

COLLEGE OF AGRICULTURE

2D30-51 Campus Drive
Saskatoon SK S7N 5A8
Phone: (306)966-7881
Fax: (306)966-8894
www.ag.usask.ca/

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B. L. Harvey, University Coordinator of Agricultural Research
G. A. Jones, Associate Dean (Research) of Agriculture
G. I. Christison, Assistant Dean (Academic) of Agriculture

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K. Kartha, National Research Council
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AG-BIOTECHNOLOGY CO-ORDINATOR

G. G. Khachatourians

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H. Tiessen

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Associate Professor

P. J. Shand

Assistant Professors

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A. M. Stephen

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Eco-Agriculture Chair

D. B. Fowler

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T. D. Warkentin

Assistant Professors

R. H. Bors, S. J. Shirtliffe

Assistant Professor (CDC)

S. L. Fox

Associate Members

R. T. Tyler

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Research Scientists*

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Professional Research Associates*

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DEPARTMENT OF SOIL SCIENCE

Professor and Head

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Professors

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Associate Professor

T. S. Tollefson

Assistant Professor

F. L. Walley

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Research Scientists*

R. E. Farrell, A. R. Mermut, J. J. Schoenau

Professional Research Associates*

J. R. de Freitas, J. D. Knight, A. Naidja

Saskatchewan Centre For Soil Research Personnel*

D. Cerkowniak, W. D. Eilers, A. Frick, H. deGoojier, L. M. Kozak, G. A. Padbury, M. Solohub

DIPLOMA PROGRAM

Associate Members

R. Barclay, J. B. Berg, W. J. Brown, T. G. Crowe, M. C. J. Grevers, G. L. Kent, W. G. Milne, M. R. Olfert, R. A. Welford

Sessional Lecturer*

S. M. Eyre

MEMBERS FROM OTHER FACULTIES

T. D. Carruthers, Assistant Professor of Herd Medicine and Theriogenology
R. K. Chaplin, Associate Professor of Veterinary Physiological Sciences
T. Crowe, Associate Professor of Agricultural and Bioresource Engineering
A. R. Davis, Associate Professor of Biology
G. R. Davis, Professor of Physics and Engineering Physics
W. P. Denham, Professor of English
B. A. Hobin, Extension Specialist
E. C. Howe, Professor of Economics
R. W. Kerrich, Professor of Geological Sciences
C. P. Maulé, Associate Professor and Head of Agricultural and Bioresource Engineering
G. M. Moss, Professor of Extension
M. Painter, Associate Professor of Accounting
M.S.C. Pedras, Professor of Chemistry
B. Ziola, Professor of Microbiology

*Denotes non-members of faculty.

PROGRAMS

INTERNATIONAL LINKAGES

For information on international research linkages and student exchange and experience opportunities, contact Professor H. Tiessen, International Agriculture Coordinator, telephone: (306) 966-6841.

THE PRE-VETERINARY MEDICINE PROGRAM

Students may complete the pre-veterinary medicine requirements in two years. Because the program load is heavy and the competition for entry is very keen, students are urged to spread their program over a longer period and to take the standard first-year courses for the B.S.A. program.

Candidates of exceptional ability who seek to complete the entrance requirements in two years are advised to take the following courses:

Year 1: AGRIC 111.3, 112.3; BIOL 110.6; CHEM 111.3, 251.3; ENG 110.6 or two of ENG 111.3, 112.3, 113.3, 114.3; MATH 101.3 and STATS 103.3.

Year 2: AGRIC 201.3; AN SC 212.3; AP MC 212.3; BIOCH 200.3, 211.3 or 212.3; BIOL 211.3; one of CHEM 221.3, 231.3, 242.3; ECON 111.3; PHYS 111.6.

It is essential that all students consult a departmental program advisor each spring to develop an approved program of studies for the following year. Successful completion of the pre-veterinary medicine course requirements does not assure admission to the Western College of Veterinary Medicine. Students can continue a B.S.A. degree with little timetable and programming difficulty in most fields of specialization.

Students should consult the General Information and the Western College of Veterinary Medicine sections of the *Calendar* regarding details of admission procedures.

DIPLOMA AND CERTIFICATE PROGRAMS

ADMISSION AND PROGRAM INFORMATION

Admission requirements for the Diploma and Certificates in Agriculture and Prairie Horticulture Certificate programs are described in the General Information section of the *Calendar*.

THE DIPLOMA IN AGRICULTURE PROGRAM

This program is currently under review. It is anticipated that changes in program structure and duration affecting new entrants will be introduced in the 2001-2002 academic year. For further information, telephone: (306) 966-4062.

The three-year Diploma in Agriculture Program comprises studies in applied

agricultural science. It is designed to assist individuals to become more knowledgeable farm operators and farm business managers, to increase their opportunities for meaningful off-farm employment, and to improve their abilities for effective community involvement. To accommodate farming operations, each academic year consists of two terms in the period October to March. Following the first term of Year 1, students must select one of three streams, Animal Production Management, Crop Production Management or Multiple Enterprise Management.

The College of Agriculture publishes a separate calendar for the Diploma program.

THE CERTIFICATES IN AGRICULTURE PROGRAM

The Certificates in Agriculture program, which is offered in collaboration with Extension Credit Studies, Extension Division, makes available a limited number of regular Diploma courses in home study format. Courses are combined to focus on clearly identifiable subject areas to which common sets of scientific or economic principles can be applied. At present, certificate programs are available in Crop Production, Farm Business Management, and Pork Production. Further information may be obtained from Extension Credit Studies, telephone: (306) 966-5563 or by viewing our web site at www.ag.usask.ca

THE PRAIRIE HORTICULTURE CERTIFICATE PROGRAM

The Prairie Horticulture Certificate program is a home study program offered through collaboration between four Western Canadian institutions - Assiniboine Community College (Brandon, Manitoba), Olds College (Olds, Alberta), the University of Manitoba and the University of Saskatchewan. At the University of Saskatchewan the program is delivered jointly by the College of Agriculture and Extension Credit Studies, Extension Division. The program is designed specifically for use in the prairie provinces, and offers four streams of study - Fruit and Vegetable Production, Greenhouse Crop Production, Landscaping and Arboriculture and Nursery Crop Production. Further information may be obtained from Extension Credit Studies, telephone: (306) 966-5563 or by viewing our web site at www.ag.usask.ca

THE B.S.A. DEGREE PROGRAM

Agriculture is a science and technology oriented discipline. B.S.A. graduates will be well served by pursuing careers in Agriculture. The college is an acknowledged leader in agricultural research and teaching.

Major issues that agriculture students and Professional Agrologists face include:

- Resource use consistent with sustainable food production and environmental safeguarding.
- Production, processing and marketing of high quality food and feed.
- Research, development and implementation of innovative and efficient production, management and marketing systems.

EDUCATIONAL OBJECTIVES

The four year B.S.A. degree program is designed to produce graduates with:

- a sound basis in natural and social sciences;
- a general knowledge of the agri-food system;
- sufficient depth in the area of specialization;
- the ability to think critically and solve problems;
- the ability to communicate orally and in writing;
- computer literacy;
- an appreciation of the arts and humanities;
- an understanding of the elements of the business of agriculture;
- knowledge of the profession of agrology and of ethical professional behaviour.

PROGRAM ACCREDITATION

All B.S.A. specializations offered by the College of Agriculture were granted full accreditation by the Agricultural Institute of Canada in 1999. Graduates are thus eligible for admission to the professional practice of Agrology in Canada.

ADMISSION TO PRACTICE AGROLOGY (PAG)

The Agrologists Act, 1994, requires that persons practicing agrology in the Province of Saskatchewan be registered members of the Saskatchewan Institute of Agrologists.

University of Saskatchewan graduates who intend to practice agrology within the meaning of the Act, must apply to be registered as articling agrologists immediately upon graduation. Undergraduate B.S.A. degree students are eligible to join as student members. Further details on the Agrologists Act, the definition of practicing agrology, and the Saskatchewan Institute of Agrologists may be obtained from the Executive Director, Saskatchewan Institute of Agrologists, 7 - 3012 Louise Street, Saskatoon, SK S7J 3L8. Internet site: www.sia.sk.ca.

