III: Lighting—ArtID 352
3	Interior Design Systems IV: Building Assemblies & Support—ArtID 353
	Or
3	Materials and Assemblies I—Arch 240
1	Interior Design Internship Seminar—ArtID 360
3	Interior Design Internship—ArtID 460
2	Interior Design Professional Practices—ArtID 461
R	Sophomore Field Study—ArtID 259
R	Junior Field Study—ArtID 359
R	Senior Field Study—ArtID 459
6	Studio/Business Option Select 2 courses from Arch studio, ArtIS studio, or Mgmt/Mkt
3	Electives
128.5	Total credits

Curriculum in Landscape Architecture

The department offers graduate and undergraduate degree programs.

The undergraduate program consists of a five-year curriculum, requiring 149.5 credits, leading to the degree Bachelor of Landscape Architecture. These credits are distributed between a one-year pre-professional program of 29.5 credits and a four-year professional program of 120 credits.

Admission into the professional program depends upon available resources and is subject to the approval of a faculty committee at the completion of the pre-professional program. Applicants are reviewed on the basis of scholastic performance, a portfolio of original work, and a written essay.

The BLA from Iowa State University is an LAAB (Landscape Architectural Accreditation Board)-accredited professional degree program. In the United States, most state registration boards require a degree from an accredited professional degree program as a prerequisite for professional licensure. The LAAB is the sole entity recognized by the Council for Higher Education Accreditation to accredit U.S. first professional degree programs in landscape architecture at the Bachelor's and Master's levels.

The department also offers a 36 credit graduate program leading to the degree Master of Landscape Architecture. For more complete graduate program descriptions, see Graduate Study under Landscape Architecture in the Courses and Programs section.

Core Design Program

Cr.	Fall/Spring
4	Dsn S 102
4	Dsn S 131
3	Dsn S 183
6	Social Science/Humanities Electives
6	Math/Science Electives
6	English 150/250
0.5	Library 160
29.5	Required for professional program application
3	Additional electives recommended

Cr.	Fall second year
6	Landscape Interpretation and Representation—L A 201
3	Native Plants of the Midwest—LA 221
1	Developing Identities as Landscape Architect—LA 241
3	Cultural Landscape Studies—LA 272
3	Investigating Landscape Form, Process and Detail—LA 281
16	

Cr.	Spring second year
6	Site Planning and Design I—L A 202
3	The Social and Behavioral Landscape—L A 274
3	Introduced Plants of the Midwest—LA 222
3	Landscape Architecture History 1800-present—LA 371
3	Soils for Urban Use—Agron 156
18	

Cr.	Fall third year
6	Site Planning and Design II—L A 301
3	Shaping the Land—LA 381
3	Landscape Architecture History: Prehistory to 1800—LA 373
3	Landscape Change and Conservation—LA 465
3	Elective
18	

Cr.	Spring third year
6	Regional Landscape Design—L A 302
1	Contemporary Landscape Architecture—LA 341
3	LA Professional Elective
3	Social Science/Humanities Elective
3	Math 141 or Math 142/Science Elective
16	

Cr.	Fall fourth year
6	Urban Landscape Design—LA 402
2	Landscape Construction—LA 481
3	Social Science/Humanities
3	LA Professional Elective
3	Communication (300 level)
17	

Cr.	Spring fourth year
R	Landscape Architecture Professional Internship, Study Abroad, National Exchange—LA 451A, B, or C

Cr.	Fall fifth year
6	Community Landscape Design—LA 401
4	LA Professional Elective
3	Social Science/Humanities Elective (300 level)
3	Science/Math Elective
16	

Cr.	Spring fifth year
6	Interdisciplinary Design Studio (Dsn S 446), Advanced Landscape Architectural Design (LA 404), or Senior Thesis (LA 405)
2	Professional Practice—LA 441
2	Advanced Landscape Construction—LA 482
6	Elective
16	

149.5 Total credits for BLA

College of Engineering

James E. Bernard, Interim Dean
Diane T. Rover, Associate Dean
Balaji Narasimham, Associate Dean
Loren W. Zachary, Assistant Dean
www.engineering.iastate.edu/

Departments of the College

For information on undergraduate options refer to the following curriculum sections, and for graduate specializations or certificate programs, refer to the Courses and Programs section of the catalog.

Aerospace Engineering
Agricultural and Biosystems Engineering
Chemical and Biological Engineering
Civil, Construction and Environmental Engineering
Electrical and Computer Engineering
Industrial and Manufacturing Systems Engineering
Materials Science and Engineering
Mechanical Engineering

Aligning Education in Engineering with the University Mission

The mission of Iowa State University is to create, share, and apply knowledge to make Iowa and the world a better place. Students will become broadly educated, global citizens who are culturally informed, technologically adept, and ready to lead. The College of Engineering echoes this philosophy and emphasizes preparing its graduates to meet the challenges of the 21st century.

Engineering education seeks to develop a capacity for objective analysis, synthesis, and design to obtain a practical solution. The engineering programs at Iowa State University are designed to develop the professional competence of a diverse student body and, by breadth of study, to prepare students to solve the technical problems of society while considering the ethical, social, and economic implications of their work at state, national and global levels.

The focus of each curriculum is to strengthen students' critical thinking, creative abilities, and communication skills. Students in engineering will have the opportunity for interdisciplinary and experiential learning through learning communities, service learning, internships and cooperative education, as well as research, capstone, and study abroad experiences.

The problem-solving skills learned from an engineering education at Iowa State University also provide an excellent launching pad for careers not only in engineering, but also medicine, law, business, and many other fields.

Each program is guided by the criteria developed by ABET, a non-governmental organization of peer reviewers which assures the quality of post secondary engineering education. The outcomes and objectives of the accredited

engineering programs can be found in the Courses and Programs section of the catalog.

Registration as a professional engineer, which is granted by each individual state, is required for many types of positions. The professional curricula in engineering at Iowa State University are designed to prepare a graduate for subsequent registration in all states.

Seniors in accredited curricula of the College of Engineering are encouraged to take the Fundamentals of Engineering Examination toward professional registration during their final academic year. Seniors in engineering curricula who have obtained at least 6 semester credits in surveying may take the Fundamentals Examination for professional registration as land surveyors.

Concurrent Graduate/Undergraduate Programs

Several engineering programs offer the opportunity for well-qualified undergraduate juniors and seniors to pursue a graduate degree in their program while finishing the undergraduate requirements. The programs offering concurrent undergraduate/graduate degrees are: agricultural engineering, civil engineering, computer engineering, electrical engineering, industrial engineering, mechanical engineering, and materials engineering.

Programs offering concurrent bachelor of science/master of business administration degrees are: civil engineering, computer engineering, electrical engineering, industrial engineering and mechanical engineering. For more information, refer to the graduate study sections for each engineering program. Advanced work in engineering is offered in the post-graduate programs. See the Graduate College section of this catalog.

Joint Undergraduate Programs

A bachelor of science degree in software engineering is offered in the College of Engineering and the College of Liberal Arts and Sciences. This program is jointly administered by the Department of Electrical and Computer Engineering and the Department of Computer Science.

Accreditation

Ten curricula in the College of Engineering are accredited by ABET. Two newer curricula will pursue accreditation. Accreditation status is indicated in the Courses and Programs section for each engineering curricula. For more information on accreditation practices contact:

Engineering Accreditation Commission
ABET
111 Market Place, Suite 1050
Baltimore, MD 21202-4012
Phone: 410-347-7700
<http://www.abet.org>

Organization of Curricula

All curricula in engineering are designed as four-year programs. They are structured in two phases: a basic program and a professional program. The basic program consists primarily of subjects fundamental and common to all branches of engineering and includes chemistry, physics, mathematics, engineering computations, and English. The professional phase of a curriculum includes intensive study in a particular branch of engineering, as well as a continuation of supporting work in mathematics, basic sciences, humanities, and social sciences.

Students should complete the requirements of the basic program before proceeding to a professional program.

Preparation for the Engineering Curricula

In addition to the standard university admission requirements, the college also requires 2 years of a foreign language. Other high school credits particularly important to students wishing to study engineering include: 2 years of algebra, 1 year of geometry, and 1/2 year of trigonometry and 1/2 year of pre-calculus; 1 year each of chemistry, biology, and physics; 3 years of social science, and 4 years of English. See Index for specific admission requirements.

Placement in mathematics, English, and chemistry will generally be based on high school preparation and test scores. Advanced placement is possible for exceptionally well-prepared students. Students who are not adequately prepared may be encouraged or required to take additional preparatory coursework and should expect to spend more than the customary time to complete the engineering program. Any coursework which is preparatory or remedial in nature cannot be used to satisfy credit requirements for graduation in any of the engineering curricula.

Basic Program for Professional Engineering Curricula

The first year program is much the same for all professional curricula in the College of Engineering. Students normally enroll in the majority of the basic program courses during their first year. The basic program is a set of courses common to all engineering curricula. Since students may also begin curriculum designated requirements during their first year, they will want to select a curriculum as soon as possible. This will enable them to receive the bachelor's degree in a minimum time.

Entering undergraduates must demonstrate proficiency in trigonometry based on test scores, or by having transfer credits from a college trigonometry course, or by passing either Math 141 or 142 before enrolling in Math 166 or C E 160.

The Department of English may recommend placement in one or more sections of Engl 101 if the placement test administered to students whose first language is not English indicates a deficiency in reading or writing. Satisfactory completion of the recommended course(s) will be required of students in the College of Engineering.

Basic Program

Cr.	
8	Mathematics 165, 166
6	English 150, 250
4	Chemistry 167 or 177*
3	Engineering 160, Aer E 160, CE 160, Cpr E 185, E E 185, S E 185, or I E 148**
5	Physics 221
R	Engineering 101***
0.5	Library 160
26.5	Total credits

Students without a strong high school chemistry background may opt to take a two course sequence of Chem 155 (3 cr.) and Chem 165 (4 cr.) to meet the Chem 167 (4 cr.) requirement.

English 250 is normally taken in the second year. However, students who advance place into this course may be able to enroll during their first year. Credit for English 150 is earned upon successful completion of English 250. In addition to the basic program courses listed above, curriculum designated courses normally taken the first year of each engineering curricula are listed below.

Curriculum Designated Requirements

Aerospace Engineering—Aer E 160**, Aer E 161 (4 cr.), Aer E 192 (R), GenEd Electives (3 cr)

Agricultural Engineering—Chem 167L (1 cr.), A E 110 (1 cr.), Engr 170 (3 cr.), SSH Elective (3 cr.)

Biological Systems Engineering—Chem 167L (1 cr.), BSE 110 (1 cr.), Engr 170 (3 cr.), SSH Elective (3 cr.)

Chemical Engineering—Chem 177*, 177L (1 cr.), 178 (3 cr.), 178L (1 cr.), SSH Elective (3 cr.)

Civil Engineering—Chem 167L (1 cr.) or Chem 177L (1 cr.)*, C E 105 (1 cr.), C E 160**, C E 170 (2 cr.), C E 111 (3 cr.), SSH Elective (3 cr.)

Computer Engineering—Cpr E 185** (3 cr.), Com S 227 (4 cr.), Cpr E 166 (R cr.), Gen Ed Elective (3 cr.)

Construction Engineering—Con E 121 (1 cr.), 122 (1 cr.), Psychology Elective – Psych 101, 230, or 280 (3 cr.), Engr 170 (3 cr.), SSH Elective (3 cr.)

Electrical Engineering—E E 185** (3 cr.), Com S 207 (3 cr.) or 227 (4 cr.), E E 166 (R cr.), Gen Ed Elective (3 cr.)

Industrial Engineering—I E 101 (R cr.), I E 148** (3 cr.), SSH Elective (6 cr.)

Materials Engineering—Chem 177*, 177L (1 cr.), 178 (3 cr.), 178L (1 cr.), Engr 170 (3 cr.), Gen Ed Elective (3 cr.), (Physics 221 scheduled in sophomore year.)

Mechanical Engineering—Chem 167L (1 cr.), Engr 170 (3 cr.), M E 102 (R cr.), Gen Ed Elective (3 cr.)

Software Engineering—S E 185** (3 cr.), 166 (R cr.), Com S 227 (4 cr.), 228 (3 cr.)

The student's adviser may require or recom-

mend courses in addition to those specified above if the preparation and progress of the student are such that additional courses are necessary or desirable.

*Students planning to enroll in C E¹, Ch E, or Mat E will find Chem 177 to be a better preparation for Chem 178. However, Chem 167 is accepted as a substitute for 177 for those students declaring one of these curricula after having completed 167. The Chem 155-165 sequence is an acceptable substitute for Chem 167.

**Recommended choices by program:

Aer E: Aer E 160 (3 cr.)

C E: C E 160 (3 cr.)

Cpr E: Cpr E 185 (3 cr.)

E E: E E 185 (3 cr.)

I E: I E 148 (3 cr.)

S E: S E 185 (3 cr.)

Credit hours for graduation will be given for any one of Aer E 160, C E 160, Engr 160, I E 148, Cpr E 185, E E 185, or S E 185 without increasing a curriculum's minimum number of credits required for graduation.

***Students enrolled in the joint software engineering degree program will take S E 101.

¹Students in the general emphasis in C E have two chemistry/physics sequence options. The environmental emphasis requires Option 1.

Option 1—Chem 177, 177L, 178, 178L, and Phys 221.

Option 2—Chem 167, 167L; or Chem 177, 177L; and Phys 221 and 222. Students who opt for Phys 222 rather than Chem 178, 178L will increase the total number of credits required by 1.

Requirement for Entry into Professional Program

Students enrolled in the College of Engineering must satisfy both of the following requirements before enrolling in the professional courses (200-level and above) offered by departments in the Engineering College:

1. Completion of the basic program with a grade point average of 2.00 or better in the basic program courses.
2. A cumulative grade point average of 2.00 or better for all courses taken at Iowa State University.

The following are the only exceptions to this rule:

- a. Students who have completed all of their coursework while enrolled in the College of Engineering, but have not met the two basic program requirements, may enroll for not more than two semesters in 200-level or above courses offered by departments in the College of Engineering.
- b. Students transferring to the College of Engineering from another college or university, or from a program outside this college, who have not met the two basic program requirements may also enroll for not more than two semesters in 200-level or above courses offered by departments in the College of Engineering. However, they may be granted an additional semes-

ter upon review by the college.

- c. Iowa State students not pursuing an engineering degree may generally take engineering courses without restrictions provided they meet the prerequisites and space is available.
- d. Only the first two semesters of 200-level and above engineering courses, taken at ISU while a student is not enrolled in the College of Engineering, can be applied toward an engineering degree.

Requirement for Graduation

In order to graduate in a professional engineering curriculum, students must have a minimum GPA of 2.00 in a department-designated group of 200-level and above courses known as the Core. These courses will total no fewer than 24 nor more than 48 semester credits.

Engineering Minors

The College of Engineering offers three undergraduate minors which are open only to students in the College of Engineering. These are minors in bioengineering, nondestructive evaluation, and nuclear engineering. These minors must include at least nine credits which are beyond the total used to meet curriculum requirements.

The bioengineering minor is a 15 credit interdisciplinary program that complements a student's major discipline by providing additional insight into the interactions between various engineering disciplines and biological systems. The minor is administered by a supervisory faculty committee. For minor course requirements, refer to Bioengineering in Courses and Programs.

The nondestructive evaluation minor is a 16 credit minor open only to engineering students who have met the basic program requirements and are not on academic warning or probation. The minor is supervised by an interdisciplinary faculty committee. For minor course requirements, refer to Aerospace Engineering in Courses and Programs for minor course requirements.

The nuclear engineering minor is a 15 credit minor which enables engineering students to acquire a basic and fundamental knowledge of nuclear sciences and engineering. Courses are provided at Iowa State University and also through an inter-institutional distance education program offered through the Web by four of the Big 12 Engineering Consortium Schools. For minor course requirements, refer to Nuclear Engineering in *Courses and Programs*.

Minor for Non-Engineers

The College of Engineering also offers an undergraduate minor in engineering studies which is open only to students outside of the College of Engineering.

The engineering studies minor is a 21 credit interdepartmental minor. A student's minor program in engineering studies must include at least nine credits which are beyond the total used to meet minimum degree requirements. The minor is supervised by an interdepartmental faculty committee. Refer to Engineering Studies in Courses and Programs for minor course requirements.

Undergraduate Majors and Minors Outside the College of Engineering

In addition to the engineering degree program, students may earn majors or minors in other colleges of the university. A major or minor program must meet all requirements of the offering department or program and its college and contain credits beyond the requirements for a B.S. degree in engineering. A minimum of 15 additional credits is required for each major area of study and an additional 9 credits for each minor.

Advising System

The purpose of the advising system in the College of Engineering is to work constructively with students in developing their individual academic programs and to maintain close contact with students during their college careers.

The college offers an orientation program during the spring and summer for students planning to enter in the fall, and during the fall for students planning to enter in the spring. All entering students are encouraged to attend an orientation session. Placement assessments given during the orientation program help determine the student's level of achievement and enable the adviser to prepare an appropriate program for the student.

Special Programs

All engineering students are strongly encouraged to participate in either the cooperative education or internship programs. Students who are qualified to participate in the engineering honors program are also urged to do so. These programs are integrated into the professional engineering curricula and may require additional work. However, both these professional and academic programs offer opportunities that will enrich the standard academic experience. Engineering students are also encouraged to take advantage of study abroad opportunities available through the College of Engineering's International Programs Office.

a. Cooperative Education Program. The College of Engineering offers, through its curricula, a cooperative education program. Enrollment in the program allows students to gain practical experience in their career field while attending college. In general, students enrolled in the co-op program will require an additional year to complete curriculum requirements.

These programs are arranged so that the student alternates academic work with employment periods. The student has the opportunity to assess career paths within her/his chosen curriculum and the employer evaluates the student's potential as a future full-time employee. Both domestic and international co-op programs are available.

Cooperative education students pay no fees to the university during their work periods and do not receive credit hours for their work experience. Students register for a non-credit cooperative education course (298, 398, or 498) for each work period and are considered full time students while

enrolled in these courses. For additional information contact your academic adviser and the Office of Engineering Career Services.

b. Internship Program. Internships are a mechanism by which a student may work full-time for one semester per academic year while maintaining her/his status as a full-time student.

Internship students pay no fees to the university during their work periods and do not receive credit hours for their work experience. Students who register for the internship course (397) for a fall or spring semester work period or (396) for the summer term are considered to be full time students. For additional information contact your academic adviser and the Office of Engineering Career Services.

c. Honors Program. The College of Engineering participates in the University Honors Program (see Index). The honors program is designed for students with above average ability who wish to individualize their programs of study. For further details consult the chair of the Engineering College Honors Program Committee or your departmental honors program adviser.

d. Engineering International Programs. In a world where the sun never sets, engineers must be prepared to understand other cultures and other ways of doing business. Engineers must expand their exportable skills, language and cross-cultural skills.

Engineering International Programs (EIP) has formed worldwide partnerships to create opportunities for students to work and study with leading universities in other countries and multinational corporations. With careful planning, students may earn credit in courses that fulfill their degree requirements. To learn more about work and study with leading universities in other countries and multinational corporations, visit the EIP home page at www.eng.iastate.edu/intl-progs/.

e. Engineering Leadership Program. Started in the Fall Semester of 2006, the Engineering Leadership Program (ELP) was developed to address the growing need for leaders trained in technology. Initial funding for the program was provided by 3M Company with additional funding from other corporate and private sources. Students selected into the ELP have opportunities to interface with engineers and company leadership of the donating companies. Mentored by a faculty and a peer mentor, each student receives individual direction and insight on academics, leadership opportunities, career paths and life skills. They are encouraged to develop their individual leadership styles and leadership competencies, while interacting with industry, government, faculty and student leaders. Incoming freshmen may apply the spring prior to their first fall semester at Iowa State University. Current Iowa State students may apply to be upper-level scholars each spring. Visit the ELP website at: <http://www.eng.iastate.edu/leadership/>.

Curriculum in Aerospace Engineering

Leading to the degree bachelor of science.

Total credits required: 126.5. See also *Basic Program and Special Programs*.

International Perspectives¹: 3 cr.

U.S. Diversity¹: 3 cr.

Communication Proficiency and Library requirements: Engl 150 and Engl 250 with minimum grade of C ; Lib 160. Department approval. (See Basic Program for credit requirements.)

General Education Electives: 15.0 cr²
Complete 15 cr. including a series. A series of at least two courses must be taken to fulfill this requirement.

Basic Program: 26.5 cr.⁴

Complete with 2.00 GPA including transfer courses: Chem 167 or Chem 177, 4 cr.; Engl 150, 3 cr. and Engl 250, 3 cr. (see above for grade requirements); Engr 101, R cr.; Aer E 160, 3 cr.³; Lib 160, 0.5 cr.; Math 165, 4 cr. and Math 166, 4 cr.; and Phys 221, 5 cr. (See Basic Program rule.)

Math and Physical Science: 13 cr.
Math 265, 4 cr.; Math 267, 4 cr.; Phys 222, 5 cr.

Aerospace Engineering Core: 48 cr.

Aer E 243, 3 cr. and Aer E 243L 0.5 cr.; Aer E 261, 4 cr.; Aer E 311, 3 cr. and Aer E 311L, 0.5 cr.; Aer E 321, 3 cr.; Aer E 331, 3 cr.; Aer E 343, 3 cr. and Aer E 343L, 1 cr.; Aer E 351, 3 cr.; Aer E 355, 3 cr.; Aer E 411, 3 cr.; Aer E 421, 3 cr.; Aer E 361, 3 cr.; Aer E 461, 3 cr.; Aer E 462, 3 cr.; E M 324, 3 cr.; M E 330, 3 cr.

Other Remaining Courses: 24 cr.

E M 274, 3 cr.; E M 345, 3 cr.; Mat E 272, 2 cr.; Aer E 161, 4 cr. Complete 3 cr., from Aer E 412, 3 cr.; Aer E 422, 3 cr.; Aer E 423, 3 cr.; Aer E 426, 3 cr.; Aer E 432, 3 cr.; Aer E 442, 3 cr.; Aer E 446, 3 cr.; Aer E 451, 3 cr. or Aer E 464. Technical Electives, 3 cr. and Career Electives, 6 cr. selected from preceding Aer E list or departmental-approved 300-level or above courses relevant to technical and career areas.

Seminar/Co-op/Internships:

Aer E 192, R cr.; Aer E 291, R cr.; Aer E 292, R cr., Aer E 391, R cr., Aer E 392, R cr., Aer E 491, R, cr. and Aer E 492, R cr.

¹ These university requirements will add to the minimum credits of the program unless the university-approved courses are also allowed by the department to meet other course requirements within the degree program. U.S. diversity and international perspectives courses may not be taken Pass/Not Pass.

² Choose from department approved list.

³ See Basic Program for Professional Engineering Curricula for accepted substitutions for curriculum designated courses in the Basic Program.

⁴2.00 required including transfer courses.

Curriculum in Agricultural Engineering

Administered by the Department of Agricultural and Biosystems Engineering.

Leading to the degree bachelor of science.

Total credits required: 127.5 cr. See also *Basic Program* and *Special Programs*.

International Perspectives: 3 cr.¹

U.S. Diversity: 3 cr.¹

Communication Proficiency/Library requirement:

Engl 150 and Engl 250 with a minimum grade of C; Lib 160. (See *Basic Program* for credits.) Complete one course from AgEds 311, Engl 309, Engl 314 or Sp Cm 212.

Social Sciences and Humanities: 12 cr.²

Complete 3 cr. from international perspectives and 3 cr. from U.S. diversity university-approved list. Complete additional 6 cr. Social Sciences and Humanities courses.

Basic Program: 26.5 cr.⁴

Complete with 2.00 GPA including transfer courses: Chem 167 or Chem 177, 4 cr.; Engl 150, 3 cr. and Engl 250, 3 cr. (see above for grade requirements); Engr 101, R cr.; Engr 160, 3 cr.³; Lib 160, 0.5 cr.; Math 165, 4 cr. and Math 166, 4 cr.; and Phys 221, 5 cr. (See *Basic Program* rule.)

Math and Physical Science: 9 cr.

Chem 167L, 1 cr. or Chem 177L, 1 cr.; Phys 222, 5 cr.; and Stat 305, 3 cr.

Ag Engineering Core: 24 cr.⁴

A E 216, 3 cr.; A E 316, 3 cr.; A E 363, 4 cr.; A E 415, 2 cr.; A E 416, 2 cr.; E M 274, 3 cr.; E M 324, 3 cr.; E M 327, 1 cr.; Math 266, 3 cr.

Other Remaining Courses: 16 cr.

A E 110, 1 cr.; A E 201, 1 cr.; A E 301, 1 cr.; A E 401, 1 cr.; A E 404, 3 cr.; Engr 170, 3 cr.; M E 330, 3 cr. Complete one course (3 cr.) from AgEds 311, Engl 309, Engl 314 or Sp Cm 212.

Select remaining courses from one of the following options:

Agricultural and Environmental Systems Engineering Option: 40 cr.

A E 271, 1 cr. or A E 272, 1 cr.; A E 431, 3 cr.; A E 431, 3 cr.; A E 472, 3 cr.; Biol 211, 3 cr.; C E 332, 3 cr.; C E 372, 4 cr.; E M 378, 3 cr. Complete one course (3 cr.) from A E 340, A E 478, or BSE 480. Complete 3 cr. from Biological and Natural Resource Sciences list.²

Power and Machinery Engineering Option: 40 cr.

A E 271, 1 cr. or A E 272, 1 cr.; A E 340, 3 cr.; A E 342, 3 cr.; A E 413, 3 cr.; Agron 154, 3 cr.; Biol 211, 3 cr.; E M 345, 3 cr.; E M 378, 3 cr.; M E 324, 4 cr.; M E 325, 3 cr.; Mat E 272, 2 cr. Complete one course (3 cr.) from A E 431, A E 469, A E 472 or 478, or A E 480. Complete six credits of electives.²

Co-op/Internships (Optional)

¹ These university requirements will add to the minimum credits of the program unless the university-approved courses are also approved by the department to meet other course requirements within the degree program.

U.S. diversity and international perspectives

courses may not be taken Pass/Not Pass.

² Choose from department approved list.

³ See *Basic Program for Professional Engineering Curricula* for accepted substitutions for curriculum designated courses in the Basic Program.

⁴ 2.00 required including transfer courses.

Curriculum in Biological Systems Engineering

Administered by the Department of Agricultural and Biosystems Engineering.

Leading to the degree bachelor of science.

Total credits required: 127.5 cr. See also *Basic Program* and *Special Programs*.

International Perspectives: 3 cr.¹

U.S. Diversity: 3 cr.¹

Communication Proficiency/Library requirement:

Engl 150 and Engl 250 with a minimum grade of C; Lib 160. (See *Basic Program* for credits.) Complete one course from AgEds 311, C E 203, Engl 309, or Sp Cm 212.

Social Sciences and Humanities: 12 cr.²

Complete 3 cr. from international perspectives and 3 cr. from U.S. diversity university-approved list. Complete additional 6 cr. Social Sciences and Humanities courses.

Basic Program: 26.5 cr.⁴

Complete with 2.00 GPA including transfer courses: Chem 167, 4 cr.; Engl 150, 3 cr. and Engl 250, 3 cr. (see above for grade requirements); Engr 101, R cr.; Engr 160, 3 cr.; Lib 160, 0.5 cr.; Math 165, 4 cr. and Math 166, 4 cr.; and Phys 221, 5 cr. (See *Basic Program* rule.)

Biological, Math and Physical Science: 20 cr.

Biol 212, 3 cr.; Chem 167L, 1 cr.; Math 267, 4 cr.; Phys 222, 5 cr.; and Micro 302, 3 cr., Micro 302L, 1 cr., Stat 305, 3 cr.

Biological Systems Engineering Core: 26 cr.⁴

A E 316, 3 cr.; A E 363, 4 cr.; A E 404, 3 cr.; BSE 201, 1 cr.; BSE 216, 3 cr.; BSE 301, 1 cr.; BSE 380, 3 cr.; BSE 401, 1 cr.; BSE 415, 2 cr.; BSE 416, 2 cr.; BSE 480, 3 cr.