FIELDS OF SPECIALIZATION

Agricultural Biology
Agricultural Chemistry
Agricultural Economics
Agronomy
Animal Science
Applied Microbiology
Crop Science
Environmental Science
Food Science
Horticulture Science
Plant Ecology
Rangeland Resources
Soil Science

Starting in Year Two, students must follow an approved Honours or Majors specialization as described below. An 18 credit unit minor in another specialization can also be taken. Majors generally provide for fewer basic science courses and a wider selection of electives than for Honours concentrations. Honours concentrations provide an enriched selection of courses to

better prepare students for graduate studies and research.

Admission to Honours is restricted to students having an approved Honours program, a recommendation from the supervising department, and a cumulative weighted average of 70% or better on a minimum of 60 credit units in B.S.A. courses at the time of application. Students must officially apply for admission to an Honours program through the office of the Dean of Agriculture before the start of fourth year.

MINIMUM REQUIREMENTS FOR THE B.S.A. DEGREE (126 CREDIT UNITS)

The B.S.A. degree will be conferred on students who have met all the requirements of one of the fields of specialization described below. All course selections must be approved by a departmental program advisor. The minimum requirement for the B.S.A. degree is a cumulative weighted average of 60.0% on 126 credit units of approved courses. Students entering the college with credit for B.S.A. courses must complete at least 30 credit units of approved senior courses while registered in the College of Agriculture.

CO-OPERATIVE EDUCATION PROGRAM IN AGRICULTURE

Co-operative education is a structured educational concept integrating classroom studies with related work experience in the student's academic field. Students who enrol in the Co-operative Education program will benefit from a minimum 16 months full-time paid work experience in the private and public sectors. Work term length varies from 4 to 8 months. Co-operative education contributes to the students' educational experience and improves employability upon graduation. A co-operative education tuition applies to each 4 month work term. Admission requirements include being: registered full-time in the B.S.A. degree program and completion of between 54-84 credit units before starting the first work term.

For further information, contact Room 2E10, College of Agriculture, 51 Campus Drive, Saskatoon SK S7N 5A8, telephone: (306)966-7797, Fax: (306)966-7788, email molder@sask.usask.ca or www.ag.usask.ca

APPROVED COURSE REGISTRATIONS

First year students must register in the courses listed below. Students transferring into the B.S.A. degree program with 18 or more credit units of transfer credits must obtain an approved schedule of courses from the program advisor in their chosen field of specialization prior to registration.

COURSE SCHEDULING

Not all courses listed in the *Calendar* are offered every year. Students should check the *Registration Guide* to confirm the course offerings for the current year.

FIRST YEAR REQUIREMENTS - ALL STUDENTS (30 CREDIT UNITS)

Term One: BIOL 110.6; CHEM 111.3; ECON 111.3; AGRIC 111.3; and 6 credit units in the humanities, fine arts or social

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sciences (see following list of acceptable courses).

Term Two: BIOL 110.6 (continued from Term One); ECON 114.3 (AG EC Majors) or CHEM 251.3 (non-AG EC Majors); one of ENG 111.3, 112.3, 113.3, 114.3; AGRIC 112.3; social sciences or humanities course (continued from Term One).

ACCEPTABLE HUMANITIES, FINE ARTS AND SOCIAL SCIENCES COURSE AREAS

Humanities

Classics	Philosophy
English	Religious Studies
French	Russian
Greek	Sanskrit
Hebrew	Spanish
History	Ukrainian
Latin	

Fine Arts

Art	Music
Drama	

Social Sciences

Anthropology	Native Studies
Archaeology	Political Studies
Economics*	Psychology
Geography**	Sociology
Linguistics	Women's and Gender Studies

*Students majoring in Agricultural Economics cannot take Economics courses to meet this requirement.

**The following Geography courses are not acceptable to meet this requirement: GEOG 101, 102, 111, 112, 210, 222, 225, 231, 233, 235.

FIELDS OF SPECIALIZATION

AGRICULTURAL BIOLOGY

In consultation with the program advisor, biology courses and restricted electives are chosen in relation to a particular area such as entomology, plant pathology, plant molecular biology, or wildlife ecology.

Second Year (30 credit units)

AGRIC 201.3, 290.3, 291.3; BIOCH 200.3, 212.3; 12 credit units from required third and fourth-year biology courses listed; 3 credit unit elective.

Third and Fourth Years (66 credit units)

Honours

Required Courses (36 credit units): AGRIC 494.6; BIOL 203.6, 204.3, 211.3, either 202.3 or 205.3; one of ANAT 200.3, BIOL 217.3 or 331.3; one of BIOL 253.3, 263.3 or PL SC 213.3; PL SC 314.3; MATH 101.3 and STATS 103.3 or 6 other credit units in mathematics or physics; 9 additional credit units in biology; 3 credit units in humanities, fine arts or social sciences.

Restricted Electives (21 credit units): Biology courses selected from Agriculture, Arts and Science, Veterinary Medicine and approved by the Department of Biology.

Open Electives (9 credit units).

Majors

Required Courses (24 credit units): AGRIC 492.3; BIOL 203.6, 204.3, 211.3, either 202.3 or 205.3; one of ANAT 200.3, BIOL

217.3 or 331.3; one of BIOL 253.3, 263.3 or PL SC 213.3; PL SC 314.3; MATH 101.3 and STATS 103.3 or 6 other credit units in mathematics or physics; 3 credit units in humanities, fine arts or social sciences.

Restricted Electives (24 credit units): biology courses selected from Agriculture, Arts and Science, and Veterinary Medicine and approved by the Department of Biology.

Open Electives (18 credit units): 3 credit units must be in the humanities, fine arts or social sciences.

AGRICULTURAL CHEMISTRY

Second Year (33 credit units)

AGRIC 201.3, 222.3, 290.3, 291.3; CHEM 221.3, 231.3, 252.3; MATH 110.3, 116.3; PHYS 121.6.

Note: CMPT 111 can be substituted for AGRIC 290 and CHEM 302 can be substituted for AGRIC 291.

Third and Fourth Years (63 credit units)

Honours

AGRIC 494.6, BIOCH 200.3, 212.3, 220.3; CHEM 242.3, 243.3, 322.3, 332.3, 456.3; PL SC 314.3; 3 credit units of senior chemistry; 3 credit units of open electives approved by the faculty advisor; 24 credit units of electives from the list below, with at least 6 credit units from the 1st seven courses in the list below.

Majors

AGRIC 492.3; BIOCH 200.3, 212.3, 220.3; CHEM 242.3, 243.3, 322.3, 332.3, 456.3; PL SC 314.3; 6 credits units of open electives approved by the faculty advisor; 27 credit units of electives from the list below, with at least 9 credit units from the 1st seven courses in the list.

Electives (Honours, Majors)

AP MC 212.3, CHEM 353.3, 374.3, 375.3, 377.3; FD SC 415.3; PL SC 420.3; SL SC 313.3.

AGRIC 493.3; AP MC 434.3; BIOCH 300.3, 310.3, 311.3, 420.3; BIOL 202.3, 211.3, 217.3, 331.3; any senior chemistry or mathematics course; FD SC 323.3, 345.3, 412.3, 417.3; MECAG 421.3; PHSIO 212.6; SL SC 220.3, 312.3, 403.3.

AGRICULTURAL ECONOMICS

The objective of Agricultural Economics is to provide an understanding of current economic, social and environmental issues facing Saskatchewan and the world, and to look for practical solutions.

Second Year (33 credit units)

AGRIC 201.3, 291.3, AG EC 261.3, 272.3; ECON 211.3, 214.3; MATH 110.3 and 112.3, or 116.3 or 213.3 or 264.3 or ECON 305.3 or 306.3; STATS 245.3; Electives (6 credit units).

Third and Fourth Years (63 credit units)

Honours

Required Courses (39 credit units): AGRIC 222.3, 494.6; AG EC 315.3, 322.3, 342.3, 361.3; COMM 200.3 (or 204.3), 201.3,

203.3; ECON 404.6; one of PHIL 120.3, 133.3, 140.3, 235.3, 240.3, 241.3, 251.3, 262.3, HIST 254.3, 257.3, 258.3, 287.3, 288.3.

Restricted Electives (12 credit units): 400-level AG EC courses.

Electives (12 credit units) as approved by the Agricultural Economics Program Adviser.

Majors

Required Courses (33 credit units): AGRIC 222.3, 492.3, AG EC 315.3, 322.3, 342.3, 361.3, 461.3; COMM 200.3 (or 204.3), 201.3, 203.3; one of PHIL 120.3, 133.3, 140.3, 235.3, 240.3, 241.3, 251.3, 262.3, HIST 254.3, 257.3, 258.3, 287.3, 288.3.