Other Remaining Courses: 23 cr.

BSE 110, 1 cr.; Ch E 356, 3 cr.; Ch E 357, 3 cr.; Engr 170, 3 cr.; E M 274, 3 cr.; E M 324, 3 cr.; E M 327, 1 cr.; M E 330, 3 cr. Complete one course (3 cr.) from AgEds 311, C E 203, Engl 309, or Sp Cm 212.

Complete remaining courses from one of the following options:

Biorenewable Resources Engineering Option: 20 cr.

A E 388, 3 cr. BSE 403, 3 cr.; Chem 331, 3 cr.; Chem 331L, 2 cr.; Chem 332, 3 cr. Complete 6 credits for option electives.²

Bioenvironmental Engineering Option: 20 cr.

A E 431, 3 cr. C E 326, 3 cr.; Chem 211, 2 cr.; Chem 211L, 2 cr.; Chem 231, 3 cr.; Chem 231L, 1 cr. Complete 3 cr. from A E 436, C E 421, C E 428, or EnSci 381. Complete 3 credits for remaining option elective.²

Food Engineering Option: 20 cr.

AE 451, 3 cr.; BSE 469, 3 cr.; Chem 231, 3 cr.;

FSHN 311, 4 cr.; FSHN 420, 3 cr.; FSHN 471, 3 cr. Select 1 credit to complete option elective.

Pre-Professional and Pre-Graduate Option: 19-20 cr.

Chem 331, 3 cr.; Chem 331L, 1 cr.; Chem 332, 3 cr.; Chem 332L, 1 cr. Complete 3 credits from A E 406 or BSE 403. Complete 8 to 9 credits for remaining option electives.²

Co-op/Internships (Optional)

¹ These university requirements will add to the minimum credits of the program unless the university-approved courses are also approved by the department to meet other course requirements within the degree program. U.S. diversity and international perspectives courses may not be taken Pass/Not Pass.

² Choose from department approved list.

³ See *Basic Program for Professional Engineering Curricula* for accepted substitutions for curriculum designated courses in the Basic Program.

⁴ 2.00 GPA required including transfer courses.

Curriculum in Chemical Engineering

Administered by the Department of Chemical and Biological Engineering

Leading to the degree bachelor of science.

Total credits required: 125.5 cr. See also *Basic Program* and *Special Programs*.

International Perspectives: 3 cr.¹

U.S. Diversity: 3 cr.¹

Communication Proficiency/Library requirement:

Engl 150 and Engl 250; Lib 160. (See *Basic Program* for credit requirements.) Complete one course from Engl 309, 3 cr.; Engl 314, 3 cr.; or JL MC 347, 3 cr.

Social Sciences and Humanities: 15 cr.

Complete a total of 15 cr. with at least 6 cr. but not more than 9 cr. from the same department.

Basic Program: 26.5 cr.⁴

Complete with 2.00 GPA including transfer courses: Chem 167 or Chem 177, 4 cr.; Engl 150, 3 cr. and Engl 250, 3 cr. (see above for grade requirements); Engr 101, R cr.; Engr 160, 3 cr.³; Lib 160, 0.5 cr.; Math 165, 4 cr. and Math 166, 4 cr.; and Phys 221, 5 cr. (See *Basic Program* rule.)

Math and Physical Science: 30 cr.

Math 265, 4 cr.; Math 267, 4 cr.; Phys 222, 5 cr.; Chem 167L, 1 cr. or Chem 177L, 1 cr.; Chem 178, 3 cr.; Chem 178L, 1 cr.; Chem 325, 3 cr.; Chem 331, 3 cr.; Chem 332, 3 cr.; BBMB 301, 3 cr.

Chemical Engineering Core: 33 cr.⁴

Ch E 210, 3 cr.; Ch E 302, 1 cr.; Ch E 310, 3 cr.; Ch E 325, 2 cr.; Ch E 356, 3 cr.; Ch E 357, 3 cr.; Ch E 358, 3 cr.; Ch E 381, 3 cr.; Ch E 382, 3 cr.; Ch E 421, 3 cr.; Ch E 426, 2 cr.; Ch E 430, 4 cr.

Other Remaining Courses: 21 cr.

Complete one course from Engl 309, 3 cr.; Engl 314 3 cr. or JL MC 347, 3 cr. Complete 3 cr. from Chemistry Electives list.² Complete 3 cr. from Statistical Electives list.² Complete 3 cr. from Chemical Engineering

Electives list.² Complete 3 cr. from any 300+ level course in engineering.² Complete 6 cr. from Professional Electives list.²

Biological Engineering Option

The standard Chemical Engineering program may be modified to meet the option requirements for Biological Engineering:

Math and Physical Science – BBMB 404 or Biol 313, 3 cr., may be substituted for BBMB 301 from list above.

Chemical Engineering Core – Replace Ch E 426, 2 cr. with Ch E 427, 2 cr. in required Core.

Other Remaining Courses:

Chemistry Electives, 3 cr. - BBMB 405 (prerequisite 404), BBMB 420 (prerequisite 301), or Biol 314.

Chemical Engineering Electives, 3 cr. – Ch E 415, Ch E 440, Ch E 542 or Ch E 562.

Engineering Electives, 3 cr. – A E 373, A E 480, BRT 501, C E 421, or MSE 580.

Professional Electives, 6 cr. – Ch E 415, Ch E 440, Ch E 542, Ch E 562, or Ch E 490; and one course from 300-level, or above, life sciences (not BBMB 301), 300- or above level course in Chem, FS HN or BBMB.

Co-op/Internships: Optional

¹These university requirements will add to the minimum credits of the program unless the university-approved courses are also approved by the department to meet other course requirements within the degree program. U.S. diversity and international perspectives courses may not be taken Pass/Not Pass.

²Choose from department approved list.

³See Basic Program for Professional Engineering Curricula for accepted substitutions for curriculum designated courses in the Basic Program.

⁴2.00 required including transfer courses.

Curriculum in Civil Engineering (General)

Administered by the Department of Civil, Construction and Environmental Engineering.

Leading to the degree bachelor of science.

Total credits required: 131.5* See also *Basic Program* and *Special Programs*.

International Perspectives: 3 cr.¹

U.S. Diversity: 3 cr.¹

Communication Proficiency/Library requirement:

Engl 150 and Engl 250 with minimum grade of C; Lib 160. (See Basic Program for credit requirements.)

Social Sciences and Humanities: 12 cr.²

Complete 12 cr. with 6 cr. at 200-level or above.

Basic Program: 26.5 cr.⁴

Complete with 2.00 GPA including transfer courses: Chem 167 or Chem 177, 4 cr.; Engl 150, 3 cr. and Engl 250, 3 cr. (see above for grade requirements); Engr 101, R cr.; C E 160, 3 cr.³; Lib 160, 0.5 cr.; Math 165, 4 cr. and Math 166, 4 cr.; and Phys 221, 5 cr. (See Basic Program rule.)

Math and Physical Science: 17 cr. (18 cr.)*

Chem 177L, 1 cr.; Chem 178, 3 cr. and Chem 178L, 1 cr., or Phys 222 5 cr.; Geol 201, 3 cr.; Math 266, 3 cr. Complete 3 cr. Statistics Electives². Complete 3 cr. Numerical Analysis Electives².

C E Engineering Core: 30 cr.⁴

E M 274, 3 cr.; E M 324, 3 cr.; E M 345, 3 cr.; E M 378, 3 cr. C E 305, 3 cr.; C E 326, 3 cr.; C E 332, 3 cr.; C E 355, 2 cr.; C E 360, 3 cr.; and C E 372, 4 cr.

Other Remaining Courses: 45 cr.

C E 105, 1 cr.; C E 111, 3 cr.; C E 170, 2 cr.; C E 205, 3 cr.; C E 306, 3 cr.; C E 333, 3 cr.; C E 334, 3 cr.; C E 382, 3 cr.; C E 453, 4 cr.; C E 485, 2 cr.; C E 486, 3 cr.; E M 327, 1 cr.; Sp Cm 212, 3 cr. Complete 11 cr. Engineering Topics Electives.²

Seminar/Co-op/Internships: R cr.

C E 403, R. cr.

Co-op/Internship optional.

¹These university requirements will add to the minimum credits of the program unless the university-approved courses are also approved by the department to meet other course requirements within the degree program. U.S. diversity and international perspectives courses may not be taken Pass/Not Pass.

²Choose from department approved list.

³See Basic Program for Professional Engineering Curricula for accepted substitutions for curriculum designated courses in the Basic Program.

⁴2.00 required including transfer courses.

* Note: Students who opt for Phys 222 rather than Chem 178, 178L will complete 18 cr. here which will increase the total number of credits required by 1.

Curriculum in Civil Engineering with Environmental Option

Administered by the Department of Civil, Construction and Environmental Engineering.

Leading to the degree bachelor of science.

Total credits required: 130.5. See also *Basic Program* and *Special Programs*.

International Perspectives: 3 cr.¹

U.S. Diversity: 3 cr.¹

Communication Proficiency/Library requirement: Engl 150 and Engl 250 with minimum grade of C; Lib 160. (See Basic Program for credit requirements.)

Social Sciences and Humanities: 12 cr.²

Complete 12 cr. with 6 cr. at 200-level or above.

Basic Program: 26.5 cr.⁴

Complete with 2.00 GPA including transfer courses: Chem 167 or Chem 177, 4 cr.; Engl 150, 3 cr. and Engl 250, 3 cr. (see above for grade requirements); Engr 101, R cr.; C E 160, 3 cr.³; Lib 160, 0.5 cr.; Math 165, 4 cr. and Math 166, 4 cr.; and Phys 221, 5 cr. (See *Basic Program* rule.)

Math and Physical Science: 26 cr.

Chem 177L, 1 cr.; Chem 178, 3 cr. and Chem 178L, 1 cr.; Biol 173 or 211, 3 cr.; Chem 231, 3 cr., and Chem 231L, 1 cr.; Geol 201, 3 cr.; Math 266, 3 cr.; Micro 201, 2 cr. Complete 3 cr. Statistics Electives². Complete 3 cr. Numerical Analysis Electives².

C E/Env Engineering Core: 27 cr.⁴

E M 274, 3 cr.; E M 324, 3 cr.; E M 378, 3 cr.; C E 305, 3 cr.; C E 326, 3 cr.; C E 332, 3 cr.; C E 355, 2 cr.; C E 360, 3 cr.; and C E 372, 4 cr.

Other Remaining Courses: 39 cr.

C E 105, 1 cr.; C E 111, 3 cr.; C E 170, 2 cr.; C E 205, 3 cr.; C E 306, 3 cr.; C E 334, 3 cr.; C E 382, 3 cr.; C E 420, 3 cr.; C E 421, 3 cr.; C E 428, 3 cr.; C E 485, 2 cr.; C E 486, 3 cr.; E M 327, 1 cr.; Sp Cm 212, 3 cr. Complete 3 cr. Engineering Topics Electives.²

Seminar/Co-op/Internships: R cr.

C E 403, R. cr.

Co-op/Internship optional.

¹These university requirements will add to the minimum credits of the program unless the university-approved courses are also approved by the department to meet other course requirements within the degree program. U.S. diversity and international perspectives courses may not be taken Pass/Not Pass.

²Choose from department approved list.

³See *Basic Program for Professional Engineering Curricula* for accepted substitutions for curriculum designated courses in the Basic Program.

⁴2.00 required including transfer courses.

Curriculum in Computer Engineering

Administered by the Department of Electrical and Computer Engineering.

Leading to the degree bachelor of science.

Total credits required: 126.5 See also *Basic Program* and *Special Programs*.

International Perspectives: 3 cr.¹

U.S. Diversity: 3 cr.¹

Communication Proficiency/Library requirement: Engl 150 and Engl 250 with minimum grade of C; Lib 160. (See *Basic Program* for credit requirements.) Engl 314 or Engl 309 with a minimum grade of C.

General Education Electives: 15 cr.²

Complete minimum of 6 cr. from Approved General Education Component at 300 or higher level. Complete additional 9 cr. from Approved General Education Component.

Basic Program: 26.5 cr.⁴

Complete with 2.00 GPA including transfer courses: Chem 167 or Chem 177, 4 cr.; Engl 150, 3 cr. and Engl 250, 3 cr. (see above for grade requirements); Engr 101, R cr.; Cpr E 185, 3 cr.; Lib 160, 0.5 cr.; Math 165, 4 cr. (minimum grade of C-) and Math 166, 4 cr. (minimum grade of C-); and Phys 221, 5 cr. (See *Basic Program* rule.)

Math and Physical Science: 20 cr.

Com S 227, 4 cr. (minimum grade of C-) and Com S 228, 3 cr. (minimum grade of C-). Math 265, 4 cr.; Math 267, 4 cr.; and Phys 222, 5 cr.

Computer Engineering Core: 33 cr.⁴

Cpr E 281, 4 cr.; Cpr E 288, 4 cr.; Cpr E 308, 4 cr.; Cpr E 310, 3 cr.; Cpr E 381, 4 cr.; Com S 309, 3 cr.; Com S 311, 3 cr.; E E 201, 4 cr.; and E E 230, 4 cr.

Other Remaining Courses: 32 cr.

Cpr E 491, 3 cr. and Cpr E 492, 2 cr. Engl 314, 3 cr. or Engl 309, 3 cr. with a minimum grade of C.

Complete 3 cr. of Computer Science courses, 6 cr. of Computer Engineering, 9 cr. of Technical Electives, and 3 cr. of Electrical Engineering courses.^b Stat 330, 3 cr.

Seminar/Co-op/Internships:

Cpr E 166, R cr. Cpr E 294, R cr., Cpr E 394, R cr. and Cpr E 494, R cr.

Co-op or internship is optional.

Outcomes Assessment - Students are required to prepare and to maintain a portfolio of their technical and non-technical skills. This portfolio is evaluated for student preparation during the student's curriculum planning process. Results of the evaluation are used to advise students of core strengths and weaknesses.

Transfer Credit Requirements

The degree program must include a minimum of 30 credits at the 300-level or above in professional and technical courses earned at ISU in order to receive a B.S. in computer engineering. These 30 credits must include Cpr E 491. Senior Design Project I and Professionalism, Cpr E 492 Senior Design Project II, and credits in the core professional curriculum and/or in technical electives. The Electrical and Computer Engineering Department requires a grade of C or better for any transfer credit course that is applied to the degree program.

¹These university requirements will add to the minimum credits of the program unless the university-approved courses are also approved by the department to meet other course requirements within the degree program. U.S. diversity and international perspectives courses may not be taken Pass/Not Pass, but are used to meet the general education electives.

²Choose from department approved lists.

³See *Basic Program for Professional Engineering Curricula* for accepted substitutions for curriculum designated courses in the *Basic Program*.

⁴2.00 required including transfer courses.

Note: International perspectives and U.S. diversity courses are used to meet the general education electives.

Curriculum in Construction Engineering

Administered by the Department of Civil, Construction, and Environmental Engineering.

Leading to the degree bachelor of science.

Total credits required: Building Option – 123.5, Heavy Option – 123.5, Electrical – 126.5, Mechanical – 125.5 cr.

See also *Basic Program* and *Special Programs*.

International Perspectives: 3 cr.¹

U.S. Diversity: 3 cr.¹

Communication Proficiency/Library requirements: Engl 150 and Engl 250 with minimum grade of C; Lib 160. (See *Basic Program* for credit requirements.) Business Communication Elective: one course from Engl 302, Engl 309 or Engl 314 with a minimum grade of C.

Social Sciences and Humanities: 12 cr.

Complete one of Psych 101, Psych 230, Psych 250, or Psych 280. Complete either Econ 101 or Econ 102. Complete 3 cr. from international perspectives and 3 cr. from U.S. diversity approved list.

Basic Program: 26.5 cr.⁴

Complete with 2.00 GPA including transfer courses: Chem 167 or Chem 177, 4 cr.; Engl 150, 3 cr. and Engl 250, 3 cr. (see above for grade requirements); Engr 101, R cr.; C E 160, 3 cr.³; Lib 160, 0.5 cr.; Math 165, 4 cr. and Math 166, 4 cr.; and Phys 221, 5 cr. (See *Basic Program* rule.)

Math and Physical Science: 11 cr. (B, H); 12 cr. (E, M).
Stat 105, 3 cr.; Math 266, 3 cr. (B, H); Math 267, 4 cr. (E, M); Phys 222, 5 cr.

Construction Engineering Core: 24 cr. (B, H, E); 25 cr. (M)⁴.
E M 274, 3 cr.; E M 324, 3 cr.; Con E 421, 3 cr.; E M 378, 3 cr.; C E 332, 3 cr.; (See options for remaining option Core courses.)

Additional Required Courses: 35 cr. (B, H), 36 cr. (E, M)

Con E 121, 1 cr.; Con E 122, 1 cr.; C E 170,| 2 cr.; C E 111, 3 cr.; Acct. 284, 3 cr.; Con E 221, 4 cr.; Con E 241, 3 cr.; Con E 251, 1 cr. Complete one 3 cr. Law Elective.²; Con E 441, 3 cr.; Con E 487, 2 cr. and Con E 488, 3 cr.; Complete one 3 cr. Business Communication Elective from Engl 302, 309, or 314². Complete one course from Math or Stat Elective, 3 cr. (B, H); 4 cr. (E, M)²

Select remaining courses from one of the following options:

Building Option:

Remaining Core courses (9 cr.)

C E 360, 3 cr.; Con E 322, 3 cr.; Con E 340, 3 cr.

Remaining option courses – 15 cr.

C E 333, 3 cr.; C E 334, 3 cr.; C E 383, 1 cr.; Con E 352, 3 cr.; Con E 353, 2 cr.; E M 327, 1 cr.; Complete 2 cr. from Engineering Topics Electives.²

Heavy Option:

Remaining Core courses (9 cr.)

C E 360, 3 cr.; Con E 322, 3 cr.; and Con E 340, 3 cr.

Remaining option courses – 15 cr.

C E 333, 3 cr.; C E 334, 3 cr.; C E 382, 3 cr.; E M 327, 1 cr. Complete 5 cr. of Engineering Topics Electives²

Electrical Option:

Remaining Core courses (9 cr.)

M E 231, 3 cr.; E E 303, 3 cr. and E E 456, 3 cr.

Remaining option courses – 16 cr.

Con E 352, 3 cr.; Con E 353, 2 cr.; E E 201, 4 cr. E E 230, 4 cr. and E E 457, 3 cr.

Mechanical Option:

Remaining Core courses (10 cr.)

M E 231, 3 cr., M E 436, 4 cr., and M E 441, 3 cr.

Remaining option courses – 14 cr.

Con E 352, 3 cr.; Con E 353, 2 cr.; E E 442, 2 cr. and E E 448, 2 cr.; M E 442, 3 cr.

Complete 2 cr. of Engineering Topics Electives.

Co-op/Internships - Optional

¹ These university requirements will add to the minimum credits of the program unless the university-approved courses are also approved by the department to meet other course requirements within the degree program. U.S. diversity and international perspectives courses may not be taken Pass/Not Pass.

² Choose from department approved list.

³ See *Basic Program for Professional Engineering Curricula* for accepted substitutions for curriculum designated courses in the *Basic Program*.

⁴ 2.00 required including transfer courses

Curriculum in Electrical Engineering

Administered by the Department of Electrical and Computer Engineering.

Leading to the degree bachelor of science.

Total credits required: 126.5 See also *Basic Program* and *Special Programs*.

International Perspectives: 3 cr.¹

U.S. Diversity: 3 cr.¹

Communication Proficiency/Library requirement: Engl 150 and Engl 250 with minimum grade of C; Lib 160. (See *Basic Program* for credit requirements.) Engl 314 or Engl 309 with a minimum grade of C.

General Education Electives: 15 cr.²

Complete minimum of 6 cr. from Approved General Education Component at 300 or higher level. Complete additional 9 cr. from Approved General Education Component.

Basic Program: 26.5 cr.⁴

Complete with 2.00 GPA including transfer courses: Chem 167 or Chem 177, 4 cr.; Engl 150, 3 cr. and Engl 250, 3 cr. (see above for grade requirements); Engr 101, R cr.; E E 185, 3 cr.; Lib 160, 0.5 cr.; Math 165, 4 cr. (minimum grade of C-) and Math 166, 4 cr. (minimum grade of C-); and Phys 221, 5 cr. (See *Basic Program* rule.)

Math and Physical Science: 16 cr.

Com S 207, 3 cr. or Com S 227, 4 cr. (minimum grade of C-), Math 265, 4 cr.; Math 267, 4 cr.; and Phys 222, 5 cr.

Electrical Engineering Core: 37 cr.⁴

Cpr E 281, 4 cr.; Cpr E 288, 4 cr.; E E 201, 4 cr.; E E 230, 4 cr.; E E 224, 4 cr.; E E 303, 3 cr.; E E 311, 4 cr.; E E 322, 3 cr.; E E 330, 4 cr. or E E 331, 4 cr.; and E E 332, 3 cr.

Other Remaining Courses: 32 cr.

E E 491, 3 cr. and E E 492, 2 cr. Engl 309, 3 cr. or Engl 314, 3 cr. with a minimum grade of C. I E 305, 3 cr.

Complete one 3 cr. course from Math Electives list.²

Complete 12 cr. from EE/Cpr E Technical Elective list including one approved sequence.²

Complete 6 additional credits from Math Electives list, EE/Cpr E Technical Elective list and/or non-EE/CprE Electives list.²

Seminar/Co-op/Internships:

E E 166, R cr. E E 294, R cr., E E 394, R cr. and E E 494, R cr. Co-op or internship is optional.

Outcomes Assessment - Students are required to prepare and to maintain a portfolio of their technical and non-technical skills. This portfolio is evaluated for student preparation during the student's curriculum planning process. Results of the evaluation are used to advise students of core strengths and weaknesses.

Transfer Credit Requirements

The degree program must include a minimum of 30 credits at the 300-level or above in professional and technical courses earned at ISU in order to receive a B.S. in electrical engineering. These 30 credits must include E E 491 Senior Design Project I and Professionalism, E E 492 Senior Design Project II, and credits in the core professional curriculum and/or in technical electives. The Electrical and Computer Engineering Department requires a grade of C or better for any transfer credit course that is applied to the degree program.

¹ These university requirements will add to the minimum credits of the program unless the university-approved courses are also approved by the department to meet other course requirements within the degree program. U.S. diversity and international perspectives courses may not be taken Pass/Not Pass.

² Choose from department approved lists.

³ See Basic Program for Professional Engineering Curricula for accepted substitutions for curriculum designated courses in the Basic Program.

⁴ 2.00 required including transfer courses.

Note: International perspectives and U.S. diversity courses are used to meet the general education electives.

Curriculum in Industrial Engineering

Administered by the Department of Industrial and Manufacturing Systems Engineering.

Leading to the degree bachelor of science.

Total credits required: 120.5 cr. See also *Basic Program* and *Special Programs*.

International Perspectives: 3 cr.¹

U.S. Diversity: 3 cr.¹

Communication Proficiency/Library requirements:

Engl 150 and Engl 250 with minimum grade of C; Lib 160.

Remaining Communication courses: 6 cr.

Engl 314, 3 cr.; Sp Cm 212, 3 cr.

Social Sciences and Humanities: 12 cr.²

Six of twelve credits must be from 200-level or above courses. Six credits must be sequential or related courses.

Basic Program: 26.5 cr.⁴

Chem 167, 4 cr.³; Engl 150, 3 cr. and Engl 250, 3 cr. (see above for grade requirements), Engr 101, R cr.; I E 148, 3 cr.³, Lib 160, 0.5 cr.; Math 165, 4 cr. and Math 166, 4 cr.; and Phys 221, 5 cr. (See *Basic Program* rule.)

Math and Physical Science: 17 cr.

Math 265, 4 cr.; Math 267, 4 cr.; Phys 222, 5 cr.; Stat 231, 4 cr.

Industrial Engineering Core: 31 cr.

I E 248, 3 cr.; I E 271, 3 cr.; I E 305, 3 cr.; I E 312, 3 cr.; I E 413, 4 cr.; I E 341, 3 cr.; I E 348, 3 cr.; I E 361, 3 cr.; I E 441, 3 cr.; I E 448, 3 cr.

Other Remaining Courses: 28 cr.

Mat E 272, 2 cr.; E M 274, 3 cr.; E E 442, 2 cr.; M E 330, 3 cr.; Focus Electives, 6 cr.²; Management Electives, 6 cr.²; and Engineering Topic Electives, 6 cr.²

Seminar/Co-op/Internships:

I E 101, R cr. Optional co-op/internship courses.

¹ These university requirements will add to the minimum credits of the program unless the university-approved courses are also allowed by the department to meet other course requirements within the degree program. U.S. diversity and international perspectives courses may not be taken Pass/Not Pass.

² Choose from department approved list.

³ See Basic Program for Professional Engineering Curricula for accepted substitutions for curriculum designated courses in the Basic Program.

⁴ 2.00 required including transfer courses.

Curriculum in Materials Engineering

Administered by the Department of Materials Science and Engineering.

Leading to the degree bachelor of science.

Total credits required: 127.5 cr. See also *Basic Program* and *Special Programs*.

International Perspectives: 3 cr.¹

U.S. Diversity: 3 cr.¹

Communication Proficiency/Library requirement:

Engl 150 and Engl 250 with minimum grade of C; Lib 160. (See *Basic Program* for credit requirements.) Complete one course from Engl 302, 309, 314 or JL MC 347 with a minimum grade of C.

General Education Electives: 15 cr.

Complete 12 cr. from approved list with a minimum of 6 cr. but no more than 9 cr. from one designator, and a maximum of 9 cr. of 100-level courses². Complete one course from Engl 302, 309, 314 or JL MC 347.⁴

Basic Program: 26.5 cr.⁴

Complete with 2.00 GPA including transfer courses: Chem 167 or Chem 177, 4 cr.; Engl 150, 3 cr. and Engl 250, 3 cr. (see above for grade requirements); Engr 101, R cr.; Engr 160, 3 cr.; Lib 160, 0.5 cr.; Math 165, 4 cr. and Math 166, 4 cr.; and Phys 221, 5 cr. (See *Basic Program* rule.)

Math and Physical Science 18 cr.

Complete Chem 177L, 1 cr.; Chem 178, 3 cr. and Chem 178L, 1 cr.; Math 265, 4 cr.; Math 267, 4 cr.; and Phys 222, 5 cr.

Materials Engineering Core: 32 cr.⁴

Mat E 201, R cr.; Mat E 214, 3 cr.; Mat E 215, 3 cr.; Mat E 215L, 1 cr.; Mat E 216, 4 cr.; Mat E 311, 3 cr.; Mat E 314, 3 cr.; Mat E 316, 3 cr.; Mat E 317, 3 cr.; Mat E 413, 3 cr., Mat E 414, 3 cr., Mat E 418, 3 cr.

Other Courses: 12 cr.

Engr 170, 3 cr.; E M 274, 3 cr.; E M 324, 3 cr.; Complete 3 cr. from non-remedial courses.

Seminar/Co-op/Internships

Co-op and internships are optional.

Option Requirements: 18 cr.

Students must choose two from the four areas of specialization: ceramic, electronic, metallic and polymeric materials. In lieu of the second specialty from the four listed, a student may propose an individually designed, materials related technical specialty to meet specific career goals. Students must have a 3.00 gpa and a B+ in Mat E 215. Students may learn other requirements and procedures for applying in the Undergraduate Handbook or by speaking with their adviser. The options below meet that expectation by using the following specialization courses:

Ceramic Materials: 321, 322, 425
Electronic Materials: 334, 332, 433
Metallic Materials: 342, 443, 444
Polymeric Materials: 351, 453, 454

Technical Electives: 6 cr.

Complete 6 cr. technical electives from approved departments.²

¹ These university requirements will add to the minimum credits of the program unless the university-approved courses are also approved by the department to meet other course requirements within the degree program. U.S. diversity and international perspectives courses may not be taken Pass/Not Pass.

² Choose from department approved list.

³ See Basic Program for Professional Engineering Curricula for accepted substitutions for curriculum designated courses in the *Basic Program*.

⁴ 2.00 required including transfer courses.