Restricted Electives (12 credit units): 400-level AG EC courses.

Electives (18 credit units) as approved by the Agricultural Economics Program Adviser.

AGRONOMY

The Agronomy major integrates principles of crop production, soil management and economics. Students should find this program useful for future jobs in agricultural extension, business or farming. Graduates wishing to do postgraduate study in the Departments of Agricultural Economics, Plant Sciences or Soil Science should consult their program advisor regarding appropriate electives.

Second Year (33 credit units)

AGRIC 201.3, 290.3, 291.3; AG EC 302.3; AP MC 212.3; BIOL 202.3; MATH 101.3 and STATS 103.3 or 6 other credit units in mathematics or physics; PL SC 213.3; SL SC 240.3; 3 credit units from third year required courses.

Third and Fourth Years (63 credit units)

Required Courses (36 credit units): AGRIC 222.3, 492.3 or 493.3; AG EC 320.3; AN SC 212.3; BIOL 331.3; PL SC 301.3, 314.3, 330.3, 340.3, 418.3; SL SC 312.3, 322.3, 343.3.

Electives: (27 credit units): As approved by the Agronomy program advisor. Students may choose an 18 credit-unit minor in another specialization. Students interested in employment in the agriculture business sector should consider taking the Agri-business minor.

ANIMAL SCIENCE

Second Year (33 credit units)

AGRIC 201.3, 290.3, 291.3; AN SC 212.3; AP MC 212.3; BIOCH 200.3, 211.3; BIOL 211.3; PL SC 314.3; MATH 101.3 and STATS 103.3 or 6 other credit units in mathematics or physics.

Third and Fourth Years (63 credit units)

Required Courses (30 credit units): AGRIC 492.3 or 493.3; AN SC 313.3, 315.3, 340.3, 410.3, 420.3, 440.3; VT P 324.3, 325.3; 3 credit units in social sciences, fine arts or humanities.

Restricted Electives: 15 credit units from: AG EC 302.3, 320.3, 343.3; AGRIC 494.6, 498.3; AN SC 301.3, 333.3, 411.3, 470.3, 480.3; AP MC 425.3, 450.3; BIOCH 212.3; BIOL 202.3, 253.3, 263.3, 316.3, 351.6, 416.3, 424.3, 455.3, 472.3; COMM 101.3, 200.3 or 204.3, 201.3, 202.3, 304.3, 404.3; EDCNT 410.3, 420.3; EDPYSY 453.3; FD SC 457.3; HMT 411.3; MECAG 417.3; PHYS 111.6; PL SC 213.3, 322.3, 361.3, 405.3, 412.3, 418.3, 420.3, 423.3, 431.3, 434.3; SL SC 312.3, 470.3; VT AN 314.3; VT PA 412.3; VT P 425.3 or other courses as approved by the Animal Science program advisor.

Open Electives (18 credit units).

APPLIED MICROBIOLOGY

The Applied Microbiology specialization provides a broad background in the study of microbial activities and their application to agriculture, industry and the environment. It also provides an introduction to biotechnology and its accompanying techniques. Graduates are equipped for a wide range of technical and industrial positions related to agriculture, secondary food production and resource management.

Second Year (33 credit units)

AGRIC 201.3, 222.3, 290.3, 291.3; AP MC 212.3, BIOCH 200.3, 211.3, 212.3; MICRO 215.3; PL SC 314.3; 3 credit units from required third- and fourth-year AP MC courses listed.

Third and Fourth Years (63 credit units)

Honours

Required Courses (42 credit units): AGRIC 494.6; AP MC 425.3, 430.3, 433.3, 434.3, 435.3, 437.3, 450.3; MATH 110.3 and 112.3 or PHYS 111.6; MICRO 386.6, 421.3; SL SC 343.3.

Electives (21 credit units):

Approved minor stream: 18 credit units for minor plus 3 credit units from elective listed in non-minor stream following.

Non-minor stream: 12 credit units from: AGRIC 493.3; BIOCH 300.3, 435.3, BIOL 204.3; FD SC 412.3, 415.3 or 417.3, 452.3; HMT 411.3; MICRO 308.3, 309.3, 390.3, 391.3, PL SC 213.3; and 9 credit units of open electives.

Majors

Required Courses (36 credit units): AGRIC 492.3 or 493.3, AP MC 425.3, 430.3, 433.3, 434.3, 435.3, 437.3, 450.3; MATH 101.3 and STATS 103.3, or MATH 110.3 and 112.3 or PHYS 111.6; MICRO 386.6; SL SC 343.3.

Electives (27 credit units):

Approved minor stream: 18 credit units for minor; 3 credit units from elective listed in non-minor stream following and 6 credit units of open electives.

Non-minor stream: 18 credit units from: AGRIC 492.3 or 493.3; BIOCH 300.3, 435.3, BIOL 204.3; FD SC 412.3, 415.3 or 417.3, 452.3; HMT 411.3; MICRO 308.3, 309.3, 390.3, 391.3, 421.3; PL SC 213.3; and 9 credit units of open electives.

CROP SCIENCE

Second Year (33 credit units)

AGRIC 201.3, 290.3, 291.3; BIOL 202.3, 211.3, MATH 101.3 and STATS 103.3 or 6 other credit units in mathematics or physics; PL SC 213.3, 301.3, 330.3; SL SC 240.3.

Third and Fourth Years (63 credit units)

Honours*

Required Courses (45 credit units): AGRIC 222.3, 494.6; BIOCH 200.3, 220.3, BIOL 331.3, 345.3, PL SC 314.3, 322.3 (or 418.3), 340.3, 405.3, 411.3, 412.3 (or 417.3), 416.3, 420.3.

Electives (18 credit units): As approved by the Crop Science program advisor.

Emphasis can be obtained in genetics and biotechnology, physiology, crop protection, agronomy and grain chemistry.

Majors

Required Courses (39 credit units): AGRIC 222.3, 492.3 or 493.3; AG EC 343.3; BIOCH 220.3, BIOL 331.3, 345.3; PL SC 314.3, 322.3 or 418.3, 340.3, 405.3 (or 432.3), 411.3, 412.3 (or 417.3), 450.3.

Electives (24 credit units): As approved by the Crop Science program advisor.

Emphasis can be obtained in agri-business, extension, agronomy/crop production, crop protection, applied genetics and biotechnology.

*Students not officially admitted to Honours by the Dean of Agriculture by June 30, 2000 cannot take this program.

ENVIRONMENTAL SCIENCE

The objective of a major in Environmental Science is to provide an understanding of the relationships between environmental constraints and sustainable development, with an emphasis on prairie agriculture. The program is largely focused toward the agricultural and food sectors as they relate to the environment. The program does not provide education and training in all areas of environmental science.

Majors in Environmental Science will be required to complete an 18 credit-unit minor in an Agricultural specialization (including the Agri-Business minor, and the Agricultural Extension minor) and the core program requirements listed below. This will provide an interdisciplinary background in environmental science and focused training in an agricultural area of specialization.

Second Year (30 credit units)

AGRIC 201.3, 210.3, 290.3, 291.3; AP MC 212.3; MATH 110.3; PL SC 213.3; SL SC 220.3; 6 credit units of program electives (to be used primarily to fulfill prerequisites for upper year required courses in environmental science or to take courses in the area of specialization in environmental science or to take courses in the college minor).

Third and Fourth Years (66 credit units)

Required Courses (24 credit units): AGRIC 222.3 or PHIL 226.3; AGRIC 485.3, 492.3 or 493.3; AP MC 430.3; PL SC 301.3; STATS 245.3 or AG EC 261.3 or PL SC 314.3; ECON 275.3 (or 277.3) or AG EC

330.3 (or 430.3); GEOL 206.3 or GEOG 210.3.

Environmental Science Restricted Electives (18 credit units): As approved by the Environmental Science program advisor.

College Minor (18 credit units): As an integral part of the environmental science program students are required to select a minor in one of the fields of specialization in the college or select the Agri-Business minor or the Agricultural Extension minor.

Note: Courses taken to complete Environmental Science required or restricted electives cannot be counted towards the College minor.

Open Electives (12 credit units).

FOOD SCIENCE

The Food Science specialization emphasizes the application of the basic sciences to the food processing industry. This option prepares students for employment in the food processing industry, government or private research laboratories, or food regulatory agencies.

Second Year (33 credit units)

AGRIC 201.3, 222.3, 290.3, 291.3; AP MC 212.3; BIOCH 200.3, 211.3, 212.3; MATH 110.3, MATH 112.3 or 116.3; NUTR 120.3.