Note: A Mat E student may take up to 9 credit hours from General Education and free electives on a P/NP basis, except for courses used to meet the diversity and international perspectives requirement. S/F courses (different from P/NP) will be considered for these requirements on a course-by-course basis.

Curriculum in Mechanical Engineering

Leading to the degree bachelor of science.

Total credits required: 128.5 cr. See also *Basic Program* and *Special Programs*.

International Perspectives: 3 cr.¹

U.S. Diversity: 3 cr.¹

Communication Proficiency/Library requirement:

Engl 150 and Engl 250 with minimum grade of C; Lib 160. (See *Basic Program* for credit requirements.)

Remaining Communication Courses: 3 cr.
Engl 314, 3 cr.

General Education Electives: 15 cr.

Econ 101, 3 cr. or Econ 102, 3 cr.
Complete 3 additional credits of Social Science Electives.²

Complete 6 cr. of Humanities Electives.²
Complete 3 additional General Education credits.²

Basic Program: 26.5 cr.⁴

Complete with 2.00 GPA including transfer courses: Chem 167 or Chem 177, 4 cr.; Engl 150, 3 cr. and Engl 250, 3 cr. (see above for grade requirements); Engr 101, R cr.; Engr 160, 3 cr.; Lib 160, 0.5 cr.; Math 165, 4 cr. and Math 166, 4 cr.; and Phys 221, 5 cr. (See *Basic Program* rule)

Math and Physical Science: 20 cr.

Engr 170, 3 cr.; Chem 167L, 1 cr. or Chem 177L, 1 cr.; Math 265, 4 cr.; Math 267, 4 cr. or Math 266, 3 cr. with Math 268, 1 cr.; Phys 222, 5 cr.; Stat 305, 3 cr.

Mechanical Engineering Core: 46 cr.⁴

E M 274, 3 cr.; E M 324, 3 cr.; E M 345, 3 cr.; E E 442, 2 cr.; E E 448, 2 cr.; M E 270, 3 cr.; M E 231, 3 cr.; M E 324, 4 cr.; M E 325, 3 cr.; M E 332, 3 cr.; M E 335, 4 cr.; M E 370, 3 cr.; M E 421, 4 cr.; M E 436, 4 cr.; Mat E 272, 2 cr.

Other Remaining Courses: 18 cr.

Complete one course from M E 415, 3 cr.; M E 442, 3 cr. or M E 486, 3 cr. Complete 15 cr. Technical Electives.²

Seminar/Co-op/Internships:

M E 102, R cr.; M E 202, R cr. Co-op/Internship Optional

¹ These university requirements will add to the minimum credits of the program unless the university-approved courses are also approved by the department to meet other course requirements within the degree program.

U.S. diversity and international perspectives courses may not be taken Pass/Not Pass.

² Choose from department approved list.

³ See *Basic Program* for Professional Engineering Curricula for accepted substitutions for curriculum designated courses in the *Basic Program*.

⁴ 2.00 GPA average required including transfer courses.

Transfer Credit Requirements - The Mechanical Engineering Department requires a grade of a C or better for any transfer credit course that is applied to the degree program. The degree program must include a minimum of 15 credits taken from courses offered through the Mechanical Engineering Department at Iowa State University. Of these 15 credits, three must be from one of the senior capstone design courses. The remaining 12 credits may be from the core curriculum program (if a student is deficient in these courses) or from 400-level ME technical electives. No more than 3 credits of ME 490 (independent study) shall be applied to meet the 12 credit requirement.

Curriculum in Software Engineering

Administered by the Department of Electrical and Computer Engineering and the Department of Computer Science in the College of Liberal Arts and Sciences.

Leading to the degree bachelor of science.

Total credits required: 124.5 cr. See also *Basic Program* and *Special Programs*.

International Perspectives: 3 cr.¹

U.S. Diversity: 3 cr.¹

Communication Proficiency/Library requirement:

Engl 150 and Engl 250 with minimum grade of C; Lib 160. (See *Basic Program* for credit requirements.) Engl 314 with a minimum grade of C.

General Education Electives: 15 cr.²

Complete 6 cr. from Arts and Humanities list, 3 cr. of Social Sciences, and an additional 6 cr. from either Arts and Humanities or Social Sciences lists.

Basic Program: 26.5 cr.⁴

Complete with 2.00 GPA including transfer courses: Chem 167 or Chem 177, 4 cr.; Engl 150, 3 cr. and Engl 250, 3 cr. (see above for grade requirements); Engr 101, R cr.; S E 185, 3 cr.³; Lib 160, 0.5 cr.; Math 165, 4 cr. (minimum grade of C-) and Math 166, 4 cr. (minimum grade of C-); and Phys 221, 5 cr. (See *Basic Program* rule.)

Math and Physical Science: 11 cr.

Com S 227, 4 cr. (minimum grade of C-) and Com S 228, 3 cr. (minimum grade of C-). Math 267, 4 cr.

Software Engineering Core: 31 cr.⁴

Cpr E 281, 4 cr.; Cpr E 288, 4 cr. or Com S 229, 3 cr.; Cpr E 308, 4 cr. or Com S 352, 3 cr.; Com S 309, 3 cr.; Com S 311, 3 cr.; Com S 330, 3 cr. or Cpr E 310, 3 cr.; ComS 363, 3 cr. S E 319, 3 cr.; S E 329, 3 cr. and S E 339, 3 cr.

Other Remaining Courses: 41 cr.

S E 491, 3 cr. and S E 492, 2 cr. Engl 314, 3 cr. with a minimum grade of C. Complete either Econ 101, 3 cr., Econ 102, 3 cr. or I E 305, 3 cr. Sp Cm 212, 3 cr. Stat 330, 3 cr.

Complete 3 cr. from Math Electives list.²

Complete 6 cr. from Software Engineering course list.²

Complete 3 cr. from Technical Electives list.²

Complete 12 cr. from list of Supplementary Electives.²

Note: Excess credits from CprE 288 and/or Cpr E 308 may be applied to meet Supplementary Elective credit requirement.

Seminar/Co-op/Internships

S E 166 or Com S 203. Co-op or internship is optional.

Transfer Credit Requirements

The degree program must include a minimum of 30 credits at the 300-level or above in professional and technical courses earned at ISU in order to receive a B.S. in software engineering. These 30 credits must include S E 491 Senior Design Project I and Professionalism, S E 492 Senior Design Project II, and credits in the core professional curriculum and/or in technical electives. The software engineering degree program requires a grade of C or better for any transfer credit course that is applied to the degree program.

¹ These university requirements will add to the minimum credits of the program unless the university-approved courses are also approved by the department to meet other course requirements within the degree program.

U.S. diversity and international perspectives courses may not be taken Pass/Not Pass.

² Choose from department approved lists.

³ See *Basic Program* for Professional Engineering Curricula for accepted substitutions for curriculum designated courses in the *Basic Program*.

⁴ 2.00 required including transfer courses.

Note: International perspectives and U.S. diversity courses are used to meet the general education electives.

College of Human Sciences

Pamela White, Interim Dean
Carla Peterson, Associate Dean
www.hs.iastate.edu/

Departments of the College

Apparel, Educational Studies, and
Hospitality Management

Curriculum and Instruction

Educational Leadership and Policy Studies

Food Science and Human Nutrition

Kinesiology

Human Development and Family Studies

The College of Human Sciences provides an integrative approach to improving the quality of life for individuals, families, schools and communities by linking discovery, science, creativity, and practice; applying the knowledge of learning in all endeavors; and developing leaders for roles in research, education, business and industry, and health and human services.

The College of Human Sciences (CHS) was founded in 2005 and is the newest college on the ISU campus. The college fosters innovative synergies in teaching and research, and in many ways is reinventing how human potential can be enhanced. Members of the College of Human Sciences community strive to improve the quality of people's lives - helping them learn better, live longer, and lead lives that are more productive and fulfilling.

Recommended High School Preparation

Recommended preparation for students entering most departments of the College of Human Sciences should include 4 years of English (including speech) with emphasis in composition and communication skills; 3 years each of mathematics and natural sciences, and at least 2 years of social science and/or humanities. In addition, students interested in Elementary Education or Early Childhood Education are advised to complete three or more years of high school study in one foreign language.

Information for Prospective Students

Each student in the College of Human Sciences works closely with an academic adviser who is associated with the curriculum in which the student is majoring. In some majors, freshmen are advised by a general college adviser. After the freshmen year, these students are assigned an adviser in the department of the chosen curriculum. Advisers assist students in developing academic programs and in adjusting to university life. They also provide information and guidance about career choices. Advisers attempt to adjust each student's schedule of course work in accordance with the student's interests and capabilities.

The college offers a number of orientation sessions during the summer for students planning to enter in the fall. Incoming students are encouraged to attend an orientation session so that academic assessments can be made and appropriate classes may be scheduled for the following term.

Open Option Status

The College of Human Sciences offers an open option for entering students who have not selected a specific area of study. An orientation course helps students explore the opportunities available. Program planning information can be obtained from general college advisers.

Planned Transfer Programs

By careful planning, students may begin their education at another college, then transfer their courses to a curriculum within the College of Human Sciences with maximum efficiency in meeting the degree requirements. The college works closely with community colleges in Iowa and surrounding states to facilitate a transfer to Iowa State University. For more information, call 1-800-522-0683 or visit the College of Human Sciences Student Services.

Families Extension

Students may prepare for a career in the Cooperative Extension Service by enrolling in a curriculum in the College of Human Sciences that provides them with a broad subject matter base for conducting educational programs for families. Advice on choice of courses should be sought from the Family and Consumer Sciences Education and Studies program, the associate dean and director of Iowa State University Extension to Families programs, the director of Iowa State University Extension to Youth and 4-H programs, or the Extension Human Resources office.

Undergraduate Core Curriculum

Graduates of the College of Human Sciences will demonstrate professional and personal competencies in concepts fundamental to the College's mission. These core concepts serve as a unifying focus for students in the College. Competencies will be assessed by designated outcomes in courses within each major in the College. For information on the specific core competencies for particular majors contact the departmental office administering the program.

General Education

Students in the College of Human Sciences are required to complete a program in general education which is integrated with their professional training and extends through the undergraduate curriculum.

The general education program emphasizes intellectual growth and personal development as contrasted with specific career preparation.

The program aims to stimulate a desire for learning and intellectual endeavor, develop understanding and appreciation for the physical and cultural world, encourage independent thinking and analysis, increase competence in all aspects of communication, and create an understanding of individuals as social, psychological, and physical beings.

The student is expected to complete studies in three groups in general education. Areas represented below are not departmental titles. In some cases, courses relating to a given area may be found in several different departments. Credits listed are minimum requirements.

Minimum Group Requirements in the College of Human Sciences

9.5 cr.

I. Communication Skills: English 150, 250; Library 160; and 3 credits in oral communication

9 cr.

II. Biological and physical sciences and mathematical disciplines: at least 3 credits in mathematical disciplines

15 cr.

III. Social sciences and humanities: at least 6 credits in social sciences and at least 6 credits in humanities

Accreditation and Licensure

The following program-specific accreditation/licensure/registrations have been attained by departments within the college:

Department of Apparel, Educational Studies, and Hospitality Management:

Family and Consumer Sciences Education Teacher Licensure Program is licensed by the Iowa Department of Education and the Iowa Board of Educational Examiners.

Hotel, Restaurant, and Institution Management: is accredited by the Accreditation Commission for Programs in Hospitality Administration, the accrediting agency of the International Council on Hotel, Restaurant, and Institutional Education.

Production focus of the Apparel Merchandising, Design, and Production major is endorsed by the American Apparel and Footwear Association.

Department of Food Science and Human Nutrition:

Food Science and Industry and Food Science and Technology curricula are approved by the Institute of Food Technologists. The Dietetics Internship Program and the Didactic Program in Dietetics are accredited by the Commission on Accreditation/Approval for Dietetics Education of The American Dietetic Association, 216 W. Jackson Blvd., Chicago, IL 60606-6995, 312/899-4876.

Department of Kinesiology:

The Athletic Training Option is accredited by the Commission on Accreditation of Athletic Training Education.

Department of Human Development and Family Studies:

The Child Development Laboratory School is accredited by the National Association for the Education of Young Children (NAEYC) Academy for Early Childhood Programs and licensed by the Iowa Department of Human Services.

Teacher Education and Licensure

All students who are recommended by Iowa State University for teacher licensure must meet the requirements of the University Teacher Education Program and be recommended by the CHS Associate Dean for Teacher Education.

Each student will be enrolled in the department in which he or she plans to major and must meet the graduation requirements of that department and the college in which it is located.

For details concerning the professional teacher education requirements and the areas of specialization requirements, see *Teacher Education, Courses and Programs*.

Majors

For more information about a major, see: 1) the curriculum descriptions in this section of the catalog; 2) the department catalog section under *Courses and Programs*; and 3) department websites.

Apparel Merchandising, Design, and Production—Options: Merchandising; Design; Production—Administered by the Department of Apparel, Educational Studies and Hospitality Management

Child, Adult, and Family Services—Options: Child Programs; Youth Programs; and Adult/Family Programs — Administered by the Department of Human Development and Family Studies

Culinary Science—Administered by the Department of Food Science and Human Nutrition

Dietetics—Administered by the Department of Food Science and Human Nutrition

Early Childhood Education—Administered jointly by the Department of Curriculum and Instruction and the Department of Human Development and Family Studies

Elementary Education—Administered by the Department of Curriculum and Instruction

Family and Consumer Sciences Education and Studies—Options: Communications; Professional Studies; Teacher Licensure—Administered by the Department of Apparel, Educational Studies and Hospitality Management

Family Finance, Housing, and Policy—Administered by the Department of Human Development and Family Studies

Food Science—Options: Consumer Food Science; Food Science and Industry; Food Science and Technology—Administered by the Department of Food Science and Human Nutrition

Kinesiology—Options: Athletic Training; Community and Public Health; Exercise Science; General Studies; Health/Fitness Management; and Physical Education Licensure —Administered by the Department of Kinesiology

Hotel, Restaurant, and Institution Management—Administered by the Department of Apparel, Educational Studies and Hospitality Management

Nutritional Science—Administered by the Department of Food Science and Human Nutrition

Secondary Education—The College of Human Sciences provides secondary education licensure programs in conjunction with subject matter areas, or majors, offered by various departments across the university campus. These subject matter areas include agriculture, biology, chemistry, earth sciences, English, foreign languages, general sciences, health, family and consumer sciences education, mathematics, music, physical science, physics, and social studies. See *Index, Teacher Education*.

Minors

Minors are available to all Iowa State students. Minors consist of at least 15 credits including 6 credits taken at Iowa State University in courses numbered 300 or above. A student may not apply the same course to two different minors. The minor must include 9 credits that are not used to meet any other department, college or university requirement. Other courses in the minor may be used elsewhere on the degree audit, but the credits will only count once toward fulfilling the total credits required for graduation. Minors are available in the following areas:

Apparel Merchandising, Design, and Production

Athletic Coaching

Child, Adult, and Family Services

Dance

Educational Services in Family and Consumer Sciences

Family Finance, Housing, and Policy

Food Safety (interdepartmental minor)

Gerontology (interdisciplinary minor)

Hotel, Restaurant, and Institution Management

Nutrition (two minors: one for non FSHN majors and one for department majors)

See *Index* for minor requirements for specific departments and programs.

International Studies (secondary major only)

Sport and Culture

The International Studies Program is an interdisciplinary program which may be taken only as a second major. Students pursuing a second major in international studies must complete the International Studies Program as described in this catalog (see *Index, International Studies*).

Double Majors

Students may elect a second major from the departments and program areas listed above, or from a major field offered for the bachelor's degree in another college of the university. Double majors may be prohibited between majors as determined by the appropriate curriculum committees.

The major departments must approve the degree program, and if those majors involve two colleges, both deans must approve. Such

programs must fulfill the general education requirements of the college of the primary major. If one major leads to the B.A. degree and the other to the B.S. degree, the degree awarded will be the one offered by the department of the primary major. If the primary major may lead to either a B.A. or a B.S., a student may choose to receive either degree. In this case, the student must satisfy the requirements of each major and of the degree that is chosen for the primary major.

Students with a primary major in another college who wish to take a second major in the College of Human Sciences are required to meet all requirements for the major, including the CHS core, and prerequisite and supporting courses.

Two Bachelor's Degrees

Any degree offered by the College of Human Sciences may be earned together with a degree in this or any other college of the university. For the requirements for two degrees, see *Index, Two Bachelor's Degrees*.

International and Cross Cultural Programs

International experience opportunities are available and encouraged through the College of Human Sciences to broaden international and cross-cultural perspectives. Scholarships and other forms of financial assistance are available which provide partial support for students studying abroad. The College has established programs with a variety of colleges and universities around the world including Glasgow Caledonian University, Glasgow, Scotland; University of Otago, Dunedin, New Zealand; the International College of Hospitality Administration, Brig, Switzerland; the London College of Fashion, London, England; and Paris American Academy, Paris, France. Students also have an opportunity to participate in group study abroad programs to Europe, Africa, Central and South America, and Asia.

Other opportunities may be developed through consultation with the college director of international experiences and the student's adviser; for example, students have acquired internships and studied in such countries as Kenya, Rwanda, Spain, Puerto Rico, Ireland, Guatemala, Switzerland, England, Australia, Germany, and France. Faculty members bring diversity and global perspectives to instruction and research through their work in India, South Korea, Central and South America, Pakistan, Africa, and Europe.

Honors Program

High achieving students, with a grade point average of above 3.35, are invited to apply to the Honors Program. Honors students are encouraged to develop a creative program of study expanding their interests while meeting individual educational objectives. Students in the Honors Program also participate in University Honors Seminars, Honors Courses and complete an honors project. For further information, contact the College Honors Committee or academic adviser. Also see *Index, Honors Program*.

Dietetics Internship (DI)

This post-baccalaureate program, administered by the Department of Food Science and Human Nutrition, is accredited by the American Dietetic Association (ADA). The purpose of the program is to enable those who meet the academic requirements of the ADA to obtain at least 900 hours of practice supervised by registered dietitians in medical nutrition therapy, community nutrition, and foodservice management to meet ADA performance requirements for entry level dietitians.

Students who satisfactorily complete the DI will be eligible to take the national registration examination administered by the Commission on Dietetic Registration.

Preparation for Graduate Study

Students considering graduate studies should gain background knowledge in basic subjects related to their area of interest. Undergraduate mathematics, statistics, and research methods courses are useful as preparation for advanced study in graduate school. Upon completion of graduate programs, students are qualified for leadership positions in public and private institutions and for teaching, research, and extension positions in colleges and universities.

Graduate Curricula

The College of Human Sciences offers programs leading to the degrees of master of science, master of education, and doctor of philosophy. Graduate study in the College of Human Sciences is conducted through the Graduate College. Details are found in the Graduate College section of this catalog, (www.grad-college.iastate.edu) and on department websites.

Curriculum in Apparel Merchandising, Design, and Production

Administered by the Textiles and Clothing Program. Leading to the degree bachelor of science. **Total credits required: 123** including a minimum of 18 credits in AMDP at Iowa State University for the degree.

The major in apparel merchandising, design, and production provides a broad based program of study with flexibility in creating program options. Courses are required in general education, and textiles and clothing core. To complete the program, a student combines structured clusters of courses to form primary and secondary program options.

A minor in apparel merchandising, design, and production is available; the requirements appear under *Textiles and Clothing, Courses and Programs*.

Cr. Degree Requirements

9.5 Communications Skills

- 6.5 Engl 150, 250; Lib 160
3 Select from ComSt 214, 218; Sp Cm 212

9-14 Biological and Physical Sciences and Mathematical Disciplines

- 3-4 Mathematics (Math 150 recommended for Merchandising and Production Options)

- 3-5 Select from natural sciences (including FS HN 167)
Stat 101 or 104, or 226
9-10 **Social sciences**
6 Econ 101
3 T C 165
3 Select from the Human Sciences list (including T C 362)
9 **Humanities**
3 T C 257, 354, 356 or AESHM 342.
3 Select from Human Sciences approved list, foreign language requirement
3 One history/art history course. Creative Design: Art H required.

Professional courses

- 25 **Textiles and clothing core:**
AESHM 111, 275, 311;
TC 131, 204, 210, 231, 245, 372
3-6 T C 470
2-3 TC 380 or TC 381 (if TC 470 is not out of home state)

Primary options

Select one professional option from the following three choices

- 13 **Design Professional Courses**
T C 221, 225, 278, 321
15 **Merchandising Professional Courses**
12 T C 376, 377, 475; Acct 284;
3 Mkt 340 or T C 340
15 **Production and Sourcing Management Professional Courses**
12 T C 221, 305, 331, 496
3 Acct 284

Additional Requirements for a Primary Option

- 24 **Design**
R T C 301
9 T C 325, 326, 495
3 Select one: T C 354 or 356
12 Select from T C 257, 305, 340, 354, 356, 362, 377, 404; 415, 431
AESHM 471, 474; Thtre 255; Any Art History, Art Integrated Studio or Design Studies
24 **Technical Design**
R T C 301
12 T C 305, 325, 415, 431
6 Select two courses from T C 354, 356, 362, 496
6 Select two courses from: Acct 284; I E 408; OSCM 320; T C 340, 404
24 **Product Development**
15 T C 305, 431, 467, 496; Acct 284
3 Select one: Mkt 340, T C 340
6 Select two: T C 376, 377, 404, 415 475; AESHM 474; I E 408
14-16 **Merchandising Option**
8-10 Select three: AESHM 271, 287, 340, 471, 474, 477; T C 467, 496; ADVRT 230; Mgmt 370, 371; Mkt 340*, 410, 446, 448
3 Select one: T C 354, 356, 362, 467
3 Select one: T C 221, 305, 331, 404
12 **Production/Sourcing Management Option**
6 Select two: I E 408; LSCM 360; OSCM 320; Stat 495; AESHM 340*, 404; TSM 310
3 Select one: T C 354, 356, 362, 467

- 3 Select one: T C 362, 381 or Study Abroad

Secondary options

For Merchandising and Production/Apparel Engineering select a second cluster from the secondary option areas.

- 9-10 **Business/Entrepreneurship**
9-12 Select three courses from AESHM 287, 474; Acct 215, 285; Econ 355; Fin 301; LSCM 360; Mgmt 310, 313, 370; Mkt 340; MIS 330; OSCM 320
9 **Communications/Publication**
9 Select three: ComSt 214; Engl 302, 303, 309, 313, 314; JI MC 310, 321, 341, 342; Sp Cm 212; any Art Graphic Design
9 **Consumer Behavior/Marketing**
3 T C 467
3 Select from T C 499; AESHM 340; Advrt 230; JI MC 205, 220; Mkt 410, 442, 444, 446, 447, 448, 451, 493
9 **History/Museum Studies**
3 T C 257
6 Select two courses from T C 354, 356, 362, 404, 467, 499; Any History; Any Art History; any Anthropology
9 **Human Resource Management**
9 Select three courses from AESHM 287; T C 438, 467, 499; ComSt 214, 218, 310, 314, 317; Mgmt 370, 371; Psych 450; Soc 380; Sp Cm 212
9 **International Trade**
3 T C 362
6-8 One foreign language or 6 credits from T C 381, AESHM 421; Anthr 323, 325, 326, 418; IntSt 120/220, 235; Mgmt 414; Mkt 448; TSC 341
9 **Public Relations/Event Management**
3 Select three: T C 287, 499; AESHM 471; Advrt 230, 301, 334, 424, 434; JI MC 205, 220, 321; Mkt 410, 447
Electives
Select courses to broaden or complement the options (see adviser).
123 **Total credits**

* If Merchandising primary option, may need to select another course from approved list.

Curriculum in Child, Adult, and Family Services

Administered by the Department of Human Development and Family Studies. Leading to the degree bachelor of science. **Total credits required: 125.**

The child, adult, and family services curriculum, with options in child programs, youth programs, adult/family programs, leads to employment opportunities in the helping professions working with children, adults, and families in a variety of public and private human service agencies and organizations.

A minor in child, adult, and family services is available; the requirements appear under *Human Development and Family Studies, Courses and Programs*.

The following requirements are for the child programs, youth programs, adult/family programs:

Degree Requirements

- 12.5 Communications and Library**
9.5 Engl 150, 250; Lib 160;
Sp Cm 212
3 Select from Engl 302, 309, 314
- 10-11 Natural Sciences and Mathematical Disciplines***
3-4 Select from: Stat 101, Math 104, 105, 140, 142, 150, 165
4 Com S 103
Select 3 credits from Biology courses
- 9 Social Sciences**
Select from CHS list of approved social sciences
- 9 Humanities**
Select from CHS list of approved humanities
- 2 HD FS Orientation**
HD FS 110
- 17 Human Development and Family Studies Core:** HD FS 102, 269, 449, 491
- 11 Child, Adult, and Family Services Core:** HD FS 218, 367, 395, and 445 or 486
- 24 Programs Option**
See option lists
- 31.5-32.5 Electives**
125.0 Total credits

U.S. Diversity and International Perspectives Requirement: Students fulfill the U.S. Diversity and International Perspectives Requirement by choosing three credits of coursework from each of the university-approved lists.

Program Options

- 24 Child Programs:** HD FS 220, 221, 240, 344, 349; H S 105; C I 250
Select 3 credits from: HD FS 239, 283, 360, 270, 380, 479
- 24 Youth Programs:** HD FS 226, 227, 270, 276, 349, 479
Select 3 credits from: C I 250, HD FS 360, Psych 436 and
Select 3 credits from: HD FS 239, 283, 373, 380
- 24 Adult/Family Programs:** HD FS 270, 276, 349, 377, 479, and 360 or 463
Select 6 credits from: HD FS 239, 283, 341, 373, and 380

Curriculum in Culinary Science

Administered by the Department of Food Science and Human Nutrition

- Cr. Degree Requirements***
9.5 Communications/Library
Engl 150, 250; Sp Cm 212 or ComSt 214; Lib 160
- 6-7 Mathematical sciences**
Math 140, 142, 160, 165, or 181
Stat 101 or 104
- 9 Physical sciences**
Chem 163;163L; 231, 231L
- 12-13 Biological sciences**

- BBMB 301; Biol 211, 212; Micro 201 or 302; and Micro 201L or 302L
- 15 Humanities/Social sciences**
Econ 101; FS HN 342; 6 credits Humanities courses; 3 additional credits Humanities or Social Sciences
- 44 Food science and human nutrition**
FS HN 101, 104, 110, 167, 203, 214, 265, 311, 314, 403, 405, 406, 411, 412, 420, 480, 491B, 491D
- 3 Animal science**
An S 270
- 22 Hotel, restaurant institutional management**
HRI 233, 333, 340, 380, 380L, 383, 487 and AESHM 474
- 0-2 Electives**
- 122.5 Total credits**

*Additional requirement: Students must fulfill international perspectives, U.S. diversity, and ethics requirements by selecting coursework from approved lists. These courses may be used to fulfill other area requirements.

Curriculum in Diet and Exercise B.S./M.S.

Administered by the Departments of Food Science and Human Nutrition, and Kinesiology

Courses included have been approved as meeting the academic requirements of the American Dietetic Association in preparation for admission to dietetic internship programs. There is a \$30 fee for a statement of verification of completion of the approved program. Courses also are included to meet the ACSM requirements for certification at the level of Health Fitness Instructor.

- Cr. Degree Requirements***
9.5 Interpersonal and public communication skills
Engl 150, 250; Lib 160; Sp Cm 212
- 38-41 Mathematical, physical, and life sciences**
Math 140, 142, 160, 165, or 181; Stat 101, 104, or 226; Chem 163 and 163L or 177, 177L, and 178; 231;231L; Phys 106 or 111; BBMB 301; Biol 211, 212; 255; 255L; 256; 256L; Micro 201
- 12 Humanities and social science**
select 3 credits from approved humanities course list;
select 3 credits from approved Ethics course list (if ethics course selected is not on the humanities list, 3 additional credits of humanities must be taken.);
Psych 101, 230
- 20-22 Diet and exercise**
Kin 252-253, or FS HN 110; Kin 258; FS HN 167, 214, 265, 360;
- 41 Diet and exercise**
H S 380; Kin 220, 259, 345, 358, 462; FS HN 403. 411, 463, 466; NutrS 561;
HRI 380, 380L, 392
Kin 355, 360, 366, or 372
- 123.5 Total credits**

*Additional requirement: Students must fulfill international perspectives, U.S. diversity, and ethics requirements by selecting coursework from approved lists. These courses may be used to fulfill other area requirements.

Graduate Program

- Cr. Degree Requirements**
39-40 Graduate level coursework
FS HN 581; NutrS 501, 561, 562, 564; Kin 501, 505, 551, 558; Kin 699 or NutrS 699A; Stat 401; Kin 550, 570, or NutrS 502.
Additional requirement: FS HN 490C for students in the FSHN Department.

Curriculum in Dietetics

Administered by the Department of Food Science and Human Nutrition.

The student is prepared for admission to dietetic internship programs and other professional experience programs approved/credited by The American Dietetic Association. Courses included have been approved as meeting the academic requirements of The American Dietetic Association. There is a \$30 fee for a statement of verification of completion of the approved program.

- Cr. Degree Requirements***
9.5 Communications
Engl 150, 250; Lib 160; ComSt 214 or Sp Cm 212
- 6-7 Mathematical sciences**
3 credits Math 140, 142, 160, 165 or 181; Stat 101 or 104
- 12 Physical sciences**
Chem 163 and 163L or 177, 177L, and 178; 231; 231L;
- 20-22 Biological sciences**
BBMB 301 or Biol 314; Biol 211, 212, 212L, 255, 255L; 300-level physiology course (BIOL 306 or 335) Micro 201 and 201L
- 15 Humanities/Social sciences**
6 crs. Humanities course; FS HN 342; Psych 101; 3 crs. Humanities or social science list
- 41 Food science and human nutrition**
FS HN 110, 167, 203, 214, 265, 340, 360, 361, 362, 403, 411, 461, 463, 464, 466, 480
- 11 Management**
HRI 380, 380L, 391, 392
- 0-6 Electives**
- 120.5 Total credits**

*Additional degree requirements: Students must fulfill international perspectives and U.S. diversity requirements by selecting coursework from approved lists. These courses may be used to fulfill other area requirements.

Curriculum in Early Childhood Education

The curriculum in early childhood education is planned for students preparing to teach young children and work with their families. This program leads to careers in working with young children who are typically developing and those with special needs from birth through age eight. Graduates in this curriculum may teach in early childhood (preschool and primary) classrooms and home based programs, with emphasis on inclusive services; graduates may be employed by either public or private agencies or schools. This curriculum has been approved by the Iowa Department of Education and meets the requirements for the early childhood education unified teacher license, which permits individuals to teach general and special education for children from birth through age eight. The program is administered jointly by the Departments of Human Development and Family Studies and Curriculum and Instruction.

Students in early childhood education must make application to and be accepted into the teacher education program prior to enrolling in advanced courses. All early childhood students, including those seeking a double major, must meet general education requirements for teacher licensure. Iowa State University is in compliance with the Iowa Department of Education's mandate for a performance based system of teacher training. Following this same type of system, the state of Iowa has developed and implemented a competency system to evaluate the performance of all teachers. A detailed list of the eleven Teacher Education Standards along with other information about the University Teacher Education Program, can be found at www.teacher.hs.iastate.edu/, the teacher education website.

Foreign Language Requirement

Early childhood education majors must satisfy a graduation requirement equivalent to the first year of university-level study in one foreign language (normally, completion of a two-semester sequence in any one foreign language). The requirement may be met by completion of three or more years of high school study in one foreign language.

Students who have completed three or more years of French, German, or Spanish in high school may not receive graded credit for 101-102 in those languages; test-out credit (T credit) may be obtained by passing an appropriate examination or by completing an advanced sequence (200-level or higher) in that language. If these students choose to take 101-102 on a remedial basis, they will be graded S-F.

Degree Requirements

125.5 total semester credits required

- 9.5 Communications and Library**
Engl 150, 250; Lib 160, select 3 credits from Communications

Options

- 9 Natural Sciences and Mathematics**
Math 195, Select 3 credits from physical sciences, Select 3 credits from biological sciences

- 9 Social Sciences***
3 Select from American government or American history
6 Select from CHS approved list
9 Humanities*
Select from CHS approved list. Must meet Foreign Language Requirement.
2 Health, Dance, Physical Education, Safety
H S 105
9 Human Development and Family Studies: HD FS 102, 220, 221
2 Orientation
HD FS 110, HD FS 208
15 Professional Education Core:
C I 201, 204, 250, 332, 406
21 Preprimary Inclusive: HD FS 240, 340, 343, 345, 455, 456
21-24 Primary Inclusive: C I 245, 268, 377, 433 or 443, 438 or 448, 439 or 449, 468F, 468G, 468I; Sp Ed 355, 368, 455
16 Student teaching: Sp Ed 415 and HD FS 417B OR C I 416A and HD FS 417C

0-3 Electives

Communication Options

Select 3 credits from: ComSt 102, 218, 317, Sp Cm 212, 312, 313, 322, 327

Physical Sciences Options

Select 3 credits from: Astro 120, 150, Chem 160, 163, 164, Geol 100, 102, LAS 111, Mteor 206, Phys 101, 106

Biological Sciences Options

Select 3 credits from: Biol 101, 173, 155, 211, 211L, 255, 255L, 258, Ent 211

U.S. Diversity and International Perspectives Requirement: Students in Early Childhood Education fulfill the U.S. Diversity and International Perspectives Requirements by choosing three credits of coursework from each of the university-approved lists.

*Refer to departmental curriculum sheet, available from adviser, for specific course requirements.

Curriculum in Elementary Education

The curriculum in elementary education is planned for students preparing to teach in grades kindergarten through six. For additional information, see Index, *Elementary Education*.

Teaching endorsements in areas closely related to elementary education, including a special education endorsement in Instructional Strategist I: Mild/Moderate K-8, are available for elementary education majors. See Teacher Education, Courses and Programs, for information about specific endorsements.

Additional teaching endorsements, available at the graduate level to individuals who hold a valid Iowa teaching license, include the following: K-6 foreign language, reading, special education (Instructional Strategist I: Mild/Moderate K-8; Instructional Strategist I: Mild/Moderate 5-12; and Instructional Strategist II: Behavior Disorders/Learning Disabilities, ages 5-21).

Communication Proficiency

In order to meet graduation requirements, all students must have a C (2.0) or better for each

of Engl 150 and Engl 250.

U.S. Diversity and International Perspectives

In order to meet graduation requirements, all students must complete 3 credits of course work in U.S. Diversity and 3 credits in International Perspectives. See department for approved lists of courses.

Foreign Language Requirement

Elementary education majors must satisfy a graduation requirement equivalent to the first year of university-level study in one foreign language (normally, completion of a two-semester sequence in any one foreign language). The requirement may be met by completion of three or more years of high school study in one foreign language.

Students who have completed three or more years of French, German, or Spanish in high school may not receive graded credit for 101-102 in those languages; test-out credit (T credit) may be obtained by passing an appropriate examination or by completing an advanced sequence (200-level or higher) in that language. If these students choose to take 101-102 on a remedial basis, they will be graded S-F. Certification in American Sign Language is recognized by the University and satisfies the foreign language requirement for the curriculum in Elementary Education.

Total credits required: 128.5.

Cr.

46.5 General Education*

- 9.5** Communication skills
Engl 150 (3), 250 (3); Lib 160 (0.5); Select from ComSt 102 (3), 218 (3), 317 (3), Sp Cm 212 (3), 312 (3), 313 (3), 322 (3), 327 (3)

- 9** Social sciences
HD FS 102 or Psych 230 (3), American history/American government (3), options (3)

- 9** Humanities
Select 9 credits from department approved list

- 1** Health, dance, kinesiology, safety options (1)

- 9** Mathematics
Math 195 (3), 196 (3); Select from 104 (3), 105 (3), 140 (3), 142 (3), 160 (3), 165 (4), 180 (3), 297 (3).

- 9** Biological/Physical Sciences
Biological sciences (3) select from Anthr 202 (3); Biol 101 (3), 173 (3), 211 (3); Biol 202 (2), Biol 155 (3), 155L (2), 255 (3), 258 (3)
Physical sciences (3) select from Astro 120 (3), 150 (3); Chem 160 (3), 163 (4), 164 (4); Geol 100 (3), 100L (1), 101 (3); Mteor 206 (3); Phys 101 (3), 106 (4)

18 Area of specialization

(Requires at least 24 credits. Nine credits from an area specialization may be used to meet other requirements.)

67 Professional education

- 24** Required courses
C I 201 (3), 204 (3), 245 (2), 268 (1), 332 (3), 406 (3); HD FS 226 (3), 240 (3) or Engl 396 (3), Sp Ed 250 (3)

- 21** Required methods

- C I 377 (4), 468A (1), 378 (4), 468B (1), 448 (3), 468C (1), 449 (3), 468D (1), 443 (3)
- 6 Related Methods
Select from H S 275 (3); ArtEd 211 (3); Music 265 (3); Ex Sp 284 (3)
- 16 Student teaching
C I 416A (8) or 416D (8), 416B (8) or 416E (8), Sp Ed 416 (special education students only)
- R Orientation (required)
First year—115; sophomore—215; transfer—315

*Refer to departmental curriculum sheet, available from adviser, for specific course requirements.

Curriculum in Family and Consumer Sciences Education and Studies

Administered by Apparel, Educational Studies and Hospitality Management. Leading to the degree bachelor of science. Total credits required: 125.5

This curriculum provides a broad-based program of study focusing on preparation for professional careers related to education or community leadership. Courses are required in general education and the College core. Students select one program option.

There are three choices for this curriculum.

Option 1, teacher licensure, Option 2, communications, or Option 3, professional studies. In all options, students are prepared with a broad-based understanding of family and consumer sciences.

Option 1, teacher licensure, is designed for students seeking careers as family and consumer sciences educators in a variety of settings such as middle, junior, and senior high schools. With additional credits students may also be approved to teach in specific occupational areas: child care, fashion merchandising, and foodservice. Further information about licensure programs appears under Teacher Education.

Option 2, communications, is designed for students seeking careers emphasizing communication with diverse populations in extension, business, community agencies, community colleges, and youth and adult education programs in a global community.

Option 3, professional studies, is designed to provide students with the opportunity to pursue an individualized program which is planned with their academic advisers. Opportunities to participate in study abroad, internships, and field study build a solid base for work in a global community. Careers include working with diverse population in extension, business, community agencies, community colleges, and youth and adult education programs.

The program offers a minor in family and consumer sciences education; the requirements appear under Family and Consumer Sciences Education and Studies, Courses and Programs.

Cr.Degree Requirements

- 9.5 Communications and library**
6 Engl 150, 250
3 Select from: ComSt 102, 214 218, Sp Cm 212, 312
0.5 Lib 160
- 9-10 Natural sciences and mathematical disciplines**
3 Biol 101 or Biol 155
3-4 Select a course from the mathematical disciplines (Teacher licensure option must select a Math or Stat course and communications option must select Stat 101 or 104)
3 Select additional course in natural science. (Both teacher licensure option and communications option must complete high school chemistry or its equivalent. Teacher licensure must have a physical science course)
- 9 Social sciences**
3 Econ 101
3 Soc 130 or 134
3 HD FS 102
- 9 Humanities**
9 Courses from approved list (Teacher licensure must complete 3 cr. of American history or American government)
- 14 Family and Consumer Sciences Education and Studies core**
AESHM 111, 206, 460
AESHM 311, 379, 421

Option 1: Teacher Licensure

- 75 Additional Professional Courses**
30 FCEdS 214, 280L, 306, 318, 403, 413, 417A, 417B
6 FSHN 111, 167
12 HD FS 239; 276; 283, and 349;
3 Select from HD FS 341, 483, or 488
3 Select from HD FS 220, 221, 226 or FCEdS 223
3 T C Select one course from 121, 131, 165, 204, or 362
15 C I 201, 204, 333, 406, 415, 426
3 Sp Ed 450
125.5 Total Credits

Option 2: Communications

- 74-75 Additional Professional Courses**
14 FCEdS 306, 415, 418A
3 FSHN 167
3 JL MC 305
6 HD FS 239; 283
3 AESHM 287
9 Select from: Engl 302, 309, 313, or 314
3 Sp Cm 312
6 JI MC Select from 205, 220, 341, 462, 476, or 477
6 JI MC 342 and 342L
3 Select from Anthr 417, AESHM 342, T C 362, or Phil 340
12 Select from AESHM, FCEdS, FS HN, HD FS, HRI, H S, or T C (At least 6 credits should be 300 level or above)
6-7 Electives
121 Total Credits

Option 3: Professional Studies

- 74 Additional Professional Courses**
6-11 FCEdS 415, 418B
3 HD FS 283
3 HD FS Select from 239, 341, 483, or 488
3 AESHM 474 or Mgmt 310
3 FSHN 167
3 Select from: Anthr 417; AESHM 342, T C 362; Phil 340
6 Select from Engl 302, 309, 313, 314; JI MC 205; Sp Cm 312
16-21 Select from AESHM, FCEdS, FS HN, HD FS, HRI, H S, or T C (At least 6 credits should be 300 level or above)
14 Select from Natural Sciences, Social Sciences, Humanities, Art and Design
12 Electives
121 Total Credits

Occupational teaching areas available:
Child care: HD FS 220, 221, 340, 343, 445

Fashion merchandising: T C 131, 165, 375, 376, 377, Com S 103

Foodservice: Biol 101, Micro 201 or HRI 233, 333, 380, 380L, 438

Curriculum in Family Finance, Housing, and Policy

Administered by the Department of Human Development and Family Studies. Leading to the degree bachelor of science.

Total credits required: 121.5

The family finance, housing, and policy curriculum prepares students for professional work related to financial and housing resource management and policy analysis. The program focuses on financial resource management, housing services and administration, and family policy issues pertinent to children, adults, and families. Graduates of the program are prepared for employment within the public and private sector as financial counselors and planners, insurance agents, loan officers, mortgage originators, government housing authority administrators, housing advocates, housing planners, real-estate agents, non-profit agency administrators, policy analysts and lobbyists, property managers, and consumer credit and financial aid counselors. Family finance, housing, and policy majors also are prepared to enter graduate programs in family policy and family financial planning.

Learning outcomes are identified for graduates with a degree in family finance, housing, and policy. Students are able to: demonstrate competency in consumer science and their chosen field of emphasis; demonstrate proficiency in interpersonal communication and in working with diverse groups to solve multidisciplinary problems; effectively prepare and deliver information to family finance, housing, and policy professionals as well as to the general public; critically evaluate information and accurately interpret and use research; understand the complexity of issues facing professionals in the field, including ethical, cultural and environmental elements.

A minor in family finance, housing and policy is available; the requirements appear under Human Development and Family Studies, Courses and Programs.

Degree Requirements

121.5 total semester credits required

- 12.5 Communications and Library**
Engl 150, 250, Sp Cm 212, Lib 160
Select from Engl 302, 309, 314
- 10 Natural Sciences and Mathematical Disciplines***
4 Stat 101
3 Select from Computer Science
3 Select from Math, Stat, or natural sciences
- 9 Social Sciences**
Econ 101, Soc 134, Select from Anthr, Econ, Pol S, Psych, or Soc
- 9 Humanities**
Select from approved College of Human Sciences list
- 2 HD FS Orientation**
HD FS 110
- 20 Human Development and Family Studies Core:** HD FS 102, 269, 449, 491, Select 3 credits HD FS from outside of major
- 20 Family Finance, Housing, and Policy Core:** HD FS 239, 270, 283, 341, 395, 489, 489L, 416
- 15 Family Finance, Housing, and Policy Emphasis:**
Select from Acct 284, HD FS 360, 380, 378, 463, 483, 488
- 24 Electives**

Courses from Accounting, Architecture, Art, and Design, Community and Regional Planning, Economics, Family and Consumer Sciences Education, Finance, Gerontology, Interior Design, Journalism, Management, Marketing, Political Science, Psychology, and Sociology are suggested.

Curriculum in Food Science

Administered by the Department of Food Science and Human Nutrition.

Option 1. Food Science and Technology

- Cr. Degree Requirements***
- 12.5 Communications/Library**
Engl 150, 250; Lib 160; ComSt 214 or Sp Cm 212; TSM 115
- 11-12 Mathematical Sciences**
Math 165 and 166, or 181 and 182; Stat 101 or 104
- 23 Physical Sciences**
Chem 177, 177L, 178, 331, 331L, 332; Phys 111, 112
- 13 Biological sciences**
BBMB 301; Biol 211, 212; Micro 302, 302L
- 15 Humanities/Social Sciences**
6 credits Humanities courses; 3 credits Social Sciences courses; FS HN 342; additional 3 credits Humanities or Social Sciences courses
- 44 Food science and human nutrition**
FS HN 101, 110, 167, 203, 311, 351, 403, 405, 406, 410, 411, 412, 420, 421, 471, 472, 480
- 0-2 Electives**
- 120.5 Total credits**

*Additional degree requirements: Students must fulfill international perspectives and U.S. diversity by selecting coursework from approved lists. These courses may be used to fulfill other area requirements.

Option 2. Food Science and Industry

- Cr. Degree Requirements***
- 15.5 Communication/Library**
Engl 150, 250; Lib 160; JI MC 305, or 220, or 347; Sp Cm 212 or ComSt 214; TSM 115
- 7-8 Mathematical Sciences**
Math 160, 165, or 181; Stat 101 or 104
- 16 Physical Sciences**
Chem 163 and 163L or 177, 177L and 178; 231; 231L; Phys 106
- 12-13 Biological Sciences**
BBMB 301; Biol 211, 212; Micro 201 or 302; Micro 201L or 302L
- 15 Humanities/Social Sciences**
Econ 101; FS HN 342; select 6 credits of humanities courses; select 3 additional credits of humanities or social science courses
- 6 Business**
Select 6 credits from Acct 215, 284, 285; Econ 301, 320; Mgmt 310, 370, 371, 414, 472; MIS 330; Mkt 340, 447, 448
- 44 Food science and human nutrition**
FS HN 101, 110, 167, 203, 311, 351, 403, 405, 406, 410, 411, 412, 420, 421, 471, 472, 480
- 0-5 Electives**
- 120.5 Total credits**

*Additional degree requirements: Students must fulfill international perspectives and U.S. diversity requirements by selecting coursework from approved lists. These courses may be used to fulfill other area requirements.

Option 3. Consumer Food Science

- Cr. Degree Requirements***
- 21.5 Communications/Library**
Engl 150, 250; JI MC 305 or 220; select 6 cr. from JI MC 347, Engl 205, 302, 309, 313, or 314; Sp Cm 212 or ComSt 214; Lib 160; TSM 115
- 6-7 Mathematical sciences**
Math 140, 142, 160, 165, or 181
- 16 Physical sciences**
Chem 163 and 163L or 177, 177L and 178; 231, 231L; Phys 106
- 12-13 Biological sciences**
BBMB 301; Biol 211, 212; Micro 201 or 302; and Micro 201L or 302L
- 15 Humanities/Social sciences**
Econ 101; FS HN 342; 6 credits humanities courses; 3 additional credits humanities or social sciences
- 41 Food science and human nutrition**
FS HN 101, 110, 167, 203, 214, 265, 311, 403, 405, 406, 411, 412, 420, 471, 480
- 6 Business**
Mkt 340 or 447

0-3 Electives

120.5 Total credits

*Additional degree requirements: Students must fulfill international perspectives and U.S. diversity requirements by selecting coursework from approved lists. These courses may be used to fulfill other area requirements.

Concurrent B.S. and M.S. Program:

Well qualified students in Food Science who are interested in graduate study may apply for concurrent enrollment in the Graduate College to simultaneously pursue both a bachelor of science in Food Science and a master of science degree in Food Science and Technology. For more information, refer to www.fshn.hs.iastate.edu

Curriculum in Kinesiology and Health

The curriculum in Kinesiology and Health is designed for students preparing to enter professional areas related to the health, exercise or sport science fields. Students majoring in Kinesiology & Health may select one of six options: 1) Athletic Training, 2) Community and Public Health, 3) Exercise Science, 4) General Studies, 5) Health/Fitness Management, and 6) Physical Education Licensure.

Minors in dance, athletic coaching, and sport and culture are available; the requirements appear under Kinesiology, Courses and Programs.

A major in Performing Arts with a dance emphasis is available; the requirements appear under *Curriculum in Performing Arts in Theatre.*

Communication Proficiency

In order to meet graduation requirements, all students must earn an average of C (2.0) or better in Engl 150 and 250, with neither grade being lower than a C-. Students not meeting this condition must earn a C or better in an advanced writing course (select from Engl 220, 302, 309, or 314).

U.S. Diversity and International Perspectives

In order to meet graduation requirements, all students must complete 3 credits of course work in U.S. Diversity and 3 credits in International Perspectives. See university approved list.

Total credits required: 124 (46 credits in courses numbered 300 or above).

Cr.

- 42 General Education**
- 9 Physical and Life Sciences**
Basic Human Physiology and Anatomy
8 Biol 255, 255L, 256, and 256L
3 Introduction to Human Nutrition—FS HN 167
- 6 Mathematics and Computer Sciences**
2-3 Mathematics/Statistics—select from Math 104, 140, 141, 142, 150, 165 OR Stat 101, 104, 226
- 3-4 Computer Science choice
- 9 Social Sciences**
- 6 Humanities**
- 12.5 Communication Skills**
6 Freshman Composition—Engl 150, 250

- 3 Fundamentals of Public Speaking—Sp Cm 212
- 0.5 Library instruction—Lib 160
- 3 Business Communication—Engl 302, 314, or Sp Cm 312
- 17 **Core requirements: (Each course used to meet the Core requirements must be completed with a grade of C- or better.)**

Basic Core

- 3 Personal and Consumer Health—H S 110
- 3 Fields and Disciplines in Kinesiology—Kin 252, 253, 254 (required of fresh men only)
- 2 Concepts of Physical Fitness—Ex Sp 258

Advanced Core

(H S 110, , Kin 252, 253, and 258 should be completed prior to enrollment in the advanced core courses; students must have completed three of these courses with at least one from each sub-discipline; some courses have unique prerequisites which can be taken as part of General Education coursework)

Biological Basis of Physical Activity and Health Promotion

- 3 Biomechanics - Kin 355
- 3 Physiology of Exercise—Kin 358
- 3 Human Diseases—H S 350

Behavioral Basis of Physical Activity and Health Promotion

- 3 Sociology of Sport and Physical Activity—Kin 360
- 3 Sport Psychology—Kin 365
- OR
- Exercise Psychology—Kin 366
- 3 Motor Control and Learning Across the Lifespan—Kin 372
- 3 Consumer and Public Health—H S 310

Option 1. Athletic Training

The CAATE accredited athletic training option prepares students for the NATABOC certification examination or for graduate work in athletic training. Admission to the athletic training option is competitive and based on available department resources and will be determined on the basis of grades and other performance factors. Technical standards can be found on the athletic training website. Details are available from the Kinesiology Advising Office or the Athletic Training Education Program.

- 3 Basic Athletic Training for Athletic Trainers—Kin 222
- 1 Athletic Training Clinical Practicum—Kin 221, Kin 223
- 1 Introduction to Taping, Bracing, and Equipment Fitting - Kin 240
- 3 Evaluation of Athletic Injuries I—Kin 224
- 1 Athletic Training Clinical Practicum—Kin 225
- 3 Evaluation of Athletic Injuries II—Kin 226
- 1 Athletic Training Clinical Practicum—Kin 227
- 3 Therapeutic Modalities for Athletic Trainers—Kin 323
- 1 Athletic Training Clinical Practicum—Kin 324

- 3 Rehabilitation of Athletic Injuries—Kin 326
- 1 Athletic Training Practicum—Kin 327
- 3 Organization and Administration of Athletic Training—Kin 425
- 3 Medical Concerns for the Athletic Trainer—Kin 450
- 3 Legal Aspects of Sport—Kin 445
- 4 Principles of Fitness Assessment and Exercise Prescription—Kin 458
- R Review of Athletic Training Competencies—Kin 489
- 2 Instructor's First Aid and CPR—H S 305
- 4 General Chemistry—Chem 163
- 1 Laboratory in General Chemistry—Chem 163L
- 4 Physics 106 or 111
- 3 Drug Education—H S 215

Elective to equal 124 total credits

The following courses are required; they can be taken as part of the General Education requirements:

- 3-5 Statistics—Stat 101, 104, 226
- 2-3 Mathematics—select from Math 140, 141, 142, 150, 165

The following six courses must also be taken; three can fulfill the Advanced Core requirement: Kin 355, 358, 360, 365, 372 and H S 350.

Option 2. Community and Public Health

This option emphasizes health promotion and disease prevention and prepares students for professional involvement in community health agencies which incorporate health services and the educational process. Students will be prepared for employment in state and public health agencies, volunteer health agencies, hospitals (patient education), and industry (health and wellness programs). Graduates are eligible to take the National Certified Health Education Specialist (CHES) exam which recognizes qualified specialists in the diversified field of health education.

- 2 First Aid and Emergency Care—H S 105
- 3 Drug Education—H S 215
- 3 Worksite Health Promotion—H S 380
- R Search Strategies for Field Experiences and Employment—H S 385
- 3 Administration of School Health—H S 390
- 3 Community Health Program Development—H S 430
- 2 General Microbiology—Micro 201
- 1 Intro Micro Lab—Micro 201L
- 3 Human Sexuality—HD FS 276
- 3 Aging and the Family—HD FS 377
- 3 Principles of Accident Prevention—TSM 270
- 5 General Chemistry with lab—Chem 163 and 163L
- 4 Principles of Biology with lab—Biol 211 and 211L

- 3 Principles of Marketing—Mkt 340
- 3 Principles of Public Relations—JI MC 220 or Publicity Methods—JI MC 205
- 3 Principles of Microeconomics—Econ 101
- 3-4 Select from Engl 309, Engl 313, HD FS 395, HD FS 449 or JI MC 342/342L
- 10-16 Directed Field Experience—H S 485

Electives to equal 124 total credits

The following courses must also be taken. They can fulfill either General Education or Core requirements for the Kinesiology & Health major:

- 3 Statistics—Stat 101, 104, 226
- 3 Psych 230 or HD FS 102 (under Social Science choice)

The following three courses must also be taken; they will fulfill the Advanced Core requirement; H S 310, 350 and Kin 366.

Option 3. Exercise Science

The Exercise Science option is designed for students interested in an interdisciplinary approach to the science of human movement. By combining exercise science with another area of study to support an individualized program, this option is suitable for students interested in graduate study or who are preparing for advanced study leading to careers in medicine, physical therapy, or other allied health programs.

- R Search Strategies for Field Experience and Employment—Ex Sp 385
- 6 Two 300-400 level Ex Sp courses
- 26 Meet the requirements of a specialization area in a related field

Electives to equal 124 total credits

A statistics course and one of Math 140, 141, 142, or 165 must be selected in the General Education requirements.

The following six courses must also be taken; three can fulfill the Advanced Core requirement: Kin 355, 358, 360, 365 or 366, 372 and H S 350.

Option 4. General Studies

The general studies option is provided for students interested in an interdisciplinary approach to the study of human movement. In this option kinesiology is combined with a concentration in another area of study to support an individualized program, such as community sport and recreation, dance, and other sport, exercise, or health related fields. Programs of study must be approved by the undergraduate program coordinator.

- R Kin 385
- 6 Additional credits in 300-400 Kin courses
- 26 Credits in related areas of study (must be approved by Curriculum Coordinator)
- 8-12 Internship in Sport and Exercise Science—Kin 485

Electives to equal 124 credits

The following courses must also be taken. They can fulfill the General Education requirements:

- 2-3 Mathematics—Select from Math 140, 141, 142, 150, 165
- 3-5 Statistics—select from Stat 101, 104, 226
- 4 Physics—Physics 106 or 111

The following five courses must also be taken: three can fulfill the Advanced Core requirement: Kin 355, 358, 360, 365, 372.