Third and Fourth Years (63 credit units)

Honours

Required courses (42 credit units): AGRIC 494.6; AP MC 425.3, 435.3; FD SC 345.3, 412.3, 415.3, 417.3, 452.3, 457.3; MECAG 421.3; PHYS 111.6; 3 credit units in statistics (senior level).

Restricted Electives (15 credit units):

AN SC 440.3; AP MC 434.3, 437.3; BIOCH 220.3, 310.3; CHEM 242.3; COMM 102.3, 204.3, 206.3; FD SC 323.3; PL SC 420.3.

Open Electives (6 credit units).

Majors

Required Courses (36 credit units): AGRIC 492.3 or 493.3; AP MC 425.3; FD SC 345.3, 412.3, 415.3, 417.3, 452.3, 457.3; MECAG 421.3; PHYS 111.6; 3 credit units statistics (senior level).

Restricted Electives: 21 credit units from: AGRIC 492.3 or 493.3; AN SC 440.3; AP MC 434.3, 435.3, 437.3; BIOCH 220.3, 310.3; CHEM 242.3; COMM 102.3, 204.3, 206.3; FD SC 323.3; PL SC 420.3, 461.3.

Open Electives (6 credit units).

HORTICULTURE SCIENCE

Second Year (33 credit units)

AGRIC 201.3, 290.3, 291.3; BIOCH 220.3; BIOL 202.3, PL SC 220.3; SL SC 240.3; additional credit units from required third and fourth-year courses listed to total 33 credit units.

Third and Fourth Years (63 credit units)

Honours*

Required Courses (42 credit units): AGRIC 222.3, 494.6; BIOCH 200.3; BIOL 211.3, 331.3, 345.3; PL SC 314.3, 340.3, 411.3; 18 credit units from: PL SC 430.3, 431.3, 433.3, 441.3, 450.3, 461.3, 470.3, 480.3; MATH 101.3 and STATS 103.3 or 6 other

credit units in mathematics or physics.

Electives (21 credit units): As approved by the Horticulture Science program advisor. Can be used to meet a minor in another specialization.

Majors

Required Courses (42 credit units): AGRIC 222.3, 492.3 or 493.3; BIOL 211.3, 331.3; PL SC 314.3, 340.3, 411.3, 430.3, 431.3, 433.3, 441.3, 450.3, 461.3, 470.3, 480.3; 6 credit units in mathematics or physics.

Electives (21 credit units): As approved by the Horticulture Science program advisor. Can be used to meet minor in another specialization.

*Students not officially admitted to Honours by the Dean of Agriculture by June 30, 2000 cannot take this program.

PLANT ECOLOGY

Second Year (30 credit units)

AGRIC 201.3, 290.3, 291.3; BIOL 202.3, 211.3; GEOG 111.3, 112.3; MATH 101.3 and STATS 103.3; PL SC 213.3.

Third and Fourth Years (66 credit units)

Required Courses (39 credit units): AGRIC 492.3 or 493.3; AP MC 212.3; BIOL 263.3, 323.3; PL SC 314.3; GEOG 321.3; PL SC 322.3, 361.3, 412.3, 423.3, 431.3; SL SC 220.3; 3 credit units in humanities or social sciences.

Electives (27 credit units): As approved by the Plant Ecology program advisor.

Students may choose to minor in another specialization.

RANGELAND RESOURCES

Second Year (30 credit units)

AGRIC 201.3, 290.3, 291.3; BIOL 202.3, 211.3; GEOG 111.3, 112.3; MATH 101.3 and STATS 103.3; PL SC 213.3.

Third and Fourth Years (66 credit units)

Required Courses (48 credit units): AGRIC 491.3; AN SC 212.3, 410.3; AP MC 212.3; BIOL 323.3, 424.3; GEOG 321.3; PL SC 314.3, 322.3, 412.3, 418.3, 423.3, 431.3, 434.3; SL SC 220.3; 3 credit units in humanities or social sciences.

Electives (18 credit units): As approved by the Rangeland Resources Program Advisor.

SOIL SCIENCE

The Soil Science program provides students with an in-depth understanding of the physical, biological and chemical processes that occur in the soil and the role of soils in plant production and environmental management.

Second Year (33 Credit Units)

AGRIC 201.3, 290.3, 291.3; AP MC 212.3; CHEM 231.3 or BIOCH 200.3; MATH 101.3 and STATS 103.3, or MATH 110.3 and 112.2 (or 116.3); PHYS 111.6; PL SC 213.3; SL SC 220.3 or 240.3.

Third and Fourth Years

Required Courses (42 Credit Units): AGRIC 492.3 or AGRIC 493.3 or AGRIC 497.6; one of ECON 114.3, 211.3, 213.2; one of ECON

275.3, 277.3, AG EC 330.3; GEOG 210.3 or GEOL 206.3; PL SC 301.3, 314.3; SL SC 312.3, 313.3, 322.3, 343.3; 9 credit units of 400-level Soil Science courses (including 3 credit units for AGRIC 497.6, if taken).

Electives (21 Credit Units) as approved by the Soil Science adviser. Students are strongly advised to complete an 18 credit unit Minor in another specialization.

SPECIALIZATION MINORS

Students may consider taking a minor. A minor consists of 18 credit units in a specialization outside the student's major. At least 12 credit units in the minor must be courses that are not specifically listed as required in a student's B.S.A. major.

Agribusiness

Required Courses: COMM 101.3, 201.3, 492.3.

Electives: 9 credit units from: AG EC 322.2 (or 320.3), 343.3, 420.3, 435.3; COMM 202.3*, 203.3*, 204.3* (or 200.3*), 205.3*, 301.3*, 303.3, 352.3, 354.3.

* Two of these five must be taken.

Agricultural Economics

Required Courses: AG EC 302.3 or ECON 211.3 or 213.3, AG EC 320.3, 343.3.

Electives: 9 credit units from: AG EC 330.3 (or 430.3), 432.3, 433.3, 434.3, 435.3; COMM 201.3; ECON 231.3.

Agricultural Extension (not available)

Required Courses: 400-level AGRIC capstone course in extension (to be developed); EDCNT 410.3, 420.3 or 400-level EDCNT course in program planning in agricultural extension (to be developed); EDCMM 404.3 or 470.3.

Electives: 6 credit units from: AGRIC 222.3; AG EC 432.3; EDCMM 404.3 or 470.3; EDPSY 453.3; SOC 204.3, 302.3, 308.3.

Animal Science

Required Courses: AN SC 212.3, 313.3, 315.3.

Electives: 9 credit units from: AN SC 333.3, 340.3, 410.3, 411.3, 420.3, 440.3, 470.3; HMT 411.3.

Applied Microbiology

Required Courses: AP MC 212.3, 435.3.

Electives: 12 credit units from: AP MC 425.3, 430.3, 433.3, 434.3, 437.3, 450.3; BIOL 204.3, 211.3, 342.3; FD SC 452.3; HMT 411.3; MICRO 308.3, 309.3, 386.6, 390.3, 391.3; SL SC 343.3.

Biotechnology

Required Courses: 6 credit units from each of Categories A and B below:

Electives: 6 additional credit units from Categories A or B below.

Category A: AG EC 292.3; COMM 345.3, 346.3; PHIL 236.3; SOC 292.3, 323.3.

Category B: AN SC 470.3; AP MC 425.3, 430.3, 433.3, 434.3, 435.3, 437.3, 450.3; BIOCH 212.3, 230.3, 311.3 (or MICRO 290.3), 436.3; BIOL 316.3, 420.3; BTECH 200.3*, 300.3*, 400.3*; PL SC 416.3; SL SC 343.3.

AGRICULTURE

*These courses can only be taken for B.S.A. degree credit with the signed approval of an official B.S.A. program adviser. Copy of approval must be sent to the Office of the Dean of Agriculture. Students who take other senior science courses with significant biotechnology content will not be allowed to take BTECH 200, 300 and 400 for credit.

Crop Science

Required Courses: PL SC 301.3, 330.3; 6 credit units from: PL SC 340.3, 345.3, 411.3, 416.3, 417.3, 418.3, 420.3, 432.3.

Electives: 6 credit units from BIOL 345.3; MECAG 309.3; PL SC 213.3, 322.2, 412.3; SL SC 240.3.

Environmental Science

Required Courses: PL SC 213.3; ECON 275.3 or 277.3 or AG EC 330.3 (or 430.3).