Option 5. Health/Fitness Management

This option prepares students for careers in the physical fitness/health field. It is designed for those who wish to prepare for professional roles as exercise specialists or program directors in corporate fitness programs, health clubs, cardiac rehabilitation programs, or other public and private agencies providing physical fitness activities.

- 2 Basic Athletic Training—Kin 220
- 2 Leadership Techniques for Fitness Programs—Kin 259
- 3 Management of Health-Fitness Programs and Facilities—Kin 345
- 3 Worksite Health Promotion—H S 380
- R Search Strategies for Field Experiences and Employment—Kin 385
- 4 Principles of Fitness Assessment and Exercise Prescription—Kin 458
- 1 Internship in Exercise Leadership —Kin 459
- 3 Medical Aspects of Exercise—Kin 462
- 8-16 Internship in Sport and Exercise Science—Kin 485A
- 3 Principles of Organization and Management—Mgmt 370
- 3 Principles of Macroeconomics—Econ 101
- 4 Phys 106 or 111

Electives to equal 124 credits

The following courses are required: they can be taken as part of the General Education requirements:

- 2-3 Mathematics - select from Math 140, 141, 142, 150, 165
- 3-5 Statistics - select from Stat 101, 104, 226

The following five courses must also be taken: three can fulfill the Advanced Core requirement: Kin 355, 358, 366, 372 and H S 350.

Option 6. Physical Education Licensure

This option is designed for students seeking a license to teach physical education K-12. Students interested in preparing to coach must earn additional credits in: Kin 220 and 315. Note: when making general education course selections, teacher licensure students must choose C I 201, Psych 230, a natural science and a U.S. history or political science course.

Professional education requirements

- 3 Foundations of American Education—C I 204
- R Senior Seminar—C I 415
- 3 Multicultural Gender Fair Education—C I 406

- 8 Supervised Student Teaching in Physical Education in the Secondary School—Kin 417
- 8 Supervised Student Teaching in Physical Education in the Elementary School—Kin 418

Physical education professional theory

- 2 Leadership Techniques for Fitness Programs—Kin 259
- 3 Elementary and Pre-school Movement Education—Kin 312
- 0.5-1 Directed Field Experience in Elementary School Physical Education—Kin 280
- 0.5-1 Directed Field Experience in Physical Education—Kin 281
- 3 Teaching Physical Education—Kin 375
- 3 Adapted Physical Education—Kin 395
- 3 Measurement in Physical Education—Kin 471
- 3 Physical Education Curriculum Design and Program Organization—Kin 475

Physical education professional activity and related courses

- 2 First Aid and Emergency Care—H S 105
- 1 Aquatics—Kin 230
- 1 Tumbling and Gymnastics Skills—Kin 231
- 1 Fundamentals of Self-defense—Kin 237
- 1 Fundamentals of Outdoor and Adventure Activities—Kin 238
- 1 Team Sport - Kin 232 or 233
- 1 Individual Sport—Kin 235 or 236
- 2 Dance—Dance 211

Electives to equal 124 total credits

The following course must also be taken. It can fulfill the General Education requirement:

- 4 Physics 106 or 111

The following five courses must also be taken; three can fulfill the Advanced Core requirement: Kin 355, 358, 360, 365 or 366, and 372.

Curriculum in Hotel, Restaurant, and Institution Management

Administered by the Hotel, Restaurant, and Institution Management Program. Leading to the degree bachelor of science. **Total credits required: 123.5**

The curriculum in Hotel, Restaurant and Institution Management develops students as leaders for the hospitality professions.

Cr. Degree Requirements

- 9.5 **Communications and library**
Engl 150, 250; Lib 160; Sp Cm 212
- 13 **Natural sciences and mathematical disciplines**
Math 104 or 150; Stat 101; and 6 credits of natural sciences
- 9 **Social sciences**
Econ 101; HD FS 102; select 3 credits from psychology or sociology

9 Humanities

AESHM 342 and courses from approved list.

37 Hotel, Restaurant, and Institution Management core

AESHM 287; HRI 101, 193, 233, 315, 333, 352, 380, 380L, 393 or 491, 433, 438,455

13-15 Hotel, Restaurant, and Institution Management electives

Select from AESHM 271, 471, 474, 477; HRI 189, 260, 289, 383, 437, 439, 452, 487

13 Supporting courses

Acct 284, AESHM 111, 311
FS HN 111*, 167*

18-20 Electives

123.5 Total credits

*A student who has not had high school chemistry is required to take Chem 160.

**A student who has not had high school biology is required to take Biol 101.

Curriculum in Nutritional Science

Administered by the Department of Food Science and Human Nutrition.

Cr. Degree Requirements*

- 12.5 **Communications/Library**
Engl 150, 250; Lib 160; ComSt 214 or Sp Cm 212; Engl 314
- 7-12 **Mathematical sciences**
Math 160, 165-166, or 181-182
Calculus (2 semesters recommended); Stat 101 or 104
- 24 **Physical sciences**
Chem 177, 177L, 178, 331, 331L, 332, 332L; Phys 111, 112
- 26-27 **Biological sciences**
Biol 211, 211L, 212, 212L, 313, 314, 255, 255L, 335; Micro 201 or 302; Micro 201L or 302L
- 15 **Humanities/Social sciences**
FS HN 342; select 6 crs. of humanities courses; select 3 crs. of social science courses; select 3 additional crs. of humanities or social sciences courses
- 34-35 **Food science and human nutrition**
FS HN 110, 167, 203, 214 or 311, 265, 360, 361, 362, 461, 480, 492; select at least 9 additional credits from FS HN 403, 412, 419 or 519, 463, 464, 466, 490C 499,
- 0-2 **Electives**
- 120.5 **Total credits**

*Additional degree requirements: Students must fulfill international perspectives and U.S. diversity requirements by selecting coursework from approved lists. These courses may be used to fulfill other area requirements.

Concurrent B.S. and M.S. Program:

Well qualified students in Nutritional Science who are interested in graduate study may apply for concurrent enrollment in the Graduate College to simultaneously pursue both a bachelor of science in Nutritional Science and a master of science degree in Nutritional Sciences. For more information, refer to www.fshn.hs.iastate.edu

College of Liberal Arts and Sciences

Michael B. Whiteford, Dean
 Zora D. Zimmerman, Associate Dean
 David J. Oliver, Associate Dean
 Dawn Bratsch-Prince, Associate Dean
 Ruth W. Swenson, Associate Dean Emerita
www.las.iastate.edu/

Departments of the College

Air Force Aerospace Studies
 Anthropology
 Biochemistry, Biophysics, and Molecular Biology
 Chemistry
 Computer Science
 Ecology, Evolution, and Organismal Biology
 Economics
 English
 Genetics, Development, and Cellular Biology
 Geological and Atmospheric Sciences
 Greenlee School of Journalism and Communication
 History
 Mathematics
 Military Science (Army Reserve Officers' Training Corps)
 Music
 Naval Science
 Philosophy and Religious Studies
 Physics and Astronomy
 Political Science
 Psychology
 Sociology
 Statistics
 World Languages and Cultures

The College of Liberal Arts and Sciences is the academic home, the foundation, for many essential learning disciplines. The college provides students with all the components of a modern liberal education. Students may choose to study in various fields of the physical, biological, and social sciences; in mathematical disciplines; in methods and systems of communication; and in the arts and humanities.

Learning and Teaching Mission

The primary mission of the college is to promote learning in all its dimensions by providing the student with ample opportunities to acquire the requisite knowledge, abilities, and skills to succeed in the world beyond the university. Throughout coursework within the major and in general education, students will develop skills in reasoning, analysis, and communication; achieve an understanding of the intellectual, historical, and artistic foundations of culture; and work to strengthen their abilities to interact with people, cultures, and the environment in an ethical and sensitive manner. To achieve these learning goals, the college asks students to acquire depth in learning within disciplines of their own choosing, and to acquire breadth through general education courses and electives.

The Curriculum

A baccalaureate degree in liberal arts and sciences is the end result of a curriculum that connects and integrates study in a major with general education. Requirements for a degree are deliberately flexible. Students select programs of study suited to a variety of interests and goals. Students having academic interests not fully met by a departmental major may also pursue a major offered by one of the college's interdepartmental programs or may apply for an undergraduate major in interdisciplinary studies (See *Index, Cross-Disciplinary Studies, Courses and Programs*). The college participates in the University Honors Program; thus, students with exceptional academic promise can develop unique and challenging programs of study.

The college has three curricula: a curriculum in Liberal Arts and Sciences, leading to the bachelor of arts or the bachelor of science degree; a curriculum in music, leading to the bachelor of music degree; and a curriculum in liberal studies, leading to the bachelor of liberal studies degree.

High School Preparation/ Admission Requirements

Students entering the college are required to present evidence of the following high school preparation:

4 years of English (Typically this preparation includes courses in British, American, and world literature in which critical reading and writing skills are emphasized and courses in speech and composition, including at least one senior-level writing course.)

3 years of social studies (Typically such preparation includes two semesters of world history, two semesters of American history, and a semester of American government. Electives can be chosen from areas such as economics, sociology, or psychology.)

2 years of a single world language (Three years or more of a single world language are strongly recommended for students who wish to continue their work in that language. A minimum of three years of a single world language is required to fulfill the world language graduation requirement in the College of Liberal Arts and Sciences.)

3 years of mathematics (Such preparation shall include two semesters of beginning algebra, two semesters of geometry, and two semesters of intermediate algebra. A fourth year of study involving analytic geometry, trigonometry, linear algebra, and/or calculus is strongly recommended for students who will major in mathematical or scientific disciplines.)

3 years of science (At least two years of such preparation shall be chosen from biology, chemistry, and physics.)

Recommended but not required as a condition of admission to the College of Liberal Arts and Sciences is one semester of computer experience. (Such a course should stress problem-solving with computers and should not substitute for courses in mathematics. In schools where computer use is an integral part of most courses, separate instruction in computers is not necessary.)

Students who transfer from another college or university with at least 24 credits of satisfactory coursework may be exempt from most of these requirements. Students who do not meet the requirements listed here may be admitted with a limited number of deficiencies. Contact the college office for further information about resolving these deficiencies.

Transfer Students

To graduate from the College of Liberal Arts and Sciences, a transfer student must complete the general requirements of the college as well as those of the university. Students planning to transfer to Iowa State University for the purpose of enrolling in the College of Liberal Arts and Sciences are advised to contact the college office for information concerning degree program requirements. Prospective transfer students are urged to learn about the academic programs that are of interest to them well before arriving on campus so that pre-transfer courses are appropriate to the planned major and transferable toward graduation from ISU. Additional information concerning transfer credit evaluation may be obtained through the Office of Admissions as well as the department in which a student is interested.

A transfer student in the College of Liberal Arts and Sciences may choose to graduate under the catalog in effect at the time of his or her graduation or under one of the two immediately preceding catalogs, provided that it covers the period of his or her enrollment either at Iowa State or any other accredited school. Full requirements of the chosen catalog must be met except that adjustments will be made in instances where courses are no longer available or where programs have been changed. A transfer student is responsible for reviewing his/her transfer credit evaluation with the academic adviser during the first semester of enrollment.

University Requirements

The university requirements for the bachelor's degree, including statements of academic standards, learning goals, the university residence requirement, the Communication proficiency requirement, U.S. diversity and international perspectives requirement, and the library requirement, appear in the Colleges and Curricula portion at the beginning of this catalog.

Curriculum in Liberal Arts and Sciences

To obtain a bachelor's degree from the College of Liberal Arts and Sciences, curriculum in liberal arts and sciences, an undergraduate student must earn a minimum of 120 semester credits including a minimum of 32 semester credits earned in residence at Iowa State University. In addition, the student must meet general education, communication proficiency, library proficiency, world language, and advanced credit requirements, as well as the requirements of a major. Courses taken on a pass/not pass basis may be counted toward the required total of 120 credits, and may be used to meet the advanced credit requirement, if appropriate, but may not be used to satisfy any other graduation requirement. No more than 9 credits of 490 (Independent Study) courses in a single discipline may be counted toward graduation.

General Education

Requirements and Learning Goals

The central importance of a general education is reflected in the learning goals of each of four disciplinary areas. Whereas the courses in a major are designed to develop mastery of a specific field or discipline, courses in general education are designed to establish a strong, intellectual foundation for all specializations. Students earn the minimum credits listed in each of the four general education areas in courses not required by the department of the first major listed on the degree program. Interdisciplinary courses may be used to satisfy requirements in any area for which they have been approved, but a student may not apply the same course to more than one area.

Credit by Examination Program

Individual departments may use CLEP Subject Tests for testout of specific courses. Students in the College of Liberal Arts and Sciences may use CLEP General Test credits as free electives but not toward any of the general education area requirements.

World Language Requirement

The faculty of the College of Liberal Arts and Sciences believes that undergraduate students should acquire elementary practical experience in a second language, should be introduced to the theoretical study of language structure, and should begin to develop an understanding of a second culture through study of that culture's language.

As a means of achieving this objective, a student must satisfy a graduation requirement equivalent to the first year of university-level study in one world language (normally, completion of a two-semester sequence in any one world language). Students who have completed three or more years of high-school world language study are deemed to have completed the LAS World Language Requirement. These students may not enroll in or receive credit for 101 or 102 in those languages; test-out credit may be obtained by passing an appropriate examination or by completing an advanced

sequence (200-level or higher) in that language. 101 or 102 may not be taken on a remedial basis.

Students who have completed more than one year but less than three years of high-school world language study may not enroll in 101 in the same language. These students may enroll in either a 102 course in that language, or in the case of Spanish, Span 97. Before enrolling in either Span 97 or a 102 language course, students are advised to take the on-line placement test available at www.language.iastate.edu. Span 97 is designed for students who need additional remedial work in the language at the first-year level (101-102) and are not planning to continue their language study at the second-year 201-202 level. Students who complete Span 97 with a passing grade will have fulfilled the LAS World Language Requirement. Students who have completed Span 97 and wish to pursue further study in Spanish at the 201-202 level may enroll in 102.

Students who have completed more than one year but less than three years of high-school world language study may satisfy the World Language Requirement by (a) passing the exam for credit at the 102 level, (b) receiving a passing grade in a 102 world language course, or (c) receiving a passing grade in a world language course at the 200-level or higher. For more information see *Department of World Languages and Cultures*. (Courses taught in English do not satisfy the World Language Requirement). Iowa State University accepts a record of academic performance in American Sign Language or certification of proficiency in American Sign Language as fulfillment of entrance or graduation requirements in world language for a baccalaureate degree.

Questions about the World Language Requirement and how to meet it should be directed to the Department of World Languages and Cultures. Credits applied toward the World Language Requirement cannot be used to satisfy the general education requirements, but students who have fulfilled the World Language Requirement may apply additional courses in world languages toward the appropriate general education areas. Majors in any world language are deemed to have fulfilled the college World Language Requirement. International students for whom English is a second language may satisfy the World Language Requirement by completion of Engl 150 and 250 at ISU with an average grade of C- or better. See *World Languages and Cultures* for additional information on international students.

Advanced Communication Skills

The continued development of communication skills following the sophomore year is the responsibility of the student's major department. The department promotes this development by adopting measures to certify the writing proficiency of its own majors. Certification occurs upon satisfactory completion of a designated course in which writing is evaluated and is a significant component. This designated course may be either a course required in the student's program or an advanced writing course offered by the Department of English (e.g., Engl 302, 305, or 314).

General Education Areas

The central importance of a general education is reflected in the learning goals of each of three disciplinary areas. Whereas the courses in a major are designed to develop mastery of a specific field or discipline, courses in general education are designed to establish a strong, intellectual foundation for all specializations. The general education areas with their minimum credit requirements for the College of Liberal Arts and Sciences are:

Arts and Humanities—(Minimum 12 credits). The student should develop an understanding of human cultural heritage and history, and an appreciation of reasoning and the aesthetic value of human creativity.

Natural Sciences and Mathematical Disciplines—(Minimum 11 credits, including 3 in the mathematical disciplines and 8 in the natural sciences). The student should experience science as a rational search for understanding the structure and behavior of the natural world, and should appreciate mathematics as a valuable tool of the sciences and as an intrinsically important way of thinking.

Social Sciences—(Minimum 9 credits). The student should develop an appreciation of the principal methods of studying human behavior and an understanding of the structure and functioning of institutions.

Because students fulfill, in part, the learning goals of the area of their first major by taking courses in their programs of study, the minimum number of general education credits required in the area of the first major is reduced from that listed above by 3 credits. Students in Liberal Studies or Interdisciplinary Studies majors must complete the minimum requirements in all three areas. The list of majors falling within each area is available from the Office of the Dean, College of Liberal Arts and Sciences, and is posted on the web site of the College of Liberal Arts and Sciences.

Courses from the department of the first major may not be applied to general education requirements. Courses cross-listed with a course in the student's first major may be used to satisfy either major requirements or general education requirements, but may not be used more than once. Interdisciplinary courses may be used to satisfy requirements in any area for which they have been approved, but a student may not apply the same course more than once.

Lists of approved courses are available on the web, from academic advisers or from the Office of the Dean, College of Liberal Arts and Sciences.

Advanced Credit Requirements

To obtain a baccalaureate degree from the College of Liberal Arts and Sciences, curriculum in liberal arts and sciences, a student must earn at least 45 credits at the 300 level or above taken at a four-year college. All such credits, including courses taken on a pass/not pass basis, may be used to meet this requirement.

The major must contain at least 8 credits in courses taken at Iowa State University that are numbered 300 or above and in which the student's grade is C or higher. In addition, the average grade of all courses in the major (those courses listed under major on the degree audit) must be 2.0 or higher. Courses from the department of the first major listed on the degree program may not be counted in the general education areas.

The Major

Students must show they have achieved depth in a specialized area by completing successfully the requirements and learning goals of a major. A major is comprised of 24 to 48 credits in a specific discipline as determined by the faculty. Tracks within a major must have a common 24 credit core. Some courses outside the major discipline may also be required as supporting work for the major. (See Index for page reference to individual department and program requirements.)

The major must contain at least 8 credits in courses taken at Iowa State University that are numbered 300 or above and in which the student's grade is C or higher. In addition, the average grade of all courses in the major (those courses listed under major on the degree audit) must be 2.0 or higher. Courses in the first major listed on the degree program may not be counted in the general education groups.

Courses meeting the requirement of additional majors may be counted in the general education groups. When choosing an additional major, students must confirm that the additional major is allowable (see list under "Double Majors").

The major is chosen from the following list, which also indicates the degree(s) offered in the respective majors.

Advertising, B.A.
 Anthropology, B.A., B.S.
 Biochemistry, B.S.
 Bioinformatics and Computational Biology, B.S.
 Biological/Pre-Medical Illustration, B.A.
 Biology, B.S.
 Biophysics, B.S.
 Chemistry, B.A., B.S.
 Communication Studies, B.A.
 Computer Science, B.S.
 Earth Science, B.A., B.S.
 Economics, B.S.
 English, B.A., B.S.
 Environmental Science, B.S.
 Environmental Studies (may be taken as a second major with the degree to be determined by the first major)
 Genetics, B.S.
 Geology, B.S.
 History, B.A., B.S.
 Interdisciplinary Studies, B.A., B.S.
 International Studies (may be taken as a second major with the degree to be determined by the first major)

Journalism and Mass Communication, B.A., B.S.
 Linguistics, B.A.
 Mathematics, B.S.
 Meteorology, B.S.
 Music, B.A., B. Mus.
 Performing Arts, B.A.
 Philosophy, B.A.
 Physics, B.S.
 Political Science, B.A.
 Psychology, B.A., B.S.
 Religious Studies, B.A.
 Sociology, B.A., B.S.
 Software Engineering, B.S.
 Speech Communication, B.A.
 Statistics, B.S.
 Technical Communication, B.S.
 Women's Studies, B.A., B.S.
 World Languages and Cultures, B.A.

The major in interdisciplinary studies (B.A., B.S.) is available for undergraduate students who have unique interdisciplinary educational goals. Such a major is designed by the faculty and the student and is approved only when the educational goals cannot be met by a reasonable combination of existing majors, minors, and electives. (See Index, *Interdisciplinary Studies*.)

A curriculum in liberal studies leading to a bachelor of liberal studies degree (B.L.S.) is also available. (See Index, *Liberal Studies*.)

The LAS College offers certificate programs available for students seeking documentation of additional study in specialized academic topics. At present, certificates are available in Latin American Studies and in Community Leadership and Public Service. Information about the specific course requirements in these certificate programs may be found in their respective entries in the Courses and Programs section of this catalog.

Double Majors

Students may elect a second major from the departments and program areas listed above, or from a major field offered for the bachelor's degree in another college of the university. Double majors between the following are not allowed: Chemistry with Biochemistry and Agricultural Biochemistry; Biology with Animal Ecology, Agricultural Biochemistry, Biochemistry, Genetics, and Microbiology.

The major departments must then approve the degree program, and if those majors involve two colleges, both deans must approve. Such programs must fulfill the general education requirements of the college of the primary major. If one major leads to the B.A. degree and the other to the B.S. degree, the degree awarded will be the one offered by the department of the primary major.

If the primary major may lead to either a B.A. or a B.S., a student may choose to receive either degree. In all cases, the student must satisfy the requirements of each major and of the degree that is chosen for the primary major. Students with a primary major in another college who wish to take a second major in the College of Liberal Arts and Sciences are not required to meet the Liberal Arts and Sciences General Education and World Language Requirements.

A student may earn two degrees in the Liberal Arts and Sciences curriculum with two appropriate majors and at least 30 additional credits. Either the B.A. or the B.S. in this curriculum may be earned with the Bachelor of Music.

A major in Liberal Arts and Sciences may not be added to a Bachelor of Liberal Studies or a Bachelor of Music degree. Any degree offered by this college may be earned together with a degree with a major in any other college of the university. For the requirements for two degrees, see Index, *Bachelor's Degree Requirements*.

Minor

A minor, which is optional, must consist of at least 15 credits, with at least 6 credits in courses numbered 300 and above taken at ISU with a grade of C or higher. The minor must include at least 9 credits that are not used to meet any other department, college, or university requirement. (See Index, *Minors*.)

The following minors are offered by the college of Liberal Arts and Sciences:

Advertising
 African American Studies
 American Indian Studies
 Anthropology
 Astronomy
 Biochemistry
 Biological Illustration
 Biology
 Chemistry
 Chinese Studies
 Classical Studies
 Communication Studies
 Computer Science
 Criminal Justice Studies
 Economics
 Emerging Global Disease
 English
 Entrepreneurial Studies
 Environmental Science
 Environmental Studies
 French
 Genetics
 Geology
 German
 Gerontology
 History
 International Studies
 Journalism and Mass Communication
 Latin
 Linguistics
 Mathematics
 Meteorology
 Military Studies (Army Reserve Officers' Training Corps)
 Music
 Music Technology
 Performing Arts
 Philosophy
 Physics
 Political Science
 Psychology
 Religious Studies
 Russian Studies
 Sociology
 Spanish
 Speech Communication
 Statistics
 Technical Communication
 Technology and Social Change
 Women's Studies

Courses applied toward the general education groups may be used to meet the requirements of a minor. (For restrictions, see *Index, Minors*.)

If a student declares a minor and completes the requirements specified by the offering department/program, the minor will be recorded on the transcript.

Electives

Students will take additional courses, freely elected, sufficient to accumulate a total of 120 credits. These additional courses together with the general education courses may be used to meet the requirements of a minor or of another major, provided that they are taken on a graded basis.

Planning the Program of Study

Careful, comprehensive planning is important for meeting graduation requirements and taking advantage of the resources offered by the university. Each student is encouraged to work with his or her academic adviser in developing a four year plan as soon as possible after declaration of the major. A degree audit listing all completed courses and those remaining to be taken for fulfillment of the degree requirements in the student's chosen major is provided to the student and the adviser each semester. The student should review the audit each semester and consult with the adviser when changes are required. Any changes to the audit must be approved by the academic adviser and by the dean's office. It is essential that the audit be reviewed and updated in a timely fashion in order to avoid delay in the student's graduation.

During the first year, students should meet proficiency requirements in English and in library. They should also make progress toward meeting the general education requirements, a large part of which should be completed by the end of the second year. The third and fourth years should emphasize completion of the major (and minor, if elected) and of general education requirements, and should give the student an opportunity to take electives.

Academic Advising Learning Outcomes

Through their experience with academic advising, students will:

Develop an understanding of the structure, application, and goals of a liberal arts education in relation to their academic development.

Be able to formulate appropriate questions, seek information, and evaluate and apply academic advice.

Know the requirements, policies and protocol of the university, college, and department as they relate to their educational experience.

Understand how degree programs can be enhanced by study and experiences tailored to their intellectual and personal goals.

Be able to identify and utilize university resources effectively to

- Satisfy degree requirements
- Plan programs of study, including selection of appropriate courses and registration
- Discover how interests, skills and goals connect to fields of study and careers
- Link curricular and co-curricular activities
- Research and prepare for advanced study and/or careers

Share responsibility for a mentor-mentee relationship between advisee and adviser.

The Open Option

Many students entering Iowa State University are not ready to declare a major. They want time to become familiar with the academic opportunities that the university offers and to determine the best match between their academic interests and abilities. These students enter Iowa State University as Open Option majors.

The Open Option experience is designed to help students explore majors and careers, become acquainted with the entire university, and make successful adjustments to the academic expectations of Iowa State. Open Option students are assigned academic advisers in the Liberal Arts and Sciences Student Academic Services Office. These advisers help students with academic and career development.

During the first year, an orientation class introduces them to all of the colleges and majors on campus. A career development class in the second semester guides students in selecting a major and career that match their academic and personal goals. Open Option majors also have the opportunity to be members of a learning community with other Open Option students.

Aided by their adviser, Open Option students select courses that allow them to sample their academic interests before committing to a specific university major. Open Option students are encouraged to declare this major by the end of the first year. In addition, students who may have started in a specific field and have discovered it is not meeting their needs may transfer into Open Option for a semester or two while they decide on a new major.

Honors Program

For information on the Honors Program in the College of Liberal Arts and Sciences, see *Index, Liberal Arts and Sciences, Cross-Disciplinary Programs, Honors Program*.

Reserve Officers' Training Corps Programs (ROTC)

The College of Liberal Arts and Sciences also offers students the opportunity to combine their academic programs with ROTC programs in the Military Science (Army), Naval Science, and Air Force Aerospace Studies).

Teacher Licensure

Teaching licenses are issued by the Iowa Board of Educational Examiners. The Recommending Officer for the ISU University Teacher Education Program submits each candidate file after that candidate is determined to be eligible for licensure. Teaching licenses are issued for a specific teaching level, e.g., K-6 or 7-12. A subject area endorsement is listed on the candidate's license. The licensee may have multiple subject area endorsements listed.

Students in the College of Liberal Arts and Sciences who complete the approved licensure program in music education (BM degree with Vocal K-12 option or Instrumental K-12 option) may apply for a teaching license that allows them to teach music in grades K-12. Students who plan to teach in secondary schools (grades 7-12) may qualify for a license by completing an approved licensure program in one of the following LAS majors:

- Biology
- Chemistry
- Earth Science
- English
- French
- German
- History
- Spanish (Latin & Russian endorsements)
- Mathematics
- Physics

Students may also add these additional endorsements to their primary license:

- English as a Second Language
- General Science
- Physical Science
- Social Studies
- Speech Communication

For further information, see *Index, Teacher Education*.

Preprofessional Programs

Students in the College of Liberal Arts and Sciences may participate in preprofessional programs in human health-related fields, law, and theology by taking the courses required for admission to professional schools. Students may enter the college with the designation Premed, Prelaw, or Preprofessional Health Programs. Most will earn a bachelor's degree by choosing a major and meeting the requirements for the major while taking the preprofessional courses.

Others will spend one to three years as students in the college before transferring to a professional school to which they have applied and been accepted. For further information, see *Index, Preprofessional Study*.

Experiential Learning (Internship/Co-op Program)

The Experiential Learning (Internship/Co-op) Program assists students in gaining career-related experience while going to school. Internships/Co-ops provide students with the opportunity to gain specific skills, apply academic knowledge in practical situations, pretest their career choice, earn a salary, and establish a network of professional contacts.