Electives: 12 credit units from: AGRIC 210.3, 222.3; PL SC 301.3; GEOG 210.3 or GEOL 206.3; SL SC 220.3.

Food Science

Required Courses: 12 credit units from: AP MC 212.3, 425.3; FD SC 345.3, 412.3, 417.3, 452.3, 457.3.

Electives: 6 credit units from: AP MC 435.3; FD SC 323.3, 457.3; MECAG 421.3; NUTR 120.3 or AN SC 315.3; PL SC 420.3, 461.3.

General Horticulture

Required Courses: PL SC 220.3 and 15 other credit units in horticulture science.

Fruit and Vegetable Production

Required Courses: PL SC 220.3, 441.3, 450.3, 461.3.

Electives: 6 credit units from: BIOL 345.3; PL SC 330.3, 340.3, 470.3.

Ornamental Horticulture

Required Courses: PL SC 220.3.

Electives: 15 credit units from: BIOL 345.3; PL SC 330.3, 430.3, 431.3, 433.3, 470.3, 480.3.

Mechanized Agriculture

Required Courses: 18 credit units from: MECAG 211.3, 212.3, 215.3, 309.3, 313.3, 319.3, 417.3.

Plant Ecology

Required Courses: PL SC 213.3, 412.3, 431.3.

Electives: 9 credit units from: BIOL 323.3; PL SC 322.3, 361.3, 423.3, 434.3, 462.3.

Poultry Science

Required Courses: AN SC 212.3, 315.3, 440.3, 480.3; VT PA 412.3.

Electives: AGRIC 492.3 (on a Poultry Science topic) and an additional 3 credit units in animal science.

Rangeland Resources

Required Courses: AN SC 410.3; PL SC 213.3, 322.3, 434.3 or (BIOL 424.3).

Electives: 6 credit units from: AN SC 212.3; BIOL 202.3, 323.3, 424.3; PL SC 418.3, 423.3; SL SC 220.3.

Soil Science

Required Courses: 12 credit units from 200- and 300- and 400- level SL SC courses.

Electives: 6 credit units from: additional 300- and 400- level SL SC courses, AG EC 330 (or 430.3) or 435.3, PL SC 340.3, 361.3 (or 322.3).

ACADEMIC REGULATIONS

For provisions governing examinations, students are referred to the *University Council Regulations on Examinations* section in the *Calendar* or to www.usask.ca/registrar/Current_Calendar/examregs/

For information on *College Regulations on Examinations*, students are referred to the college office.

For regulations on student appeals and academic dishonesty students are referred to the General Information section of the *Calendar* or www.usask.ca/university_council/reports.shtml

(1) **Admission Deficiency Removal:** All deficiencies in admission subjects must be removed before a student will be allowed to register for the second year.

(2) **Course Scheduling:** All first-year courses must be completed before a student will be allowed to register for third year.

(3) **Promotion Average Calculations:** A student's weighted average for a year's work is based on all courses attempted during the Regular Session. Intercession and Summer Session marks are not included. Attempted courses are defined as those continued beyond the last day for dropping courses without academic penalty. Term 1 marks in failed courses will be replaced by Term 2 marks for average calculation purposes, if the failed courses are repeated and passed in Term 2. Grades of ABF, INF, WF, and actual marks of less than 30% will be assigned a mark of 30% for average calculation purposes.

Where Academic Dishonesty has been proven, the actual grades assigned by the College Discipline Committee will be used in the calculation of promotion averages.

(4) **Minimum Regular Session Average Required for Promotion:** These provisions apply to all students who at any time during the September to April period are registered in 18 or more credit units of course work. Students not meeting the following averages will be Required to Discontinue.

a) Non-Probationary Students	Credit units to September of current year	Avg Req'd
	0 -21	57.0%
	24 -54	58.5%
	57 -126	60.0%
b) Probationary Students*		60.0%

*Defined as those who have not previously met the minimum average required for promotion or who have previously been advised or required to discontinue. (See Academic Regulations [7]).

Required to Discontinue (RTD1): Weighted sessional average less than the minimum annual promotion requirement. Have had

no previous faculty action at the university or any other post-secondary institution.

Penalty: Required to discontinue from the college for upcoming academic year (July 1 to April 30). Lose credit for courses in which a grade of less than 60.0% was obtained during the session the action was based upon. Acceptance of academic credit earned during a period in which a student has been required to discontinue is at the discretion of the college.

Required to Discontinue (RTD2): Weighted sessional average less than the minimum annual promotion requirement. Have had a previous faculty action by the university or any other post-secondary institution or are on probation.

Penalty: Required to discontinue from the college for upcoming academic year (July 1 to April 30). Lose credit for courses in which a grade of less than 60.0% was obtained during the session the action was based upon. Acceptance of academic credit earned during a period in which a student has been required to discontinue is at the discretion of the college. RTD2 students require special permission of the Dean of Agriculture to obtain readmission to the college. Should they re-apply for admission (through the Office of the Registrar) they must submit a letter explaining the reasons for their previous poor performance and indicating why they may do better if readmitted.

(5) **Enrolment in the Diploma in Agriculture Program While Required to Discontinue from the B.S.A. Program:** With the permission of the Coordinator of the Diploma in Agriculture Program, RTD students may be admitted to the Diploma in Agriculture Program without staying out a year.

(6) **Evaluation of Students with a Partial Load:** The records of partial students pursuing the B.S.A. degree will be evaluated for promotion purposes when a cumulative total of 18 credit units of course work has been attempted since the student started taking B.S.A. credit courses, or since the student's record was last evaluated, whichever is the later date. Failure to meet the applicable minimum annual promotion requirement will result in the student being required to discontinue. At the discretion of the Committee on Studies and Awards the previously unevaluated record of a student who has attempted less than 18 credit units of course work, may be omitted for purposes of calculating a cumulative weighted average if the student subsequently returns to the college and obtains a weighted average of 60.0% or higher on the next 18 credit units or more of course work attempted in a Regular Session.

(7) **Probationary Students:** A student is on probation in the first year of registration after failing to meet the minimum promotion average or after being advised or required to discontinue by the university or any other post-secondary institution. At the discretion of the Dean of Agriculture a student on probation may be required to discontinue attendance at the end of the first academic term if the student obtains a weighted average of less than 60.0% or has two or more failures in first term final

examinations. While on probation, the maximum course load is 30 credit units during the Regular Session. Students on probation are not eligible for supplemental examinations.

(8) **Promotion Regulations (Returning Students):** Students returning to the College of Agriculture after an absence of one year or more will be placed under the most recent promotion regulations in effect.

(9) **Curriculum Provisions (Returning Students):** A student returning to the College of Agriculture after an absence of five years or more will be placed under the curriculum requirements in effect, as of the date that the student is readmitted to the college.

(10) **Transfer Students and Advanced Standing:** For the purpose of determining the advanced standing for transfer students, all previous university-level courses attempted will be averaged and where the weighted average is less than 60.0% no credit will be granted toward the B.S.A. degree for those courses in which a grade of less than 60.0% was obtained. Regardless of advance standing granted, students must complete at least 30 credit units of approved senior course offerings while registered in the College of Agriculture.

(11) **Supplemental Examinations for Potential Graduates:** Supplemental examinations may be granted to students in their final undergraduate year (those with potential to graduate in May or October of that year) if the minimal promotion requirements have been met in that year, the mark in the failed course is 40.0% or better, and there is a final examination in the failed course(s). Supplemental examination results replace the previously failed grade(s) for average calculations. When a supplemental examination is granted the only part of the course being rewritten is the final examination. Other determinants (labs, mid-term tests, term papers, etc.) retain their original weight in computing the final grade for the course. Students must apply in writing to the Dean of Agriculture. Students on probation are not eligible to write supplemental exams.

(12) **Supplementals for Non-Graduates:** Supplemental examinations may be granted to students who are not in their final undergraduate year, in courses taught in the College of Agriculture and for which there is a final examination. To be eligible for consideration, the student must meet the minimum promotion requirements, the final mark in the failed course or courses must be 40.0% or better, and it must be shown that lack of a supplemental examination will cause extreme academic difficulty. Students wishing to obtain supplemental privileges under this provision must make application, in writing, to the Committee on Studies and Awards through the Dean's Office. For courses taught by other colleges, the supplemental examination regulations of those colleges will prevail, except that the College of Agriculture eligibility requirements must also be met. Students on probation are not eligible to write supplemental exams.

(13) *Maximum Course Loads*: A student will not be permitted to take more than a normal course load unless a weighted sessional average of 70.0% was obtained in the previous year. A normal course load is defined as 30 credit units for first-year students and 36 credit units for upper-year students.

(14) *Make-up Courses to Meet Degree Requirements*: A student who has completed 126 credit units for the B.S.A. degree but has a cumulative weighted average of less than 60.0% may take up to 18 additional credit units in order to remove this deficiency. The course(s) taken must be approved by the college in advance and only 6 credit units may be courses numbered 110 – 199. The other 12 credit units must be numbered 200 or greater.

(15) *No Repeat of Credited Courses*: A student who has credit for a course is not permitted to repeat that course to obtain a higher grade.

(16) *Limitation on Kinesiology Activity Courses*: A student may take a maximum of three credit units with the approval of the program advisors.

(17) *Appeal Procedures*: Students wishing to appeal decisions of the Committee on Studies and Awards must do so in writing to the Dean of Agriculture prior to June 30 of each year.

DEAN'S HONOUR ROLL

The requirement to make the Dean's Honour Roll is to be in the top 7% of the first-year, second-year or third-year class and to have a sessional weighted average of 75.0% or better on a minimum of 24 credit units of course work completed during the year.

ACADEMIC AWARDS TO GRADUATES

Students achieving high levels of academic performance will be awarded their B.S.A. degree as follows:

Cumulative Weighted Average:

70.00-74.99%

Major: No Academic Award
Honours: Honours (option)

75.00-79.99%

Major: Distinction
Honours: Honours (option) with Distinction

80.00% or better

Major: Great Distinction
Honours: Honours (option) with Great Distinction

Note: Honours students must pass an Honours Oral Examination.

SECOND DEGREES

Students pursuing two undergraduate degrees must consult with the Dean's office in each college to determine program requirements and to select courses which could be credited towards each degree.

SCHOLARSHIPS AND BURSARIES

All awards open for competition to Agriculture students are listed in detail in the *Awards Guides* available at the Office of the Registrar.

AGRICULTURAL STUDENTS' ORGANIZATIONS

The Agricultural Students' Association (A.S.A.) is the main student organization in the college. It was established to foster inter-college relations and to promote academic, athletic and social activities. Each year approximately 80 percent of all agricultural students are part of this organization. The A.S.A. acts as a liaison between members, the faculty and the university community. The A.S.A. supplies many services to its members, including an organized employment service, academic competitions and events, subsidized clothing, social events, and free intramural sports. Through the A.S.A. students can be introduced to more specific clubs in their areas of interest such as Rangelands Club, Agricultural Economics Club, Mechanized Agriculture Club, Horticulture Club, and Stockman's and Rodeo Club. Members of the A.S.A. also have the opportunity to be involved in the management and operations of student organizations and events. More information about these organizations can be obtained from the A.S.A. office, Room 1E04 Agriculture Building, telephone: (306)966-7742.

COURSE DESCRIPTIONS

See the General Information section of this *Calendar* for an explanation of the format used in course descriptions.

Not all courses listed below are offered every year. Students should consult with their B.S.A. program advisor and with the 1999/2000 Registration Guide.

AGRICULTURE COURSES

ACADEMIC COURSES

AGRIC 111.3 Agricultural Science I 1(3L-2P)

An introduction to agricultural systems illustrating the interactions between plant, animal, microbial, human and environment components. The soil/plant/environment interface is emphasized. Management decisions affecting cropping and land use are examined.

AGRIC 112.3 Agricultural Science II 2(3L-2P)

An introduction to agricultural systems and the interactions between microbial plant, animal, and human components. The emphasis is on issues and problems associated with animal production, value-added processing, marketing and the consumption of food.

AGRIC 201.3 Agricultural Systems 2(3L)

Prerequisite(s): AGRIC 111 and 112: or written permission of the Dean.

The nature of agricultural systems in Western Canada and throughout the world is explored through an examination of the physical, economic and social components of agricultural systems and their interactions. Emphasis is placed on understanding the functioning of agricultural systems, including why different agricultural systems have evolved and will continue to evolve in the face of change. Production, environmental, and socio-economic issues specific to different systems are discussed.

AGRIC 210.3 Environmental Physics 2(3L-3P)

Measurement and analysis of interactions between organisms or biomaterials and their physical environment. Transport and storage processes of matter and energy occurring within natural and human-modified agricultural environments will be studied. Lectures will cover concepts and applications while seminars and practicums will cover instrumentation and simulation.

AGRIC 222.3 Intellectual and Social Foundations of Modern Agriculture 2(3L)

Examines the role of scientific ideas, rational planning, industrialization, trade, the state, and ecology in shaping the structure of modern agriculture and the social-political environment within which it operates. Students will explore mainly European and North American history over the last 300 years to find the social, political, and economic conditions that have brought about the present situation in agriculture and which hold clues to options for the future.

AGRIC 290.3 Microcomputers in Agriculture 1/2(3L-6T)

An introduction to microcomputer hardware and software currently in use within the College of Agriculture. Software skills necessary in advanced agricultural courses will be covered. Course content and format will reflect the microcomputer systems utilized in the college.

AGRIC 291.3 Oral and Written Communications 1(1L-2P)

Provides instruction and practice in technical and professional writing and oral communication. Topics include preparation of a resume, memorandum, technical and business correspondence, formal and informal reports, speech organization, delivery, impromptu talks, group discussion methods, parliamentary procedures and use of audio-visual aids.

AGRIC 485.3 Environmental Science Capstone Course 2(1L-2P)

Prerequisite(s): Fourth year B.S.A. Environmental Science Major.

A project based course investigating global and local environmental issues. Students will investigate and synthesize information on topical environmental problems and present the results in class. The primary source of information will be the WWW so that skills involving the selection, acquisition, filtering and presentation of data together with critical thinking will be stressed. Concepts of system modelling will be introduced using Stella software.

AGRIC 492.3 Term Paper and Technical Writing 1&2

Prerequisite(s): For Agricultural Economics students: AG EC 315 (or 310), 342 (or 340) and 361 (or 362). Other students are asked to consult a program advisor in their area of specialization.

The first portion of the course is composed of lectures on writing to be given in the first seven meetings. In the second portion of the course the student will select a topic and be assigned to a professor for supervision. An acceptable typed copy of the term paper must be presented to the department.

AGRIC 493.3 Team Project in Agricultural Science 1&2

Prerequisite(s): Successful completion of 75 credit units towards the B.S.A. degree before registration.

Students will be assigned to small, interdisciplinary groups to address a current problem in agriculture. They will work closely with one or more faculty members or professionals in the private or public sectors to prepare a comprehensive written report. A final oral report may be required.

AGRIC 494.6 Research and Thesis 1&2

Prerequisite(s): Registered B.S.A. Honours students or special permission of a supervising department and a minimum cumulative weighted average of 70% or higher. For Agricultural Economics students, AG EC 315 (or 310), 342 (or 340) and 361 (or 362) are required.

A project is selected, in consultation with a faculty supervisor, which will provide an opportunity for the student to gain experience in literature review, collection, analysis and interpretation of primary or secondary data. The project results will be presented to the supervising department in the form of a bound thesis. In some departments a seminar presentation is required.

SPECIAL TOPICS

AGRIC 498.3

These courses are offered occasionally by visiting faculty and in other special situations. Students interested in these courses should contact the department for more information.

AGRICULTURE

CO-OPERATIVE EDUCATION

AGRIC 170.0

Work Experience 1

Prerequisite(s): Acceptance into the program.

AGRIC 270.0

Work Experience 2

Prerequisite(s): AGRIC 170.

AGRIC 370.0

Work Experience 3

Prerequisite(s): AGRIC 270.

AGRIC 470.0

Work Experience 4

Prerequisite(s): AGRIC 370.

AGRIC 570.0

Work Experience 5

Prerequisite(s): AGRIC 470.

AGRICULTURAL ECONOMICS

AG EC 261.3

Research Methods in Agricultural Economics 1(3L-2P)

An introduction to research methods in agricultural economics, and a survey of the various quantitative and qualitative tools commonly used in agricultural economics. Includes an introduction to economic data and the use of computers in data collection, included will be an introduction to sampling, survey design, and basic statistical inference. Data manipulation and methods for describing and displaying data will be covered. Course content will emphasize the computer skills necessary for advanced agricultural economics courses.

AG EC 272.3

Introduction to Agricultural Economics 2(3L-2P)

Prerequisite(s): AG EC 261 (or 262); ECON 211.