Most internships are full-time and last for a semester or a summer, but a part-time experience is possible. Students wishing to receive academic credit for their internship must make arrangements with a faculty member in their major department. In contrast, co-op students work full-time on an extended basis (work two semesters) or on an alternating basis (work, school, work, etc.) during any semester (fall, spring, summer).

It may take students participating in the Experiential Learning (Internship/Co-op) Program an additional semester or more to complete their academic curriculum requirements. For additional information, contact Business/Liberal Arts and Sciences Career Services.

Curriculum for Bachelor of Music

The Department of Music offers a Bachelor of Music degree (B.Mus.) as well as a Bachelor of Arts degree in music. For information about both degrees, see Music, Courses and Programs.

In order to receive teacher certification in music, students must earn the bachelor of music degree.

Candidates for the bachelor of music will complete the following requirements.

Cr.	
38.5-46.5	General education
47	Music core
31-52.5	Music option

(Students must select one of the following options: music education [vocal or instrumental], performance [voice, piano, organ, string instruments, wind or percussion instrument], or composition.)

Curriculum for Bachelor of Liberal Studies

The LAS College administers a bachelors degree program in Liberal Studies. This degree, the bachelor of liberal studies (B.L.S.), was established by the three Iowa Regent universities to meet the needs of Iowans who want to earn a college degree but whose circumstances present obstacles to completing a traditional on-campus degree program. The B.L.S. is a general studies degree in the liberal arts. There is no traditional major. Instead, students take coursework in three areas of distribution. These areas may be focused in a single discipline or diversified over several disciplines. With the assistance of a B.L.S. adviser, students can structure a program that meets their individual educational, vocational or personal goals.

For specific degree requirements, see Liberal Studies, Courses and Programs.

Curriculum for Software Engineering

A bachelor of science degree in software engineering is jointly administered by the Department of Electrical and Computer Engineering (College of Engineering) and the Department of Computer Science (College of Liberal Arts and Sciences). The program is aimed at creating high-quality software in a systematic, controlled, and efficient manner. The specific objective of the program is to educate students on principles, processes, techniques, and tools for producing, analyzing, specifying, designing and evolving software. A broader objective is to cultivate among students intellectual curiosity, problem solving skills, good learning habits, effective communication skills, leadership, and teamwork.

This interdepartmental program enables students to take a range of Software Engineering courses, as well as elective courses from both Computer Science and Computer Engineering as part of their degree program.

For specific degree requirements, see Software Engineering, Courses and Programs.

College of Veterinary Medicine

John U. Thomson, Dean

Donald D. Draper, Associate Dean for
Academic and Student Affairs

Donald L. Reynolds, Associate Dean for
Research and Graduate Studies

Eldon Uhlenhopp, Interim Associate Dean
for Outreach and Operations

vetmed.iastate.edu/

Departments of the College

Biomedical Sciences

Veterinary Clinical Sciences

Veterinary Diagnostic and Production

Animal Medicine

Veterinary Microbiology and

Preventive Medicine

Veterinary Pathology

Other units of the college include the Veterinary Teaching Hospital, Veterinary Diagnostic Laboratory, Veterinary Medical Research Institute, Veterinary Education and Technology Services and Office of Curricular and Student Assessment. The college participates in interdisciplinary graduate programs in genetics; molecular, cellular and developmental biology; toxicology; immunobiology; and neuroscience.

Objectives of the Curriculum

The instructional objective of the College of Veterinary Medicine is to enable students to assume vital roles in society as productive health care providers and biomedical scientists. Such an education provides students with general learning, communication, and problem solving abilities; veterinary medical practice and research skills; and professional and ethical values.

The curriculum incorporates basic biomedical and clinical principles, clinical decision making skills, and exceptional clinical experience in small animal medicine and surgery, equine medicine and surgery, food animal medicine and surgery, and production animal medicine. Companion animal medicine and surgery are provided within the regionally recognized referral hospital through the community practice unit and equine field services. The college is located in one of the most intensive livestock producing areas in the United States. Because of this, students engage in extensive food supply veterinary medicine experiences and numerous diagnostic cases.

The professional curriculum is a four-year course of study leading to the doctor of veterinary medicine degree. Each of the first three years of the curriculum consists of two semesters while the fourth year has three semesters. Students are admitted into the professional curriculum after completing a minimum of 60 semester credits of required undergraduate coursework.

A strong and reputable basic science education during the first two years of the professional curriculum prepares veterinary students for a wide range of clinical experience during the

last two years of the educational program.

Fourth year students may choose to enhance their education by earning clinical elective credits at approved government agencies, research laboratories, veterinary practices and other university hospitals. Outstanding research programs in infectious diseases, food safety, neuroscience, immunoparasitology, evidence-based medicine, and many other areas provide opportunities for qualified students to participate in research.

Concurrent D.V.M./M.S., DVM/Ph.D., D.V.M./M.P.H. programs are available for qualified students who wish to obtain both veterinary and graduate degrees. Students must have a bachelor's degree or a minimum of 128 semester credits in undergraduate and professional curricula in order to participate in the concurrent DVM/graduate degree program. Admission to the concurrent degree program is subject to the approval of the deans of the College of Veterinary Medicine and the Graduate College.

The college is an important recruiting center for employers seeking veterinarians for private practice; industry; educational institutions; international agencies; federal, state and local governments; the armed forces; departments of public health; zoological gardens; and other related fields of professional activity. Graduates are highly sought after and typically have multiple employment offers upon graduation. Career services and an online job board are available for students.

Pre-veterinary Medicine Preparation

Admission Requirements

The College of Veterinary Medicine seeks students with diverse backgrounds and encourages students to enroll in baccalaureate programs in the college of their choice.

Undergraduate students are strongly encouraged to complete a bachelor's degree before applying to the College of Veterinary Medicine. Because veterinarians have varied career options, when deciding on an undergraduate major, the student should consider the area of veterinary medicine which interests them. For example, those who desire a career in clinical practice may wish to pursue a degree in biological science, animal science, agricultural economics, business, social science or humanities. Students with an interest in zoo or wildlife veterinary medicine may want to look at animal ecology, environmental studies or zoology. Future researchers may wish to consider genetics, molecular biology, microbiology, or biochemistry. Students who desire a career in public health (USDA, FDA, etc) or government (legislative/policy) may find benefits in any of the biological sciences or in political science. A degree in education may be valuable to those who envision themselves as educators in a College of Veterinary Medicine. These examples are only suggestions and are but a few of the many possibilities.

For the most current information regarding applications and admission to the College of Veterinary Medicine, please refer to the College web site at www.vetmed.iastate.edu/.

Applicants for admission to the College of Veterinary Medicine must have attended an accredited college or university, have completed 40 semester credits prior to the deadline for filing an application for admission, and have completed 60 semester credits prior to the end of the spring term of the year in which the applicant seeks to be admitted to the College of Veterinary Medicine.

All science requirements should be fulfilled by the time of application or scheduled for completion by the **end of the fall term in which the applicant applies**. However, if necessary, the applicant may complete up to two required science courses during the spring term prior to matriculation.

Any required science courses taken the spring term prior to matriculation requires a grade of B (3.00) or better to fulfill the requirement. Remaining non-science required courses must be completed by the end of spring term prior to matriculation with a grade of C (2.00) or better. Required courses may not be taken during the summer prior to entering the program.

Credits earned must include the following Iowa State semester course offerings or their equivalents:

English Composition One year of composition or writing emphasis courses. May include business or technical writing.

Engl 150, 250, 302, 309, or 314 6 cr.

Oral Communications May include public speaking, interpersonal communication, group or organizational communication or speaking emphasis courses.

Sp Cm 212, 223, or 312 or ComSt 214 or Ag Ed 311 3 cr.

General Chemistry with Laboratory*

One year series for biological science majors with one semester lab.

Chem 177-177L, 178 7 cr.

Organic Chemistry with Laboratory*

One year series with one semester lab.

Chem 331, 331L, 332 7 cr.

Biochemistry*

One semester (no lab required)
BBMB 301 3 cr.

General Physics with Laboratory*

First semester of a two-semester series with lab. Must include mechanics, fluids, heat and thermodynamics, vibrations, waves and sound.
Phys 111 4 cr.

General Biology with Laboratory*

Two semester series with lab each semester. A Bachelor's degree in Biology fulfills this requirement.

Biol 211, 211L, 212, 212L 8 cr.

Genetics *

Must include Mendelian and molecular genetics.

Biol 313 or Gen 320 3 cr.

Mammalian Anatomy or Physiology*

Human anatomy or physiology will also fulfill this requirement (no lab required).

An S 214, BMS 329, Biol 155, or Biol 255 or Biol 335 3 cr.

Humanities or Social Sciences 8 cr.

Electives 8 cr.

Total Credits Required 60 cr.

* science requirement

Credits in the previously specified courses will normally be earned on the traditional four-letter grading system with A as the highest grade and D as the lowest passing grade. All required courses must be completed with a grade of C (2.0) or better. It is generally expected that required courses have been completed within the past eight (8) years. AP or CLEP credits must be documented by original scores submitted to the University and MUST meet the University's minimum requirement in the appropriate subject area. CLEP credits may be accepted only for arts, humanities and social sciences. Credits in the preceding specified courses will not be accepted if earned under the pass-not pass grading system or similar options.

Application and Admission

Applicants must apply using the Veterinary Medical College Application Service (VMCAS). The VMCAS application may be found online at the VMCAS website (www.aavmc.org under VMCAS). Those applying through VMCAS also need to complete the ISU Supplementary Application found at the College of Veterinary Medicine website. The deadline for filing the VMCAS application, evaluations and transcripts is October 1. The supplemental application, and processing fee are due to the College of Veterinary Medicine postmarked by October 15.

Any student wishing to use international coursework (including study abroad) to fulfill a preveterinary requirement must provide a transcript from the foreign institution.

A list of courses in progress at the time of submission and/or scheduled for completion by the end of spring term should accompany the supplemental application. Undergraduate college credits must average at least 2.50 on a 4.00 marking system for the application to be accepted. The preceding scholastic requirements are minimum and do not assure admission even though these requirements have been fulfilled.

Admission to the College of Veterinary Medicine is on a competitive and selective basis. Undergraduate GPA, Graduate Record Exam (GRE) general test score (The GRE must be taken prior to October 15 of the year the applicant applies and the scores must be received by October 31.), animal and veterinary experience, essays, recommendations and personal development (leadership, citizenship, etc.) are given consideration in the selection of candidates. An interview will be required for those applying to enter Fall 2008 and later.

Approximately one-half of the positions available are reserved for residents of Iowa. The College of Veterinary Medicine has implemented a Cooperative Program in Veterinary Medicine with the University of Nebraska-Lincoln for Nebraska residents and contracts with the states of North Dakota, South Dakota and New Jersey. A number of positions are also available to residents of other states. A few highly qualified international students may be accepted and are considered in the non-resident/non-contract applicant pool. Consideration is given equally to all applicants without regard to race, color, national origin, gender, religion, disability, or age, political beliefs, or marital or familial status.

For further information on these programs and contracts, please visit the College of Veterinary Medicine at www.vetmed.iastate.edu and click on Admissions.

Curriculum in Veterinary Medicine**Graduation Requirements**

To be awarded the degree doctor of veterinary medicine, candidates must have passed all required courses in the curriculum in veterinary medicine, have earned at least 4 elective credits on a graded basis of A, B, C, D while enrolled in the College of Veterinary Medicine, and have at least a 2.0 grade-point average in the veterinary medicine curriculum.

Required Courses in the Professional Program

BBMB 420—Physiological Chemistry
 BMS 330—Principles of Morphology I
 BMS 331—Principles of Morphology II
 BMS 333—Biomedical Sciences I
 BMS 334—Biomedical Sciences II
 BMS 337—Neurobiology
 BMS/VCS 339—Clinical Foundations I
 BMS 345—Case Study I
 BMS 346—Case Study II
 BMS 354—General Pharmacology
 BMS 443—Pharmacology and Therapeutics
 VCS 311—Veterinarian in Society I
 VCS 312—Veterinarian in Society II
 VCS 313—Veterinarian in Society III
 VCS 314—Veterinarian in Society IV
 VCS 315—Veterinarian in Society V
 VCS 385—Seminar
 VCS 391—Clinical Imaging
 VCS 393—Principles of Surgery
 VCS 394—Principles of Surgery Lab
 VCS 395—Small Animal Surgery
 VCS 398—Anesthesiology
 VCS 399—Ophthalmology
 VCS 436—Small Animal Internal Medicine
 VCS/VDPAM 440—Introduction to Clinics
 VCS 444—Small Animal Medicine
 VCS 445—Equine Medicine
 VCS 448—Diagnostic Imaging and Radiobiology
 VCS 449—Junior Surgery Laboratory
 VCS/VDPAM 450—Disturbances of Reproduction
 VDPAM/V PTH 426—Veterinary Toxicology
 VDPAM 445—Clinical Medicine
 V MPM 378—Case Study IV
 V MPM 380—Veterinary Immunology
 V MPM 386—Veterinary Microbiology

V MPM 387—Veterinary Virology
 V MPM 388—Public Health and the role of the Veterinary Profession
 V MPM 437—Infectious Diseases and Preventive Medicine
 V PTH 342—Anatomic Pathology I
 V PTH 372—Anatomic Pathology II
 V PTH 376—Veterinary Parasitology
 V PTH 377—Case Study III
 V PTH 409—Introduction to Veterinary Cytology and Laboratory Techniques
 V PTH 425—Clinical Pathology

Fourth Year

The fourth year of the veterinary medical curriculum is designed to be flexible yet provide a broad based clinical education involving all domestic species of animals. All students participate in rotations that are considered fundamental to any species orientation that the student might choose. In addition, students can participate in rotations focused on small animals, horses, or food animals. Students may obtain clinical elective credits by repeating on-campus rotations or participating in approved off-campus preceptorships at government, private or public agencies; other universities; or private veterinary practices.

Students may choose from the following list of clinical rotations.

Anesthesiology
 Beef Production Medicine
 Cardiology
 CDC Epidemiology
 Clinical Microbiology
 Clinical Pathology
 Community Practice
 Dairy Production Medicine
 Dermatology
 Diagnostic Laboratory
 Equine Field Services
 Equine Medicine
 Equine Surgery
 Farrier
 Food Animal Medicine and Surgery
 Food Supply Field Services
 Intensive Care/Emergency Medicine
 Necropsy
 Neurology
 Oncology
 Ophthalmology
 Orthopedic Surgery
 Public Health Laboratory
 Radiology
 Small Animal Medicine
 Small Ruminant Production Medicine
 Soft Tissue Surgery
 Swine Production Medicine
 Theriogenology

Reinstatement

Any student who voluntarily withdraws from the College of Veterinary Medicine or who is dismissed from the College of Veterinary Medicine, after having successfully completed one or more semesters forfeits his/her standing and must make written application for reinstatement to this college a minimum of 60 days prior to the opening of the semester for which they seek to re-enter. Any student who voluntarily withdraws from the College of Veterinary Medicine prior to completion of one semester must re-apply for admission to the college in the general applicant pool.

Graduate College

www.grad-college.iastate.edu/

David K. Holger, Dean
George A. Jackson, Assistant Dean
Carolyn Payne, Assistant Dean

The Graduate College and graduate faculty at Iowa State University are responsible for the quality of graduate education, for administering students' graduate programs, and for promoting research support from various governmental, industrial, and private agencies.

The graduate faculty in various programs handle admission and classification of graduate students, establish requirements for advanced degrees, and have charge of instruction and research at the graduate level. Graduate faculty members also teach graduate courses, serve on program of study (POS) committees, and direct work of master's and doctoral students. All graduate courses offered for major or nonmajor credit are taught by graduate faculty members or graduate lecturers.

Graduate study was offered soon after the university was founded, and the first graduate degree was conferred in 1877. Experimentation and research also started early, first in agriculture and shortly thereafter in home economics, engineering, science, and veterinary medicine. In 1913, the graduate faculty was organized formally and an executive graduate committee was appointed. In 1915, the graduate faculty held its first meeting, and in 1916, it granted the first doctor of philosophy degree.

Graduate education is vital to the quality of university teaching. The creative efforts of graduate faculty members and graduate students result in knowledge necessary to help society solve problems in educational, scientific, technological, and socio-economic areas. The Graduate College encourages educational exchange and contact with undergraduate areas of the university to promote improved teaching on both the undergraduate and graduate levels. A part of this exchange is accomplished by the publication of books and technical articles which are made possible by graduate research.

The degrees master of arts, master of science, and doctor of philosophy are research oriented. In many fields master's degrees are also awarded without a thesis, but a written report of independent study, called a creative component, is generally required. For those individuals interested in advanced study directed toward meeting vocational or professional objectives, the following degrees are offered: master of accounting, master of agriculture, master of architecture, master of arts in teaching, master of business administration, master of community and regional planning, master of education, master of engineering, master of family and consumer sciences, master of fine arts, master of landscape architecture, master of public administration, and the master of school mathematics.

The Graduate College Handbook lists policies and procedures of the Graduate College. It is available at the Graduate College's Web site: www.grad-college.iastate.edu/.

Admission

All degree-seeking graduate students must have graduated with a bachelor's or master's degree from a regionally accredited U.S. institution or from a recognized foreign institution where the requirements for the bachelor's degree or its equivalent are similar to those at ISU. Additionally, each applicant must be accepted at ISU by the major program, the Office of Admissions, and the Graduate College. For information concerning graduate study in a particular academic discipline, prospective students should correspond with the chair of the major program in which they wish to study.

Iowa State University has a shared application process, which means certain items are sent (electronically or in print form) to the Office of Admissions and other items are sent to the graduate program to which the prospective student is applying. Detailed instructions are available at <https://www.applyweb.com/apply/isu/>. Students are also encouraged to check the Program Requirements Web page on the Graduate College Web site at <http://www.grad-college.iastate.edu/programs/APprograms.php> for mailing instructions and deadlines for each program.

The nonrefundable application fee is \$30 (\$70 for international applicants). An electronic application is required to apply to ISU's graduate programs; the form and necessary instructions are available at <https://www.applyweb.com/apply/isu/>. The application fee is required of all applicants except those who have attended Iowa State as undergraduates, or those applying for admission in the nondegree admission status. Iowa State requires official academic records and statements of all degrees earned from all institutions attended since secondary school. Faxed, scanned, and notarized copies are not considered official. Each previous college or university attended provide official transcripts of grades and credits earned, and request that the institution from which the degree was granted provide a statement of the degree received and the applicant's quartile class rank, if available from the institution.

Many programs have very early application deadlines. For more details, check program deadlines at www.grad-college.iastate.edu/programs/APprograms.php.

Categories of Graduate Admission

An applicant pursuing an advanced degree must be recommended by the program in which he/she will be pursuing an advanced degree and must be approved by the Dean of the Graduate College. There are three admission categories for students who wish to pursue an advanced degree:

Full Admission status may be granted to an applicant who either has achieved a grade point average (GPA) of 3.0 or greater (on a 4.0 scale), or ranks in the upper one-half of his or her undergraduate class.

Provisional admission status may be granted to applicants who meet the requirements for full admission (listed above), but have academic or prerequisite deficiencies to remedy. Transfer from provisional admission to full admission status requires the completion of the graduate English requirement, completion of the coursework prescribed to remedy the background deficiencies with a grade average of B or better, and the written recommendation of the major professor and approval by the Dean of the Graduate College.

Restricted admission status may be granted to an applicant who does not satisfy the formal university requirements for full admission status and/or lacks undergraduate preparation in a field related to the graduate field of study. Restricted admission may also be granted to graduates of non-English-speaking foreign institutions, even if the student meets the university requirements for full admission status. Advancement from restricted to full admission status requires completion of 9 semester credits of graduate level course work as a graduate student with a cumulative grade average of B or better and satisfaction of the Graduate College English requirement. A recommendation is submitted in writing to the Graduate College by the major professor and must be approved by the Dean of the Graduate College.

Graduate Admission Without a Declared Major

Admission without a declared major is a category for graduates of regionally accredited institutions in the United States who do not intend to seek an advanced degree from Iowa State University. Such students usually include:

1. Those who intend to transfer graduate credit earned at Iowa State University to other institutions.
2. Those who intend to use graduate credits earned for professional certification.
3. Those who enroll for personal satisfaction.
4. Those who enroll occasionally in off-campus graduate courses. Students who wish to apply to Iowa State University without a declared major need to contact the Office of Admissions, 100 Enrollment Services Center (1-800-262-3810) for the nondegree application form for students in this category. The application form is also available at the web site at www.admissions.iastate.edu/nondegree/

Applications and schedules for students with an undeclared major are processed directly by the Office of Admissions and the Graduate College office; no program approvals are generally required. (Applications and schedules for students declaring a major require program evaluation and approval.)

A student without a declared major who subsequently seeks full, provisional, or restricted admission must apply to and be accepted by a graduate program and by the Graduate College for degree study. A new application, the application fee (unless the student attended Iowa State University as an undergraduate), and transcripts from all colleges attended are required.

For those students originally admitted to the Graduate College on a nondegree basis, no more than 9 semester hours of graduate credit earned under the nondegree option may be applied if the student later chooses to undertake a graduate degree program. The student's program of study committee will recommend to the Graduate College which courses (if any) taken on a nondegree basis may be included in the degree program.

Graduate Admission of International Students

An applicant who is a graduate of a recognized foreign institution is subject to the same criteria for admission as a graduate from an institution in the United States and may be recommended for the same admission categories described above except that of the nondegree option. International applicants for nondegree status may be considered for admission at the discretion of the Graduate College dean. Application and admission deadlines for international students can be obtained from the Admissions web site at www.admissions.iastate.edu/apply/.

International students are required to show evidence of financial support and to carry adequate health and accident insurance while in residence.

Admission Examinations

Graduate Record Examination. The Graduate Record Examination (GRE) is not a university-wide requirement for all applicants. However, many programs require or recommend submission of GRE scores; individual program statements at www.grad-college.iastate.edu/programs/APprograms.php should be consulted for this information.

English Requirements for Non-native Speakers

Applicants whose native language is not English and who have not earned a bachelor's or master's in a country where the only official language is English are required to submit Test of English as a Foreign Language (TOEFL) scores as part of the admission process. A minimum score of at least 79 on the TOEFL internet-based test or 550 on the paper-based test is required by the Graduate College. International students may also submit IELTS (International English Language Testing System) scores in lieu of the TOEFL. The ISU

Graduate College minimum is 6.5. Because many programs require higher TOEFL and/or IELTS scores, applicants should check directly with the program to which they desire admission or browse the Graduate College Web site at www.grad-college.iastate.edu/programs/AP-programs.php.

Graduate students whose native language is not English and who did not graduate from a U.S. institution must take an English Placement Test at the beginning of their first semester of enrollment. This test is administered by the Department of English. A student who does not pass this examination is assigned to one or more courses in the English 99 and 101 series. This course work must be completed during the first year of study. (There is a developmental course fee for the English 99 course.). Non-native English speaking ISU graduate students who meet or exceed the TOEFL scores (640 or above on the paper-based test or 105 on the internet-based test) are exempted from taking the English Placement Test. (Self-enrollment in English 099 or 101 courses remains possible.

A graduate student whose native language is not English but did graduate from a U.S. institution, may bring to the Graduate College the "Request for the Graduate College to Approve the Graduate English Requirement for a Student Whose Native Language is NOT English" form, available from the Graduate College or on the Graduate College's Web site at www.grad-college.iastate.edu/forms/forms.html. Two conditions must be met: the student must have received a bachelor's, master's, or Ph.D degree from a U.S. college or university and the language of instruction at that college or university must have been in English.

New teaching assistants whose native language is not English are evaluated for their ability to communicate effectively in English before their assistantship assignments are made. Tests of oral proficiency and teaching skills (SPEAK and TEACH) are given before the beginning of each semester. Department offices have a schedule of SPEAK/TEACH testing dates, or browse the SPEAK/TEACH Web site. Registration for the test is held in 1116 Pearson Hall the day before the test is administered. TAs and faculty with questions about SPEAK/TEACH testing should call 515-294-1958 or 515-294-7996. A prospective teaching assistant who does not pass these tests is required to successfully complete course work and be retested. University Studies 180 is a series of communication courses designed to help new teaching assistants. Students focus upon pronunciation, listening, question-handling, teaching and lecturing skills, and analyze the culture of U.S. university life. Because enrollment is restricted, TAs cannot register for the courses online through AccessPlus. TAs must go to the SPEAK/TEACH Office, 1116 Pearson by the first or second day of classes to obtain permission to enter the course by completing a course add slip.

Graduate Appointments

Graduate assistantships, fellowships, and research grants have been established at Iowa State University to encourage graduate work and to promote research. Such appointments and research opportunities are available

through the various departments of instruction and the research centers on campus.

Graduate assistantships, the most common form of graduate student support, are available in three categories: the research assistantship, the teaching assistantship, or the administrative assistantship. A half-time graduate assistantship (20 hours per week) permits the holder to enroll for a maximum of 12 semester credits. Recipients of these assistantships are assessed fees at full Iowa resident rates regardless of the number of credits for which they register. These students may also be eligible for tuition scholarship awards (50% of in-state tuition for most master's students and 100% of in-state tuition for most Ph.D. students and certain terminal masters students). Students who are graduates of a regionally accredited college or university in the United States or of a recognized institution in another country whose requirements for the bachelor's degree are substantially equivalent to those of Iowa State University, who are admitted in the full or provisional admissions status, and who present the requisite undergraduate or graduate preparation, may apply for these appointments.

Students registered on a restricted basis or those placed on academic probation are eligible for assistantship appointment only on a term by term basis but are not normally eligible for a graduate tuition scholarship. Students admitted without a declared major are not eligible for assistantship appointments. Further information may be obtained by writing to the appropriate graduate program.

The satisfactory completion of one appointment, plus satisfactory academic performance, will ordinarily make a student eligible for reappointment. After a period of three years of full time study for the master's degree or five years for the doctorate, the student will not normally be continued on assistantship support (shorter periods may be stipulated by the student's program or department).

Postdoctoral Study

Opportunities are provided for postdoctoral study through the extensive research programs of the university. Inquiries should be directed to the appropriate program, institute, or to the Dean of the Graduate College.

Graduate Study by Staff Members

Any full-time member of the research, instructional, or extension staff at the rank of instructor, research associate, or assistant scientist may carry up to six course credits per semester and three credits per summer session, subject to the approval of the head of the program or section, and provided it does not interfere with other duties. This privilege may be extended to members of the research, instructional, or extension staffs at the rank of assistant professor with approval of the college dean and the Dean of the Graduate College. Staff members at the rank of professor or associate professor cannot become candidates for graduate degrees from ISU.

Registration

Graduate students are encouraged to register for courses on the ISU web site (www.iastate.edu) via AccessPlus. Students who are unable or who choose not to register through this system may use a walk-through registration procedure. Students who do not register by the published deadline for initiation of a schedule through the AccessPlus systems must use the walk-through procedure. For complete information on registration, see the ISU Schedule of Classes or the Registration Web site at www.iastate.edu/~registrar/registration/.

Credit Limits

Registration is limited to a maximum of 15 credits per semester. Schedules for graduate assistants on one-half time appointments are limited to a maximum of 12 credits. For full-time staff members, the limit is 6 credits. (Different credit limits apply during the summer session; see the Graduate College Handbook at www.grad-college.iastate.edu/publications/homepage.html for more details.)

Interim Registration

Registration for special work between semesters and during certain vacation periods cannot exceed one credit for each week that the student is in residence. For more information, consult the Graduate College Handbook.

Distance Education

Iowa State offers many graduate degree and certificate programs off-campus. For a listing of the degree programs, registrations for courses, and more information about distance education, consult the Iowa State University Web site at <http://www.distance.iastate.edu/programs/homepage.php>.

Other information about graduate requirements is available in the Graduate College Handbook at <http://www.grad-college.iastate.edu/publications/gchandbook/homepage.html>.

Doctoral Post Prelim (formerly Continuous Registration)

Even when Ph.D. graduate students have completed course work and residency requirements, they are required to register and pay tuition and fees, whether or not university facilities and equipment are used or staff is consulted—either in person or in absentia.