Demonstrates the practical application of the economic theory and technique developed in previous courses. On-going and published research is used to teach the step by step process of using economic theory to understand and analyze issues with which the discipline concerns itself. In addition, current issues and policies are selected to guide students through the process of translating an economic problem into a researchable question. Students will participate by defining their own research questions, selecting the appropriate theoretical framework, finding data appropriate to conducting an analysis, doing a simple empirical analysis, summarizing results and discussing implications of their research in the form of a paper.

AG EC 292.3

Economics of Biotechnology 1(3L)

Prerequisite(s): Completion of 30 credit units of University level courses.

Advances in scientific knowledge and technology are transforming the nature of economic growth and giving rise to new industries. This course examines the nature and organization of the biotechnology industry from the perspective of policy and economics. The primary focus will be on the agri-food system.

AG EC 302.3

Intermediate Agricultural Economics 1(3L-2P)

Prerequisite(s): ECON 111.

A study of production economics principles and their application to optimum resource allocation in agriculture followed by a study of the theory of consumer demand, market structures and pricing as they apply to agricultural conditions.

Note: Agricultural Economics students will not be allowed to take this course for credit.

AG EC 315.3 (Formerly 310)

Application of Microeconomic Theory to Agriculture 1(3L-2P)

Prerequisite(s): ECON 211; MATH 110 and MATH 112 or 116 or 213 or 264 or ECON 305 or 306.

A calculus treatment of microeconomic theory as it applies to optimal resource allocation in agriculture, individual consumer choice, and the behaviour of competitive markets.

AG EC 320.3

Introduction to Farm Business Management 1(3L-2P)

Prerequisite(s): AG EC 302 or COMM 101 or ECON 211.

The analysis and interpretation of basic farm accounting records and the use of this information in planning future farm decisions. Skills taught will include an analysis of financial statements, including ratio and trend analysis and projecting future farm business plans using budgeting and computerized tools.

Note: Agricultural Economics students will not be allowed to take this course for credit.

AG EC 322.3

Farm Business Management 2(3L-2P)

Prerequisite(s): ECON 211; COMM 201; COMM 203 and 200 or 204.

Analysis of farm business financial statements using ratio and trend analysis. Forward planning using capital budgeting and risk analysis techniques. Case studies will be used throughout the course.

AG EC 330.3 (Formerly 430)

Land Resource Economics 1(3L)

Prerequisite(s): AG EC 302 or ECON 211 or 213.

A study of natural resource economics with emphasis on environmental economics, measurement of non-market goods, project evaluation, issues in urban and rural land use, and conservation. Policy problems related to the foregoing will be examined.

AG EC 342.3

Industrial Organization of Agricultural Markets (Formerly 340) 2(3L-2P)

Prerequisite(s): AG EC 315; or permission of the instructor.

Describes the current structure of agriculture and changes currently taking place. Theoretical concepts such as oligopoly models, game theory, and transactions costs theory are developed. These theories are used to examine such issues as market concentration, spatial

competition, vertical integration, contracting, and agricultural research and development.

AG EC 343.3

Grain and Livestock Marketing 2(3L-1P)

A study of the Canadian grain and livestock marketing systems, procedures and institutions. Examines the price discovery methods used in grains and livestock marketing including: open (futures) market, marketing boards, teletype auctions, etc. Other topics include: the historical evolution of current marketing systems, marketing functions, government policy and regulation and market structure.

AG EC 361.3 (Formerly 362)

Intermediate Statistical Analysis 1(3L-2P)

Prerequisite(s): AG EC 261; STATS 245; or equivalent.

Focuses on analysis of agricultural management and marketing issues using statistical methods. Topics include: data collection, estimation, and test of hypotheses in regression analysis; use of binary variables and non-linear regression.

AG EC 420.3

Farm and Agricultural Business Operations Management 1(3L-2P)

Prerequisite(s): AG EC 322 or equivalent.

An introduction to the theory and practice of operations and financial management under risk and uncertainty. This consists of an examination of techniques and procedures which can be used by the manager and by the professional acting as consultant to the manager. Techniques reviewed include total farm budgeting, linear and quadratic programming and decision analysis.

AG EC 432.3

Rural Development: Theory, Policy and Case Studies 2(3L)

Prerequisite(s): ECON 211 and 214.

Focuses on the theories of rural development, a review of the rural development policies of federal and provincial governments and an analysis of various rural development projects. Comparisons are made at appropriate points between Canadian and U.S. policies and development programs.

AG EC 433.3

Methods of Rural Analysis: Theory and Application 2(3L)

Prerequisite(s): ECON 211 and 214.

The methods used in the analysis of rural economies, with particular emphasis on economic impact analyses, will be examined. Case studies utilizing these techniques will be reviewed and analyzed.

AG EC 434.3

Economic Methods of Project Analysis 2(3L)

Prerequisite(s): AG EC 302 or 315 (or 310), and ECON 214; or permission of the instructor.

Examines and illustrates various techniques to analyze the economics of an investment

project. Techniques covered include: benefit-cost analysis, input-output based impact analysis, computable general equilibrium models, and methods to deal with linkages between environment and development. Project analysis from a sustainable development perspective and multiple criteria methods for planning of projects are also included.

AG EC 435.3

Agricultural Finance and Appraisal 1(3L)

Prerequisite(s): AG EC 420 or COMM 203.

Study and application of economic principles in agricultural finance and capital investments analysis and farm real estate appraisal. Farm finance includes the study of financial management and agricultural credit. Farm appraisal includes a study of land values and the various approaches to the valuation and assessment of farm real estate.

AG EC 440.3

Agricultural Marketing Systems 2(3L)

Prerequisite(s): AG EC 315 (or 310) and 342 (or 340); or permission of the instructor.

Provides an understanding of how prices are discovered under alternative marketing systems in the Canadian agriculture and food industries. Price discovery mechanisms under open and regulated markets are examined including buyer-seller negotiations, futures and options, auctions and use of formulas and contracting. The performance of alternative systems is examined. The course introduces the additional subjects of information theory, institutional economics and contracting.

AG EC 451.3

Agricultural Problems and Policies 1(3L)

Prerequisite(s): AG EC 315 (or 310).

A review of the scope and character of problems affecting Western Canadian agriculture, and a study of the policies and legislation bearing on those problems. Students will be assigned special references for review and discussion and will complete a term assignment on a special phase of the course. Special emphasis is given to student participation.

AG EC 461.3

Agricultural Commodity Analysis 2(3L-2P)

Prerequisite(s): AG EC 361; or equivalent.

Deals with two basic approaches to analysis of agricultural commodities, including variables such as prices, outputs and sales. The first approach focuses on the causal relationships among economic variables, and the topics include supply-disposition analysis, regression analysis, and an introduction to econometric modeling. The second approach focuses on the time series characteristic of an economic variable and the topics include trend extrapolation, exponential smoothing and Box-Jenkins analysis.

ANIMAL AND POULTRY SCIENCE

AN SC 212.3 Livestock and Poultry Production 1(3L-2P)

The structure of the livestock and poultry industries. Principles, problems, and programs associated with production.

AN SC 301.3 Animal Production Tour 1(Summer Tour)

Prerequisite(s): AN SC 212 and permission of the instructor.

Introduces students to the diversity of animal agriculture and agri-business. Students will participate in a five day field trip that will cover traditional and exotic livestock production and marketing enterprises as well as food and feed processing facilities. Emphasis will be placed on exposing the student to livestock production conditions over the range of commercial operations found in Saskatchewan. Students will be expected to integrate information gathered from the field-trip into oral presentations and term reports with a goal of providing the student with background information necessary to complete upper year Animal Science courses. A special fee (approximately \$250.00) will be assessed to cover expenses.

AN SC 313.3 Animal Breeding and Genetics 2(3L-2P)

Prerequisite(s): BIOL 211; or permission of the instructor.

Qualitative and quantitative genetics applied to animal improvement. Principles and systems of selecting and breeding poultry and livestock. Introduction to genetic engineering in animals.

AN SC 315.3 Animal and Poultry Nutrition 1(3L-2P)

Prerequisite(s): BIOCH 200, 211; or permission of the instructor.

Lectures cover the principles of nutrition; the processes of digestion and utilization of foods and feeds; and the character, sources, function and requirements of the various nutrients. Laboratory work includes participation in laboratory analysis of feeds and practical nutritional exercises.