After the preliminary oral examination is passed (with either full or conditional pass) and if university facilities, equipment, and staff time are used, the Ph.D. candidate must register for the appropriate number of credits in the major department or program and pay the appropriate graduate tuition and fees.

After the preliminary oral examination is passed (with either full or conditional pass) and if university facilities, equipment, and staff time are not used, the Ph.D. candidate may register for Gr St 680 (Doctoral Post Prelim Registration) and pay the Doctoral Post Prelim Registration fee.

The Ph.D. candidate must be aware that registration for Gr St 680 is allowed only after

the Ph.D. candidate passes the preliminary oral examination; is required only in the fall and spring semesters, and not during the summer term; is not allowed after the completion of the final oral examination; and is not sufficient registration for the term the preliminary or final oral examination is taken; and does not defer student loans.

If students take the final examination during the interim between terms (including the first day of classes), registration can be for the term either before or after the examination is held.

Auditing

Audit registration means taking courses without receiving formal credit. Audit provisions are as follows: Instructors must approve ALL audits; students must register for audits by day 10 of the semester; changes to or from an audit must be made in the first 10 days of the semester; students are assessed tuition and fees as though they were taking the course for credit; and the course DOES NOT count in determining full-time student status.

Audited courses do not appear on the student's permanent record unless the "Request for Audit(s) to Appear on Transcript" form is completed and signed by the student, course instructor, and major professor. Copies of this form, which are available from the Graduate College or from the Graduate College's web site at www.grad-college.iastate.edu/forms/forms.html, must be filed with the Graduate College, 1137 Pearson Hall.

After the fifth class day, if a student changes a regular course to an audit, that course will appear on the student's permanent record as a drop. Audits are not acceptable as registration for loan deferments.

Graduate Courses Taken by Undergraduates

Certain graduate level courses listed in the ISU Catalog may be used in the program of study even though they were taken for graduate credit by the student as an undergraduate at Iowa State University.

The following conditions must be met:

1. The POS committee can request approval from the Dean of the Graduate College that up to nine hours of such credit be applied toward meeting advanced degree requirements (these courses must be clearly marked on the POS).
2. Credits earned in these courses must be in addition to those used to meet requirements for the bachelor's degree and must have grades of B or better.
3. The student must be classified as an undergraduate and not a nondegree undergraduate (credits taken as a nondegree undergraduate student are not allowed).
4. The Graduation Office (10A Enrollment Services Center) should be contacted to determine that the courses were not taken as a nondegree undergraduate student, were not used toward fulfillment of the undergraduate degree program and were graded B or better.

Undergraduate Admission to Concurrent Graduate Degree Programs

Several programs provide opportunities for well qualified ISU juniors and seniors majoring in those curricula to apply for admission to both a bachelor's and master's degree.

The graduate degree will be awarded only at the same time as, or after, the undergraduate degree is conferred. For a complete listing of the concurrent degree programs, consult the table, "Concurrent Bachelor and Master Programs" in this section.

Students interested in a research career may apply for graduate research assistantships during their last two years of study. Students should contact the programs listed below about applying early in their undergraduate careers. Undergraduate students seeking admission to concurrent graduate degree programs in field other than these, plus any student with an interdepartmental major, must submit a written proposal for an individualized program, co-signed by their advisers, to the Graduate College for review and approval. For more information about the application process and transferring credits, consult the *Graduate College Handbook*.

Veterinary Medicine Students in Concurrent Graduate Degree Programs

Students may be concurrently enrolled in the professional curriculum leading to the D.V.M. degree and in a graduate program leading to the M.S. or Ph.D. degree after completion of 90 semester credits. The graduate program may be in the College of Veterinary Medicine or in another college.

Interested students must complete a graduate application, complete a "Concurrent Enrollment Request" form available in the Graduate College office or on the web site at www.grad-college.iastate.edu/forms/forms.html, submit both forms with appropriate transcripts and letters of recommendation to the Office of Admissions (100 Enrollment Services Center). (Copies of the application forms may be obtained at www.admissions.iastate.edu/apply/index.php.) State on the application that the application is for a concurrent degree program.

Signed approvals on the Graduate Admissions Evaluation form are required from the graduate program, the Dean of the College of Veterinary Medicine, and the Dean of the Graduate College. On admittance, the student receives an admission notification from the Office of Admissions. For more information see the *Graduate College Handbook*.

Graduate Students in Concurrent Undergraduate Programs

Graduate students interested in enrolling in a concurrent undergraduate program should contact the Office of Admissions (100 Enrollment Services Center) to obtain admission information (even if the student has been previously

admitted as an undergraduate). A "Concurrent Enrollment Request" form should be obtained from the Graduate College Web site at www.grad-college.iastate.edu/forms/forms.html and circulated for the appropriate approvals. The student must be formally admitted both as a graduate student and as an undergraduate student. Official enrollment and fee payment will be as a graduate student. Credits transferred from the graduate permanent record to the undergraduate permanent record are no longer available for use on a graduate program of study.

Courses Taken as a Nondegree Undergraduate Student

A person classified as a "nondegree undergraduate" student may not use courses taken under that status in a graduate degree program. A student who has received the baccalaureate degree must register as a graduate student if he/she is to receive graduate credit for courses.

Grading

Grades are the permanent official record of a student's academic performance. Iowa State uses A through F grading for most courses. S, P, and NP grades are given in some courses. The standard four-point scale is used to calculate a grade point average.

Grade Point Average (GPA)

All courses (even if they are undergraduate courses) taken as a graduate student will be calculated into the graduate GPA. The GPA is determined by dividing the number of grade points earned by the total number of ISU cumulative hours. The grade given when an incomplete (I) is resolved is figured into the cumulative grade point average, but not into a particular semester's average. Marks of I, S, P, NP, T, and X are not counted in the grade point average; a mark of F (even if taken S/F) is counted in the grade point average. Creative Component/Research (599 and 699) credits are not used in the calculation of the GPA. In the case of repeated courses, only the grade achieved the last time the course is taken is used in computing the grade point average. (However, grades in courses that are noted as repeatable courses in the catalog, such as certain repeatable seminars, will all be used in calculating the grade point average.)

Grading Research and Creative Component Credits

Creative Component/Research credits may be graded as A, B, C, D, I, S, or F. Plus and minus grades are optional. These credits are not calculated in a student's GPA.

Pass (P)/Not Pass (NP) Course Credit

Pass/Not Pass courses are those that a student, with the approval of the major professor, may take for personal enrichment, but not for satisfying prerequisites or deficiencies in the undergraduate background. P/NP marks may not be used in a POS, nor do P/NP marks contribute to the student's GPA. Full credit for P/NP courses is used in calculating tuition

Concurrent Bachelor and Master Programs			
Bachelor's Degree	Bachelor's Major	Master's Degree	Master's Major
B. S.	Accounting	M.Acc.	Accounting
B.S.	Agricultural Biochemistry	M.S.	Biochemistry
B. S.	Agricultural Engineering	M.S.	Agricultural Engineering
B. S.	Animal Science	M.S.	Animal Breeding and Genetics
B. S.	Animal Science	M.S.	Nutritional Sciences
B. S.	Animal Science	M.S.	Meat Science
B. S.	Animal Science	M.S.	Animal Physiology
B. S.	Animal Science	M.S.	Animal Science
B. S.	Biochemistry	M.S.	Biochemistry
B. S.	Biophysics	M.S.	Biophysics
B. S.	Civil Engineering	M.S.	Civil Engineering
B.S.	Civil Engineering	M.B.A.	Business Administration
B. S.	Computer Engineering	M.S.	Computer Engineering
B. S.	Computer Engineering	M.B.A.	Business Administration
B. S.	Diet and Exercise	M.S.	Diet and Exercise
B. S.	Electrical Engineering	M.S.	Electrical Engineering
B. S.	Electrical Engineering	M.B.A.	Business Administration
B.S.	Family Finances, Housing and Policy	M.S.	Human Development and Family Studies
B. S.	Food Science	M.S.	Food Science and Technology
B.S.	Industrial Engineering	M.B.A.	Business Administration
B. S.	Industrial Engineering	M.S.	Industrial Engineering
B. S.	Materials Engineering	M.S.	Materials Science and Engineering
B.S.	Mechanical Engineering	M.B.A.	Business Administration
B.S.	Mechanical Engineering	M.S.	Mechanical Engineering
B. S.	Nutritional Science	M.S.	Nutritional Sciences
B. S.	Psychology	M.S.	Psychology
Concurrent Bachelor and Master Certificates			
Bachelor's Degree	Bachelor's Major	Master's Certificate	
B.S.	Computer Engineering	Information Assurance	
B.S.	Family Finances, Housing and Policy	Family Financial Planning	

assessment and credit load limitations. For more information, see *the Graduate College Handbook*.

Satisfactory/Fail (S/F) Grading

S/F grading is not the same as P/NP grading. S/F grading is by instructor option; all students in a particular course receive S/F grading. P/NP grading is generally a student option. A P mark is equivalent to at least a D- grade whereas an S mark is equivalent to at least a B grade at the graduate level. No special registration procedures are required for S/F grading. An S mark in a course taken S/F is not counted in the grade point average, but an F mark in a course taken S/F is counted in the grade point average and is equivalent to an F in a regularly graded (A-F) course. No more than 20 percent of the total credits (excluding creative component, thesis or dissertation research) in the program of study may be earned on an S/F basis.

S/F grading may be used only for approved courses offered as seminars, symposia, workshops, special topics, and research. Programs must submit requests for S/F grading to the Dean of the Graduate College. The Graduate College Curriculum and Catalog Committee reviews and approves or rejects all S/F courses.

Grievances about Grades

A graduate student who feels that a course grade has been unjustly assigned, and whose attempts to resolve the matter with the instructor have failed, may appeal through the grievance procedures described in the *Graduate College Handbook*.

Probation

If a graduate student does not maintain a cumulative 3.0 grade point average on all course work taken, exclusive of research credit, he or she may be placed on academic probation by the Dean of the Graduate College. Grades earned by graduate students in undergraduate courses are included in the calculation of the grade point average. Academic probation judgments are made on the basis of grades in course work only. New, first-term graduate students who fall below a 3.0 GPA at the end of their first semester will be given a one term grace period to bring their grades back to a 3.0 GPA. These students will receive a warning letter from the Graduate College.

While on academic probation a student will not be admitted to candidacy for a degree and if appointed to a graduate assistantship, the student will not receive a Graduate tuition scholarship unless approval is given by the student's academic college. If a student is to qualify for a tuition scholarship, he/she must be removed from probation by the tenth class day of the term.

To insure that registration does not take place without a review by the program, the Graduate College places a hold on future registrations by a student on probation. Before the student registers for each term, the program must review his or her record and recommend in writing if the Graduate College should permit further registration. Before graduation is approved, the student must complete all courses listed on the program of study with a minimum grade of C and have achieved a 3.0 GPA or greater.

Master's Degrees

General requirements for all master's degrees are as follows:

General Requirements

The Graduate College Handbook outlines the general requirements for completion of a graduate degree at ISU. Faculty in a major field have the responsibility for establishing educational objectives for their graduate program, including specific course requirements and research requirements appropriate to the master's programs in the major. These requirements may place additional responsibilities on the student, the major professor, or the student's program of study (POS) committee beyond those listed in the Graduate College Handbook as deemed appropriate to the goals of the major program.

Faculty and graduate students are active participants in the academic programs of Iowa State University. As active participants, they have a collective impact on the success of those programs and of the university in fulfilling its mission. Each graduate program is encouraged to implement a mechanism for responding to feedback from graduate students as a valuable resource for continuing improvement.

Appointment of the Student's Program of Study (POS) Committee

New graduate students at ISU may be assigned a temporary academic adviser by the major program in the first semester of the student's residence. This faculty member guides the student in selection of a field of study and

in development of a graduate program of study until the major professor and POS committee are selected. After the POS committee has been selected, it guides and evaluates the student during the remainder of graduate study.

A master's POS committee consists of at least three members of the graduate faculty. It must include two members, including the major professor, from the major or program. The committee must include member(s) from different fields of emphasis so as to ensure diversity of perspectives. A term member of the graduate faculty may participate in the direction of a student's master's research as a co-major professor if a member of the graduate faculty serves as a co-major professor and jointly accepts responsibility for the direction of a program of study. For more information on duties and makeup of the committee as well as changes to the committee makeup, see the *Graduate College Handbook*.

Program of Study. The student and major professor develop the program of study with the consultation and approval of the POS committee. This agreement between the student and the Graduate College should be submitted as early as possible for approval. It is recommended that the committee be formed and the POS form submitted as early as the second semester of graduate study. In no case can the committee be formed later than the term before the final oral examination.

Residency. There is no on-campus residency requirement for the master's degree.

Credits. Unless otherwise noted, at least 30 credits of acceptable graduate work must be completed in all master's programs. At least 22 graduate credits must be earned from Iowa State University unless noted in the descriptions under "Specific Master's Degrees" in this catalog.

Transfer Credits. At the discretion of the POS committee, and with the approval of the program and the Graduate College, graduate credits earned as a graduate student at another institution or through a distance education program offered by another institution may be transferred if the grade was B or better. Such courses must have been acceptable toward an advanced degree at that institution and must have been taught by individuals having graduate faculty status at the institution. If a student wishes to transfer credits from graduate courses taken at or through another university as an undergraduate student, it is the student's responsibility to provide verification by letter from that institution that these graduate courses were not used to satisfy undergraduate requirements for a degree.

A transcript must accompany the POS in order to transfer credits. The POS committee may ask for other materials, such as a course outline or accreditation of the institution, to evaluate the course. Transfer courses not completed when the POS is submitted must be completed before the term in which the student graduates. A transcript must then be submitted for review and final approval.

Research credits earned at another institution are generally not transferred. In rare circumstances, the transfer of S or P marks may be accepted for research credits only. It is the

responsibility of the POS committee to obtain a letter from the responsible faculty member at the other institution stating that research credits recommended for transfer with S or P marks are considered to be worthy of a B grade or better. Audits may be listed on the program of study, but do not carry credit.

Major. A major is an approved area of study leading to a graduate degree. The exact number of credits in a major is not prescribed.

Minor. Students may request a minor in any program approved to grant a graduate degree and in programs approved to offer only a minor. A student may not minor and major in the same field. Requirements for declared minors are determined by the minor program and the faculty member representing the minor field on the student's POS committee.

The minor subject area must be tested at the final oral examination and cannot be placed on the transcript after graduation unless it was approved on the program of study, listed on all examination reports, and recorded on the "Application for Graduation" form (diploma slip). A minor cannot be added to a degree that has already been received.

Department/Program Change.

Transferring from One Major/Program/Department to Another

Students who have been admitted to a graduate program and to the Graduate College may request to transfer at a later date to another department or program. Because graduate students are admitted to particular programs, transfers require the approval of both the receiving program and the Graduate College.

Students seeking transfer to another program or department should first discuss their wishes with the new program DOGE (Director of Graduate Education) to determine requirements and interest by the new program. When a student receives a favorable preliminary response from the new program, he or she should fill out the student portion of the form entitled "Request to Transfer from One/Major/Program/Department to Another" and submit this form to his or her current DOGE. The current DOGE will fill out the Current Program Information adding any comments he or she believes the new program should consider and forward the form to the proposed new program. This form is available from the department, the Graduate College, or the Graduate College web page.

The receiving program will generally give the student the same consideration and employ the same admissions standards that are used for original applications for admission and will expect the same application materials (transcripts, letters of recommendation, test scores, etc). During the process, the new and old programs and the Graduate College are authorized and encouraged to seek and disclose information related to the student's overall fitness for studies in the receiving program. Programs are authorized to inquire into the student's prior conduct at the university, both with the prior department and with the Dean of Students.

Upon departmental action (acceptance or denial), the request to transfer form must be sent to the Graduate College for approval. All parties

will receive a copy of the completed form from the Graduate College.

Students desiring to transfer from a degree-seeking status to a nondegree-seeking status need to fill out the "Request to Transfer from One Major/Program/Department to Non-degree" form and bring it to the Graduate College.

Students desiring to transfer from nondegree-seeking status to a degree-seeking status must be admitted by a program through the regular graduate admission process.

Curriculum Change from Active Graduate to Active Undergraduate Status

Individuals who are in good standing in the Graduate College and who wish to transfer to an undergraduate curriculum must contact the graduate classification officer (1137 Pearson Hall). The classification officer will consult with the student and determine the proper course of action.

Curriculum Change from Inactive Graduate to Active Undergraduate Status

Individuals who were admitted to the Graduate College more than one year previous and who do not have active graduate status but who wish to change their status from inactive graduate to active undergraduate, must follow the same procedures required of reentering undergraduate students and must begin the process by filing a completed "Undergraduate Reentry" form with the Office of the Registrar. When considering reinstatement, the undergraduate college may consider the student's overall fitness for continued studies including information about the student's conduct, employment and education since the student's last enrollment.

Individuals who do not have active graduate status and who first enrolled less than one year previous should first see the classification officer in the Graduate College.

Time Limits. It is expected that work for the master's degree shall be completed within five years. In special circumstances the student's POS committee may recommend that the Dean of the Graduate College extend these degree time limits. Cases in which the student leaves Iowa State during his or her graduate career and later returns are dealt with individually by the student's POS committee and the Graduate College. The inclusion in the student's program of study of course work that is beyond the time limits ("over-age" courses) must be justified by the POS committee in a statement accompanying the submission of the program of study.

Application for Graduation. Students planning to graduate must submit an "Application for Graduation" form (diploma slip) to the Graduate Office by the end of the first week of the semester (fall or spring) in which he/she expects to receive the degree, or by the last day of spring semester when wishing to graduate during summer.

Before submitting this form, a student must have submitted and had approved by the Graduate College a "Recommendation for Committee Appointment" form and a "Program of Study" form. Also the student must have been

fully admitted to a program and have met the Graduate English requirement if he/she is a non-native English speaker. Graduation may be delayed if the "Application for Graduation" form filing deadline is not met. If it becomes apparent that a student cannot graduate during the indicated term, he/she should call the Graduate College (515-294-4531) and cancel the previously submitted "Application for Graduation" form. The student must then file a new form for the next planned term of graduation.

Thesis. A master's thesis is a scholarly composition that demonstrates the ability of the author to do independent and creative work. A thesis is required in all fields in which a master's degree is awarded, except where specific provision is made for a nonthesis degree program. A minimum of three research credits is required on every program of study for a thesis master's degree.

Responsibility for writing and editing of the thesis rests with the student, under the supervision of the major professor, and not with the Graduate College. The Graduate College does not permit joint authorship of theses. It is the responsibility of the major professor to supervise the preparation of preliminary and final drafts of the thesis to assure the highest level of quality when the student presents the thesis to the committee for final approval.

Copies of the thesis must be submitted to the members of the POS committee at least two weeks before the final oral examination.

All theses and dissertations will be submitted electronically after the final oral examination is held. Please browse the Graduate College's web site (<http://www.grad-college.iastate.edu/thesis/homepage.html>) for requirements, revised fees, and other pertinent information.

Shortly after the submission of the "Application for Graduation" form, a one-time, nonrefundable thesis fee is billed by the university accounting system. In addition, a graduation fee will be assessed by the Registrar's Office. This fee is nonrefundable if a student does not cancel his/her graduation by the Graduate College's cancellation deadline.

Creative Component. Most nonthesis students must present substantial evidence of individual accomplishment (e.g., a special report, capstone course, integrated field experience, annotated bibliography, research project, design, or other creative endeavor). A minimum of two credits of such independent work is required on those programs of study for a nonthesis master's degree. Some programs require more credits. (For more information, contact the individual program or consult the Specific Master's Degrees section in this catalog.) The element of creative independent study must be explicitly identified on the program of study. The format of the creative component is determined in cooperation with the POS committee. As with a thesis, a creative component should be submitted to members of the POS committee two weeks before the final oral examination. However, no final submission of a creative component is turned in to the Graduate College for review and approval.

Final Oral Examination. Most master's candidates must pass final oral examinations. The final oral examination must be held by the final examination deadline date for the semester in which the degree is granted. All coursework in the program of study must either be completed or in progress before the final examination can be scheduled. This examination is oral; it may also include a written component if specified by the student's (POS) committee.

Graduate students must register at Iowa State for the equivalent of two credits, or for the R-credit course GR ST 600 (Examination Only) if no course work is needed, during the semester in which the final examination is taken. (Graduate students who are not required to take a final oral examination should complete all required coursework on the POS prior to or during the term of graduation. Any transfer credits must be completed the term before the graduation term and follow normal transfer rules.) Taking only an R-credit course where the fee is not equivalent to the 2-credit minimum charge is not acceptable for the term of the final oral examination. If the examination is taken during the interim between terms (including the first day of classes), registration can be for either the term before or the term after the examination is held.

The candidate is responsible for initiating the "Request for Final Oral Examination" form, which must be submitted to the Graduate College at least three weeks before the examination. This form can be obtained only from the student's program/department. The entire POS committee must be convened for the final oral examination. For more information on the final oral examination, see *the Graduate College Handbook*.

Graduate Student Approval Slip for Graduation. Every candidate for an advanced degree is required to complete a "Graduate Student Approval Slip for Graduation" form. It is sent to the major professor or program to give to the student after the "Request for Final Examination" form is received and approved by the Graduate College. Signatures are required by the major program, the Graduate College Thesis specialist (for those completing a thesis), and the Graduate College. Final clearance of academic requirements will be made when current term grades have been submitted and evaluated by the Graduate College.

All incompletes from previous terms must be completed by the deadline for completion of the Graduate Student Approval Slip. An incomplete or non-report grade that a student receives for the term of graduation will result in removal from that term's graduation list. The student will need to complete a new Application for Graduation and Graduate Student Approval Slip for the new term of graduation. If a conditional pass was recommended at the final oral examination, the major professor and the committee members, if so specified, must notify the Graduate College in writing no later than the due date for the Graduate Student Approval Slip for the term of graduation that the conditions have been met.

Specific Master's Degrees

The number of credits in a major for a master's degree will vary according to the degrees listed below. General credit requirements for all master's degrees include: a minimum of 30 graduate credits is required for all master's programs at ISU; at least 22 graduate credits must be earned at ISU unless noted in descriptions; any transfer of graduate credits from another institution must be recommended in the program of study by the POS committee; and graduate credit earned as a graduate student will be approved for transfer only if a B grade or better was earned. A transcript must accompany the POS form.

Master of Arts or Master of Science—Thesis

At least 30 credits of acceptable graduate work must be completed, not less than 22 of which must be earned from ISU. Students are expected to research and write a thesis that demonstrates independent and creative work. A minimum of 3 semester credits is required for thesis research.

Master of Arts or Master of Science—Nonthesis

In certain programs a nonthesis degree program is offered. (For more information on requirements, contact the individual program or department.) This option requires the satisfactory completion of at least 30 graduate credit hours of acceptable work (not including research credit), not less than 22 credits of which must be earned from Iowa State University, and satisfactory completion of a comprehensive final oral examination. In addition, every nonthesis master's program must present substantial evidence of individual accomplishment (e.g., a special report, capstone course, integrated field experience, annotated bibliography, or other creative endeavor). A minimum of two semester hours of such independent work (referred to as the creative component) is required on every program of study for a nonthesis master's degree and is applied toward the credit-hour requirement. This element of creative independent study must be explicitly identified on the program of study. Detailed requirements may vary with fields. Reference should be made to the *Courses and Programs* section in this catalog.

Master of Accounting. The Department of Accounting offers a 30-credit Master of Accounting graduate degree. The program requires 15 credits of graduate accounting courses, at least 9 credits of non-accounting graduate electives, a communications course, an international course from an approved list, and an optional creative component. At least 22 graduate credits must be earned at ISU. The degree is appropriate for any student wanting to pursue a variety of accounting careers. Additionally, the program is designed to help interested candidates meet the 150-hour education requirement for the CPA certification in Iowa. Since no final oral examination is required in the above professional program and its options, students should complete all coursework on the POS prior to or during the term of graduation. Any transfer credits must be completed the term before the graduation term and follow normal transfer rules.

Master of Agriculture. The major in professional agriculture is an off-campus, nonthesis program leading to the master of agriculture degree. It is available to students wishing to pursue graduate study in agriculture without taking formal coursework on campus. The program is considered to be a terminal master's degree. Students are required to take a minimum of two courses in each of three disciplines and complete 28 semester credits of formal coursework and four credits of creative component experience, resulting in a total of 32 graduate credits of coursework. At least 22 graduate credits must be earned at ISU. Courses are delivered via video-tapes, interactive video, world-wide web, on-and off-campus classes and workshops. Specific courses offered in the program and the location of the off-campus classes may be obtained from the departmental course listings, off-campus course catalog, or by contacting the Professional Agriculture Coordinator, 201 Curtiss Hall.

Master of Architecture. The Department of Architecture offers three master programs: M Arch I, M Arch II and M S A S. M Arch I (100 credits) is a non-thesis accredited professional degree in architecture. Students with an undergraduate degree other than architecture enroll in a 100-credit, seven semester program. Students with a B.A. or B.S. in architecture or other affiliated design fields are considered for advanced standing based on a review of their academic record. Students with advanced standing typically enroll for four semesters. Since no final oral examination is required in the M Arch I program, students should complete all coursework on the POS prior to or during the term of graduation. Any transfer credits must be completed the term before the graduation term and follow normal transfer rules.

The M Arch II (30 credits) is a post-professional degree in architecture with a required graduate thesis. Students with a B Arch, M Arch I or equivalent professional degree in architecture or other affiliated design fields may apply for this degree.

The M S A S (30 credits) is an interdisciplinary research degree in architecture with a required graduate thesis. This degree is for students with bachelor degrees in various fields that are interested in conducting graduate-level research on the built environment. At least 22 graduate credits must be earned at ISU for all the above programs.

Since no final oral examination is required in the above professional program and its options, students should complete all coursework on the POS prior to or during the term of graduation. Any transfer credits must be completed the term before the graduation term and follow normal transfer rules.

The M.Arch. II (30-credit) option is for students with a B.A. or B.S. in a 4-year degree program in architecture or a M.Arch.I degree. These students must complete a thesis. At least 22 graduate credits must be earned at ISU for all the above options.

Master of Arts in Teaching. This is a degree leading to teacher licensure. A range of graduate credits are required depending on the program offering the degree. The student must also demonstrate an ability to perform

independent study through the completion of a creative component or thesis. At least 22 graduate credit hours must be earned at ISU.

Master of Business Administration. The College of Business offers a 48 graduate credit-hour program leading to a nonthesis master of business administration degree.

At least 22 graduate credits must be earned at ISU. Students may select courses in the traditional business disciplines or choose areas of specialization in accounting, agribusiness, family financial planning, information systems, international business, marketing, and supply chain management.

Since no final oral examination is required, M.B.A. students should complete all required coursework on the POS prior to or during the term of graduation. Any transfer credits must be completed the term before the graduation term and follow normal transfer rules.

Master of Community and Regional Planning. The master of community and regional planning degree requires a minimum of 48 graduate semester credit hours. At least 22 graduate credits must be earned at ISU. This degree is available as a thesis or nonthesis option.

Master of Education. For the master of education degree, a range of 30 to 40 graduate credits are required. At least 22 graduate credits must be earned at ISU. The student demonstrates an ability to perform independent study through the completion of a creative component or a field-based activity.

Master of Engineering. The academic standards and the general level of attainment are the same for the master of engineering and master of science degrees. Master of engineering programs are offered to meet the needs for professionally oriented programs on campus and for off-campus professionally oriented programs at locations with adequate library and laboratory facilities. An appropriate number of credit hours in design, laboratory work, computation, or independent study is required as evidence of individual accomplishment. Of the minimum 30 graduate credits requirement, 22 graduate credit hours must be earned at ISU. For those Master of Engineering programs that do not require a final oral examination, students should complete all coursework on the POS prior to or during the term of graduation. Any transfer credits must be completed the term before the graduation term and follow normal transfer rules.

Master of Family and Consumer Sciences. The College of Human Sciences offers two nonthesis options leading to the degree master of family and consumer sciences. Both options are designed to enhance the skills of those holding the bachelor's degree so that they may meet the requirements of their present jobs or progress in their careers. The comprehensive option can be followed on- or off-campus and requires 36 graduate credits covering a variety of family and consumer sciences subject matter. The specialization option requires 36 credits and is offered on-campus from the following departments and programs: Dietetics, Family Financial Planning, Foodservice and Lodging Management, Gerontology, Human Development and Family Studies, Nutritional Sciences, and Textiles and Clothing. At least 22 graduate

credits must be earned at ISU. Both options require a written and oral integrative final exam.

Master of Fine Arts. For this degree a minimum of 54-61 graduate credits is required, including the completion of a thesis-exhibition or a thesis. At least 22 graduate credits must be earned at ISU.

Master of Landscape Architecture. The master of landscape architecture degree requires a minimum of 36 graduate credits and the satisfactory completion of a thesis or a creative component. At least 22 graduate credits must be earned at ISU.

Master of Public Administration. This is a professional degree program designed to provide training necessary for an administrator in a public or quasi-public bureaucracy. The MPA degree requires 37 graduate credit hours, which includes (a) 12 credit hours in Core Competency, (b) 12 credit hours in one of the Concentration areas, (c) 4 credit hours in other required courses, (d) up to 7 credit hours of electives, (e) 3 credit hours of Creative Component (a Capstone Project) or a minimum of 3 credit hours of research (thesis). Pre-service students are encouraged to obtain an internship for 3 credit hours. At least 22 graduate credits must be earned at ISU.

Master of School Mathematics. This degree is designed primarily for in-service secondary mathematics teachers. Its prescribed program of study requires 33 graduate credits, two of which come from the writing of an approved creative component, 15 from courses offered for graduate credit, and 13 from courses offered for nonmajor graduate credit. At least 22 credit hours must be earned at ISU.

Master's Double Degree Programs

A double degree requires fulfillment of the requirements for two graduate majors for which two differently named master's degrees and two diplomas are granted at the same time. For double degrees the final project (thesis or creative component) must integrate subject areas from both departments. One final oral examination must be held covering the combined thesis or creative component. Students planning to pursue double degrees must complete a double degree request form and submit it to the Dean of Graduate College for approval. Just one "Recommendation for Committee Appointment" form and one "Program of Study (POS)" form need to be submitted for the two degrees. However, two "Application for Graduation" forms, one for each degree, will need to be submitted. All forms should show clearly that the student is enrolled in a double-degree program.

Like other master's programs, three graduate faculty members can constitute a POS committee; however, POS committees for double degrees must include co-major professors from each of the majors. Although specific degree programs may require more, the program of study must include at least 44 hours of non-overlapping credit (22 for each major) in the two degrees.

Several such combinations are currently available: (1) Master of Architecture/Master of Busi-

ness Administration; (2) Master of Architecture/Master of Community and Regional Planning; (3) Master of Community and Regional Planning/Master of Business Administration; (4) Master of Landscape Architecture/Master of Community and Regional Planning; (5) Master of Public Administration/Master of Community and Regional Planning; (6) Master of Public Administration/Master of Science in Information Assurance; (7) Master of Science in Statistics/Master of Business Administration; and (8) Master of Science in Information Systems/Master of Business Administration.

If a student outside one of the named areas is interested in an individually-developed double degree program, a written proposal for a double degree to serve those interests and needs must be submitted to the Dean of the Graduate College for review. See the *Graduate College Handbook* for more information.

Drake University Law School/ Iowa State University Combined Degree

To provide training in the complementary fields of law, political science, and economics with a minimum amount of academic duplication, special arrangements for combined degree programs have been approved with the Drake University Law School. ISU and Drake offer a combined J.D.-M.A. in political science and J.D.-Ph.D. in economics. Drake Law School students are permitted to transfer the equivalent of nine semester credits of specified law courses to ISU for nonmajor graduate credit. Because of the difference in grading systems, the Law School grades are transferred as passes, provided the student has achieved a grade of C or better in those courses at Drake for the political science program or a grade of B or better for the economics program.

Applicants for either of the combined programs must meet the regular entrance requirements of, and be admitted to, both the Drake Law School and the ISU Graduate College.

Doctor of Philosophy General Requirements

The degree doctor of philosophy is strongly research oriented. The primary requirements for the degree are: (1) high attainment and proficiency of the candidate in his or her chosen field, (2) development of a dissertation which is a significant contribution to knowledge and which shows independent and creative thought and work, and (3) successful passing of detailed examinations over the field of the candidate's major work, with a satisfactory showing of preparation in related courses. General requirements for Ph.D. candidates follow.

The Graduate College Handbook outlines the general requirements for completion of a graduate degree at ISU. Faculty in a major field have the responsibility for establishing educational objectives for their graduate program, including specific course requirements and research requirements appropriate to the master's or Ph.D. programs in the major. These

requirements may place additional responsibilities on the student, the major professor, or the student's program of study (POS) committee beyond those listed in the Graduate College Handbook as deemed appropriate to the goals for the major program.

Faculty and graduate students are active participants in the academic programs of Iowa State University. As active participants, they have a collective impact on the success of those programs and of the university in fulfilling its mission. Each graduate program is encouraged to implement a mechanism for responding to feedback from graduate students as a valuable resource for continuing improvement.

Appointment of the Student's Program of Study (POS) Committee. The POS committee for a doctoral program consists of at least five members of the graduate faculty. It must include at least three members, including the major professor, from within the student's major or program. The committee must include member(s) from different fields of emphasis so as to ensure diversity of perspectives. A term member of the graduate faculty may participate in the direction of a student's dissertation research as a co-major professor if a member of the graduate faculty serves as a co-major professor and jointly accepts responsibility for direction of the dissertation.

Changes to POS committee. Recommendations for changes in the POS committee must have the approval of the student, major professor, DOGE, and all committee members involved in the change (committee members who are on Faculty Professional Development Assignments, retired, or resigned do not have to sign) before seeking approval of the Graduate College. A form to seek approval is available in program offices or on the web at www.grad-college.iastate.edu/forms/forms.html. These changes must be approved by the Dean of the Graduate College before the preliminary or final oral examination is held. For more information on changes to the committee and to the Program of Study, see the *Graduate College Handbook*.

Program of Study. The student and the major professor develop the program of study with the consultation and approval of the POS committee. Early selection of a major professor, appointment of a POS committee, and development of a program of study are very important. It is recommended that the committee be formed as early as the second semester of graduate study. In no case can the committee be formed later than the term before the preliminary oral examination.

Credits. A minimum of 72 graduate credits must be earned for a Ph.D. degree. At least 36 graduate credits, including all dissertation research credits, must be earned at Iowa State University. At least 24 of these credits must be earned during two consecutive semesters or during a continuous period including two semesters and a summer session while in residence at the university. (This requirement does not apply to doctoral students who are employed more than half time at ISU). There is no specific university requirement regarding the number of credits to be taken inside or outside the major/program.

Transfer Credits. At the discretion of the POS committee, and with the approval of the program and the Graduate College, graduate credits earned as a graduate student at another institution or through a distance education program offered by another institution may be transferred if the grade was B or better. Such courses must have been acceptable toward an advanced degree at that institution and must have been taught by individuals having graduate faculty status at that institution. If a student wishes to transfer credits from graduate courses taken at or through another university as an undergraduate student, it is that student's responsibility to provide verification by letter from that institution that those graduate courses were not taken to satisfy undergraduate requirements for a degree.

A transcript must accompany the POS in order to transfer credits. The POS committee may ask for other materials, such as a course outline or accreditation of the institution, to evaluate the course. Transfer courses not completed when the POS is submitted must be completed before the term in which the student graduates. A transcript must then be submitted for review and final approval.

Research credits earned at another institution are generally not transferred. In rare circumstances, the transfer of S or P marks may be accepted for research credits only. It is the responsibility of the POS committee to obtain a letter from the responsible faculty member at the other institution stating that research credits recommended for transfer with S or P marks are considered to be worthy of a B grade or better.

Residency. At least 24 semester credits must be earned during two consecutive semesters or during a continuous period including two semesters and a summer session. This requirement does not apply to doctoral students who are employed at least half-time by Iowa State University and government laboratories located in Ames. Of the 72 graduate credits required for a Ph.D. at least 36 credits, including all dissertation research credits, must be earned under the supervision of the student's POS committee.

Major. A major is the area of study or academic concentration in which a student chooses to qualify for the award of a graduate degree. Majors are listed at the end of this section of the bulletin. Opportunities also exist for majoring in more than one area of study (co-major or joint major programs).

Minor. Students may request a minor in any program approved to grant a graduate degree and in programs approved to offer only a minor. Requirements for declared minors are determined by the minor program and the faculty member representing the minor field on the student's POS committee. The minor subject area must be tested at the preliminary oral and final oral examinations. A minor cannot be added to a program of study after the preliminary oral examination has been taken, nor can a minor be placed on the transcript after graduation, unless it was approved on the program of study, listed on all examination reports, and recorded on the "Application for Graduation" form (diploma slip). A student may not minor and major in the same field. A minor

cannot be added to a degree that has already been awarded.

Time Limits. A student beginning a Ph.D. degree program at Iowa State with a master's degree from another institution is expected to complete the Ph.D. within five years, while a student beginning a Ph.D. degree program without the master's degree is expected to complete the program within seven years. If warranted, the Program of Study (POS) Committee may request by letter that the Dean of the Graduate College extend these time limits. Cases in which the student leaves Iowa State during his or her graduate career and later returns are dealt with individually by the student's program of study committee and the Graduate College. The inclusion in the program of study of coursework that is beyond the time limits ("over-age" courses) must be justified by the POS committee in a statement accompanying the submission of the program of study.

Preliminary Examination. The Graduate College requires a preliminary oral examination of Ph.D. degree students; most programs add a written portion to the preliminary oral examination. The Ph.D. degree preliminary oral examination rigorously tests a graduate student's knowledge of major, minor, and supporting subject areas as well as the student's ability to analyze, organize, and present subject matter relevant to the field. A "Request for Preliminary Examination" form must be submitted to the Graduate College by the major professor at least two weeks before the proposed date of the examination.

The following conditions should be met before the "Request for Preliminary Examination" form is submitted to the Graduate College: admitted to full admission status in a Ph.D. granting program, approved "Recommendation for Committee Appointment" form, approved POS form, English requirement met, not on probation, time limit not exceeded, qualifying examination (if required by program) passed, and registration for at least the equivalent of 2 credits, or for the R-credit course GR ST 600 (Examination Only) if no course work is needed, during the term in which the preliminary oral examination is taken. (Taking only an R-credit course where the fee is not equivalent to the 2-credit minimum charge is not acceptable for the term of the preliminary oral examination.)

A preliminary oral examination will not be scheduled for a student on provisional or restricted admission or on academic probation. Upon successful completion of the preliminary oral examination, the student is admitted to candidacy for the Ph.D. degree. If the graduate student fails all or part of the preliminary oral examination, the committee provides two options: gives a not pass and allows the student to retake the examination after six months or gives a not pass and does not allow the student to retake the examination. Six months must elapse between the first attempt and the next. The entire POS committee must be convened for the preliminary oral examination. The preliminary oral examination must be passed at least six months prior to the final oral examination. An exception to the rule is allowed if a request signed by the major professor(s) and the program's DOGE is approved by the Dean of the Graduate College.

Application for Graduation. Application for graduation should be made by the end of the first week of the semester (fall or spring) in which the student expects to receive the degree, or by the last day of the spring semester if graduation is planned during summer session. To apply for graduation, the student is required to submit to the Graduate College a signed "Application for Graduation" form, available in the program office or on the web at www.grad-college.iastate.edu/forms/forms.html. Before submitting this form, a student must have submitted and had approved by the Graduate College a "Recommendation for Committee Appointment" form and a "Program of Study" form. Also the student must have been fully admitted to a program and have met the Graduate English requirement. Graduation may be delayed if the "Application for Graduation" form filing deadline is not met. If it becomes apparent that a student cannot graduate during the indicated term, he/she should call the Graduate College (515-294-4531) and cancel the previously submitted "Application for Graduation" form. The student must then file a new form for the next planned term of graduation.

Dissertation. A doctoral dissertation must demonstrate conclusively the ability of the author to conceive, design, conduct, and interpret independent, original, and creative research. It must attempt to describe significant original contributions to the advancement of knowledge and must demonstrate the ability to organize, analyze, and interpret data. In most instances, a dissertation includes a statement of purpose, a review of pertinent literature, a presentation of methodology and results obtained, and a critical interpretation of conclusions in relation to the findings of others. When appropriate, it involves a defense of objectives, design, and analytical procedures. Dissertation research should be worthy of publication and should appear in appropriate professional journals or in book form.

Responsibility for writing and editing of the dissertation rests with the student, under the supervision of the major professor, and not with the Graduate College. The Graduate College does not permit joint authorship of dissertations. It is the responsibility of the major professor to supervise the preparation of preliminary and final drafts of the dissertation, so as to assure the highest level of quality when the student presents the dissertation to the committee for final approval. Copies of the dissertation must be submitted to the POS committee at least two weeks before the final oral examination.

All theses and dissertations will be submitted electronically after the final oral examination is held. Please browse the Graduate College's web site (<http://www.grad-college.iastate.edu/thesis/homepage.html>) for new requirements, revised fees, and other pertinent information.

Shortly after the submission of the "Application for Graduation" form, a one-time, nonrefundable thesis fee is billed by the university accounting system. In addition, a graduation fee will be assessed by the Registrar's Office. This fee is nonrefundable if a student does not cancel his/her graduation by the Graduate College's cancellation deadline.

Final Oral Examination. The Ph.D. final oral examination, conducted after the dissertation is finished, is oral and often limited to a defense of the dissertation. To receive the degree at the end of a given semester, the student must hold the final oral examination before the final oral examination deadline for the semester.

The candidate is responsible for initiating the "Request for Final Oral Examination" form, which must be submitted to the Graduate College at least three weeks before the examination. This form can be obtained only from the student's program/department. The entire POS committee must be convened for the final oral examination. For more information on the final oral examination, see *the Graduate College Handbook*.

Graduate Student Approval Slip for Graduation. Every candidate for an advanced degree is required to complete a "Graduate Student Approval Slip for Graduation" form. It is sent to the major professor or program to give to the student after the "Request for Final Examination" form is received and approved by the Graduate College. Signatures are required by the major program, the Graduate College Thesis specialist, and the Graduate College. Final clearance of academic requirements will be made when current term grades have been submitted and evaluated by the Graduate College.

All incompletes from previous terms must be completed by the deadline for completion of the Graduate Student Approval Slip. An incomplete or non-report grade that a student receives for the term of graduation will result in removal from that term's graduation list. The student will need to complete a new Application for Graduation and Graduate Student Approval Slip for the new term of graduation. If a conditional pass was recommended at the final oral examination, the major professor and the committee members, if so specified, must notify the Graduate College in writing no later than the due date for the Graduate Student Approval Slip for the term of graduation that the conditions have been met.

Graduate Majors

More information on each major can be found in the Courses and Programs section of this catalog under the department or program listed in parentheses after the degree information.

Accounting: M.Acc. (see *Accounting*)

Aerospace Engineering: M.Engr., M.S., Ph.D. (see *Aerospace Engineering*)

Agricultural Economics: M.S., Ph.D. (see *Economics*)

Agricultural Education: M.S., Ph.D. (see *Agricultural Education and Studies*)

Agricultural Engineering: M. Engr., M.S., Ph.D. (see *Agricultural Engineering*)

Agricultural History and Rural Studies: Ph.D. (see *History*)

Agricultural Meteorology: M.S., Ph.D. (see *Agronomy*)

Agronomy: M.S. (see *Agronomy*)

Analytical Chemistry: M.S., Ph.D. (see *Chemistry*)

Animal Breeding and Genetics: M.S., Ph.D. (see *Animal Science*)

Animal Ecology: M.S., Ph.D. (see *Natural Resource Ecology and Management*)

Animal Physiology: M.S., Ph.D. (see *Animal Science*)

Animal Science: M.S., Ph.D. (see *Animal Science*)

Anthropology: M.A. (see *Anthropology*)

Applied Linguistics and Technology: Ph.D. (see *English*)

Applied Mathematics: M.S., Ph.D. (see *Mathematics*)

Applied Physics: M.S., Ph.D. (see *Physics and Astronomy*)

Architectural Studies: M.S. (see *Architecture*)

Architecture: M. Arch., M. Arch./M.B.A., M. Arch./M.C.R.P. (see *Architecture*)

Art and Design: M.A. (see *Art and Design*)

Astrophysics: M.S., Ph.D. (see *Physics and Astronomy*)

Biochemistry: M.S., Ph.D. (see *Biochemistry, Biophysics and Molecular Biology*)

Bioinformatics and Computational Biology: M.S., Ph.D. (see *Bioinformatics and Computational Biology*)

Biomedical Sciences: M.S., Ph.D. (see *Biomedical Sciences*)

Biophysics: M.S., Ph.D. (see *Biochemistry, Biophysics and Molecular Biology*)

Biorenewable Resources and Technology: M.S., Ph.D. (see *Biorenewable Resources and Technology*)

Botany: M.S., Ph.D. (see *Botany*)

Business: M.S. (see *Business Administration*)

Business Administration: M.B.A., M. Arch./M.B.A., M.B.A./M.C.R.P., M.B.A./M.S. (Statistics), M.B.A./M.S (Information Systems) (see *Business Administration*)

Business and Technology: Ph.D. (see *Business and Technology*)

Chemical Engineering: M. Engr., M.S., Ph.D. (see *Chemical and Biological Engineering*)

Chemistry: M.S., Ph.D. (see *Chemistry*)

Civil Engineering: M.S., Ph.D. (see *Civil Engineering*)

Community and Regional Planning: M.C.R.P., M. Arch./M.C.R.P., M.B.A./M.C.R.P., M.L.A./M.C.R.P., M.P.A./M.C.R.P. (see *Community and Regional Planning*)

Computer Engineering: M.S., Ph.D. (see *Computer Engineering*)

Computer Science: M.S., Ph.D. (see *Computer Science*)

Condensed Matter Physics: M.S., Ph.D. (see *Physics and Astronomy*)

Creative Writing and Environment: M.F.A. (see *English*)

Crop Production and Physiology: M.S., Ph.D. (see *Agronomy*)

Diet and Exercise: B.S./M.S. only (see *Food Science and Human Nutrition or Health and Human Performance*)

Earth Science: M.S., Ph. D. (see *Geological and Atmospheric Sciences*)

Ecology and Evolutionary Biology: M.S., Ph.D. (see *Ecology and Evolutionary Biology*)

Economics: M.S., Ph.D. (see *Economics*)

Education: M.Ed., M.Ed. Practitioner, M.S., Ph.D. (see *Curriculum and Instruction, Educational Leadership and Policy Studies*)

Electrical Engineering: M.S., Ph.D. (see *Electrical Engineering*)

Engineering Mechanics: M.Engr., M.S., Ph.D. (see *Engineering Mechanics*)

English: M.A. (see *English*)

Entomology: M.S., Ph.D. (see *Entomology*)

Environmental Science: M.S., Ph.D. (see *Environmental Science*)

Family and Consumer Sciences: M.F.C.S. (see *Family and Consumer Sciences, Master of*)

Family and Consumer Sciences Education: M.Ed., M.S., Ph.D. (see *Family and Consumer Sciences Education and Studies*)

Fisheries Biology: M.S., Ph. D. (see *Natural Resource Ecology and Management*)

Food Science and Technology: M.S., Ph.D. (see *Food Science and Human Nutrition*)

Foodservice and Lodging Management: M.S., Ph.D. (see *Hotel, Restaurant, and Institution Management*)

Forestry: M.S., Ph.D. (see *Natural Resource Ecology and Management*)

Genetics: M.S., Ph.D. (see *Genetics—Interdisciplinary*)

Geology: M.S., Ph.D. (see *Geological and Atmospheric Sciences*)

Graphic Design: M.F.A. (see *Art and Design*)

High Energy Physics: M.S., Ph.D. (see *Physics and Astronomy*)

History: M.A. (see *History*)

History of Technology and Science: M.A., Ph.D. (see *History*)

Horticulture: M.S., Ph.D. (see *Horticulture*)

Human Computer Interaction: M.S., Ph.D. (see *Human Computer Interaction*)

Human Development and Family Studies: M.S., Ph.D. (see *Human Development and Family Studies*)

Immunobiology: M.S., Ph.D. (see *Immunobiology*)

Industrial and Agricultural Technology: M.S., Ph.D. (see *Technology Systems Management*)

Industrial Engineering: M.S., Ph.D. (see *Industrial Engineering*)

Information Assurance: M.S., M.S./M.P.A. (see *Information Assurance*)

Information Systems: M.S., M.S./M.B.A. (see *Management Information Systems*)

Inorganic Chemistry: M.S., Ph.D. (see *Chemistry*)

Integrated Visual Arts: M.F.A. (see *Art and Design*)

Interdisciplinary Graduate Studies: M.A., M.S. (see *Interdisciplinary Graduate Studies*)

Interior Design: M.F.A. (see *Art and Design*)

Journalism and Mass Communication: M.S. (see *Journalism and Communication, Greenlee School of*)

Kinesiology: M.S., Ph.D. (see *Kinesiology*)

Landscape Architecture: M.L.A., M.L.A./M.C.R.P. (see *Landscape Architecture*)

Materials Science and Engineering: M.S., Ph.D. (see *Materials Science and Engineering*)

Mathematics: M.S., Ph.D. (see *Mathematics*)

Meat Science: M.S., Ph.D. (see *Animal Science, Food Science and Human Nutrition* (offered as Ph.D. only jointly with Animal Science))

Mechanical Engineering: M.S., Ph.D. (see *Mechanical Engineering*)

Meteorology: M.S., Ph.D. (see *Geological and Atmospheric Sciences*)

Microbiology: M.S., Ph.D. (see *Microbiology*)

Molecular, Cellular, and Developmental Biology: M.S., Ph.D. (see *Molecular, Cellular, and Developmental Biology*)

Neuroscience: M.S., Ph.D. (see *Neuroscience*)

Nuclear Physics: M.S., Ph.D. (see *Physics and Astronomy*)

Nutritional Sciences: M.S., Ph.D. (see *Nutritional Sciences*)

Operations Research (must be a joint major with Statistics): M.S. (see *Industrial Engineering/Statistics*)

Organic Chemistry: M.S., Ph.D. (see *Chemistry*)

Physical Chemistry: M.S., Ph.D. (see *Chemistry*)

Physics: M.S., Ph.D. (see *Physics and Astronomy*)

Plant Breeding: M.S., Ph.D. (see *Agronomy*)

Plant Pathology: M.S., Ph.D. (see *Plant Pathology*)

Plant Biology: M.S., Ph.D. (see *Plant Physiology*)

Political Science: M.A., (see *Political Science*)

Professional Agriculture: M.Ag. (see *Professional Agriculture*)

Psychology: M.S., Ph.D. (see *Psychology*)

Public Administration: M.P.A., M.P.A./M.C.R.P., M.P.A./M.S. (Information Assurance) (see *Political Science*)

Rhetoric and Professional Communication: Ph.D. (see *English*)

Rhetoric, Composition, and Professional Communication: M.A. (see *English*)

Rural Sociology: M.S., Ph.D. (see *Sociology*)

School Mathematics: M.S.M. (see *Mathematics*)

Science Education: M.A.T. (see *Curriculum and Instruction*)

Seed Technology and Business: M.S. (see *Seed Technology and Business*)

Sociology: M.S., Ph.D. (see *Sociology*)

Soil Science: M.S., Ph.D. (see *Agronomy*)

Statistics: M.S., M.B.A./M.S., Ph.D. (see *Statistics*)

Sustainable Agriculture: M.S., Ph.D. (see *Sustainable Agriculture*)

Systems Engineering: M.Engr. (see *Systems Engineering*)

Teaching English as a Second Language/Applied Linguistics: M.A. (see *English*)

Textiles and Clothing: M.S., Ph.D. (see *Textiles and Clothing*)

Toxicology: M.S., Ph.D. (see *Toxicology*)

Transportation: M.S. (see *Transportation*)

Veterinary Clinical Sciences: M.S. (see *Veterinary Clinical Science*)

Veterinary Microbiology: M.S., Ph.D. (see *Veterinary Microbiology and Preventive Medicine*)

Veterinary Pathology: M.S., Ph.D. (see *Veterinary Pathology*)

Veterinary Preventive Medicine: M.S. (see *Veterinary Diagnostic and Animal Production Medicine*)

Wildlife Biology: M.S., Ph.D. (see *Natural Resource Ecology and Management*)

Zoology: M.S., Ph.D. (see *Zoology*)

Declared Minors

(in addition to the majors above which can also be minors)

Complex Adaptive Systems (see *Complex Adaptive Systems*)

Gerontology (see *Gerontology*)

Philosophy (see *Philosophy and Religious Studies*)

French (see *World Languages and Cultures*)

German (see *World Languages and Cultures*)

Latin (see *World Languages and Cultures*)

Linguistics (see *Linguistics*)

Russian (see *World Languages and Cultures*)

Spanish (see *World Languages and Cultures*)

Speech Communication (see *Speech Communication*)

Technology and Social Change (see *Technology and Social Change*)

Women's Studies (see *Women's Studies*)

Graduate Certificate Programs

A graduate certificate provides a mechanism for bestowing formal recognition of focused graduate study in a specialized area that is less comprehensive than required for a master's degree. At Iowa State University, a graduate certificate may be earned either before, after, or concurrently with the master's or doctoral degree. For more detailed information on certificate programs, browse the Graduate College web site at: www.grad-college.iastate.edu/publications/gchandbook/appendixd.html.

Advanced Medical Nutrition Therapy Certificate (see <http://www.fshn.hs.iastate.edu/grad/certificate.php>)

Biorenewable Resources and Technology Certificate (see <http://www.ede.iastate.edu/Graduate-Certificates/Grad-Cert/BRT-GradCert.html>)

Community College Leadership Certification (see www.cclp.hs.iastate.edu/)

Community College Teaching (see http://www.cclp.hs.iastate.edu/teaching_learning.html)

Dietetics Communication and Counseling Certificate (see <http://www.fshn.hs.iastate.edu/grad/certificate.php>)

Dietetics Management Certificate (see <http://www.fshn.hs.iastate.edu/grad/certificate.php>)

Environmental Engineering Certificate (see <http://www.ede.iastate.edu/Graduate-Certificates/Grad-Cert/environmental.html>)

Family Financial Planning Certificate (see <http://www.hs.iastate.edu/online/mfcs/ffp/homepage.php>)

Food Safety and Defense Graduate Certificate (see <http://www.fshn.hs.iastate.edu/grad/foodsafetycert.php>)

Forensic Sciences Certificate (see <http://www.chem.iastate.edu/certificate/>)

Gerontology Certificate (see <http://www.hs.iastate.edu/online/mfcs/gerontology/homepage.php>)

Geographic Information Systems Certificate (see www.design.iastate.edu/GIS/)

Graduate Student Teaching Certificate (see <http://www.celt.iastate.edu/gstc/homepage.html>)

Human Computer Interaction (see <http://www.ede.iastate.edu/Graduate-Certificates/Grad-Cert/hci.html>)

Information Assurance Certificate (see <http://www.ede.iastate.edu/Graduate-Certificates/Grad-Cert/infas.html>)

Power Systems Engineering Certificate (see <http://www.ede.iastate.edu/Graduate-Certificates/Grad-Cert/powersystems.html>)

Principal Licensure (Pre-LEAD) (see <http://www.elps.hs.iastate.edu/edadm/edadmhmpg3-prelead.php>)

Public Management Certificate (see www.pols.iastate.edu/mpa.shtml)

Seed Business Management (see <http://www.seeds.iastate.edu/class/certificates.htm>)

Seed Science and Technology (see <http://www.seeds.iastate.edu/class/certificates.htm>)

Special Education Certificate (see http://www.teacher.hs.iastate.edu/addtnl_endorsements.php)

Superintendent Licensure (see www.elps.hs.iastate.edu/edadm/edadmhmpg3-acad.php)

Systems Engineering (see <http://www.ede.iastate.edu/Graduate-Certificates/Grad-Cert/syscert.html>)

TESL (Teaching English as a Second Language) Certificate (see http://www.public.iastate.edu/~aplmg/TESL_cert.html)