AN SC 333.3 Animal Environments 2(3L-1P)

Prerequisite(s): AN SC 212; or permission of the instructor.

An integrated approach to the needs of livestock and poultry confined in intensive husbandry systems. The relationship of physiology, behaviour and productivity to temperature, ventilation, light, pen and building layout to be discussed. A project involving the evaluation of animal facilities is required.

AN SC 340.3 Monogastric Animal Production I 2(3L-2P)

Prerequisite(s): AN SC 212; or permission of the instructor. AN SC 315 is recommended.

The classification, characteristics and processing of concentrate feeds as well as operating and management applications relating to swine production. Laboratory

exercises involve solving feeding and swine management problems. The course will also cover specialty feeds (pet food).

AN SC 410.3 Grazing Animal Production 1(3L-2P)

Prerequisite(s): AN SC 212; or permission of the instructor.

Provides senior undergraduate students with an understanding of the management, feeding and productivity of the breeding beef herd and horses. Includes both summer grazing and winter feeding management. Emphasizes the effect of climate on management and feed requirements; environmental impacts of grazing; stocking rates; plant palatability, preference and selection; nutritional behavior; nutrient cycling and energy flow; interactions with wildlife; ingestion of toxic plants.

AN SC 411.3 Behaviour of Domestic Animals 2(3L-2P)

Prerequisite(s): AN SC 212.

Deals with application of principles of animal behaviour to modern intensive management of domestic animals. Laboratory periods will emphasize research techniques and observation of animal behaviour.

AN SC 420.3 Intensive Ruminant Production 2(3L-2P)

Prerequisite(s): AN SC 212; or permission of the instructor. AN SC 315 and 340 are recommended.

Provides senior undergraduate students with an understanding of the management and feeding of ruminant animals housed under intensive farming operations. Includes forage production and storage principles, beef cattle feedlot operations and marketing, sheep and goat production, dairy cattle management and feeding as well as exotic ruminant production. Emphasizes animal management and feeding system design, ration formulation principles and product marketing with a goal to providing the student with a strong background in the basics of intensive ruminant production.

AN SC 440.3 Monogastric Animal Production II 1(3L-2P)

Prerequisite(s): AN SC 212; or permission of the instructor. AN SC 315 and 340 are recommended.

Review of poultry production systems with emphasis on breeding, housing and environmental control, feeding, disease prevention, and processing of meat and eggs. Lectures will integrate scientific principles with production techniques, relate management and nutrition to problems in and the economics of industrial production and highlight current issues. Laboratories will include tours of selected poultry facilities as well as projects in artificial incubation and hatching, management techniques for poultry and judging egg quality. Similar, but less extensive coverage, will be provided for Aquaculture production systems.

AN SC 470.3 Applied Animal Biotechnology 1(3L)

Prerequisite(s): AN SC 313; BIOL 211; VT P 324 and 325; or equivalent.

Covers reproductive technologies; transgenic techniques; molecular genetics in animal selection; use of recombinant proteins for growth, lactation and reproduction; immunological modulation of animal production; improvement of feeds and rumen organisms; improvement of health. In addition, ethical and safety aspects will be considered. Emphasizes the application and impact of biotechnological techniques on animal production.

AN SC 480.3 Poultry Feeds and Feeding 2(3L-2P)

Pertains to organs of digestion and the digestion of feeds, feedstuff evaluation and quality, nutrient requirements, and advanced management and problem solving with emphasis on feeding programs. Laboratory work will include ration formulation, a research project and tours of selected poultry operations.

APPLIED MICROBIOLOGY AND FOOD SCIENCE

APPLIED MICROBIOLOGY

AP MC 212.3 General Microbiology 1(3L-2P)

Prerequisite(s): BIOL 110; CHEM 111 and 251 (may be taken concurrently).

An introduction to the general biology of microorganisms with emphasis on those of economic and environmental importance. Microbial morphology, metabolism, growth and genetics; infectious disease and immunity; environmental microbiology and waste water treatment; agricultural microbiology; food and industrial microbiology. Laboratory practice in basic microbiological techniques and their application to the study of microbial activities.

Note: Students with credit for MICRO 214 may not take this course for credit.

AP MC 425.3 Food Microbiology 2(3L-2P)

Prerequisite(s): AP MC 212 or MICRO 214.

The relationship of microorganisms to the food supply: food spoilage, food-borne illness, and production of fermented foods. Emphasis is placed on techniques for isolating, enumerating, and identifying important food-borne microbes.

AP MC 430.3 Microbial Ecology 2(3L-3P)

Prerequisite(s): AP MC 212 or MICRO 214; AGRIC 290 or CMPT 100.

Introduction to the diversity of microorganisms and the dynamics of microbial interactions. Microbial biogeochemistry of specific aquatic and terrestrial ecosystems. Use of microorganisms in bioremediation and waste

treatment. Cultivation, analysis, and theory of microbial communities and consortia.

AP MC 433.3 Microbial Insecticides 1(3L-1T)

Prerequisite(s): AP MC 212 or MICRO 214 and permission of the instructor.

The use of microorganisms as biological insect pest control agents is a rapidly advancing area of biological, agricultural and environmental significance. Examines the microbiology and molecular biology of such pest control agents.

AP MC 434.3 Industrial Microbiology I 1(3L)

Prerequisite(s): AP MC 212 or MICRO 214.

A study of the microbiology and biotechnology of single cell protein and bakers' yeast production from surplus carbohydrates and petroleum, biochemistry of cell growth, production and usage of industrial enzymes, immobilized cells and enzymes, and microbial insecticides.

AP MC 435.3 Microbiological Techniques 2(3L-2P)

Prerequisite(s): AP MC 212 or MICRO 214 and permission of the instructor.

The theories and practical use of various microbiological techniques in industry and in quality control laboratories. Includes: media design and sterilization; enumeration and identification of bacteria; enzyme formation, extraction and usage for industrial purposes; filtration techniques; analysis of nutrient utilization, microbial cell components and fermentation parameters.

AP MC 437.3 Industrial Microbiology II 2(3L-1P)

Prerequisite(s): AP MC 212 or MICRO 214; Corequisite(s): BIOCH 211.

The principles of design and operation of fermentation equipment; aerobic and anaerobic fermentation processes leading to industrial chemicals, antibiotics, vitamins and amino acids with emphasis on biochemistry. Influence of biotechnology on the fermentation industry. Demonstrations, films, and field trips are included.

AP MC 450.3 Microbiology of the Rumen 2(3L)

Prerequisite(s): AP MC 212 or MICRO 214; BIOCH 211.

A detailed study of the microflora and microfauna indigenous to the rumen and of the role of the rumen microbiota in nutrition of the host animal.

FOOD SCIENCE

See Applied Microbiology and Food Science.

FOOD SCIENCE

FD SC 323.3 Food Additives and Toxicants 2(3L)

Introduction to the types of food additives currently used in the food industry and the

AGRICULTURE

function of these chemical compounds in foods will be presented. The safety of these additives and toxicological information will be discussed. The question of the addition of additives to foods versus 'natural' foods will be discussed, emphasizing the types and concentrations of 'natural toxicants' in foods.

FD SC 345.3 Food Processing I 2(3L-1P)

The fundamental principles of the common unit operations of food processing and preservation are discussed with emphasis on freezing, drying, evaporation and thermal processing operations. The operating principles of equipment utilized in these operations will be examined and selected processes of unit operations studied in detail.

FD SC 412.3 Fluid Food Products 1(3L-1P)

Introduction to the production and processing of milk, alcoholic beverages, carbonated and non-carbonated drinks, and other fluid food products.

FD SC 415.3 Advanced Food Chemistry 1(3L-4P)

Prerequisite(s): BIOCH 211.

Advanced study of chemical components in foods and of chemical reactions involving these components. Topics include carbohydrates, lipids, pigments, emulsions/emulsifiers, enzymes and browning reactions.

FD SC 417.3 Food Analysis 1(3L-4P)

Prerequisite(s): BIOCH 211 or CHEM 251.

Modern analytical techniques/instruments and their application to food analysis are presented and discussed. Basic principles, methodology, applications, sampling, accuracy and precision are discussed.

FD SC 452.3 Quality Assurance for the Food Industry 2(3L)

Principles of quality assurance as applied to the food industry. Topics include food regulations, analytical concerns, statistical quality control, sanitation, and the Hazard Analysis Critical Control Point (HACCP) quality assurance system.

FD SC 457.3 Food Processing II 1(3L-3P)

Fundamentals of Meat Science, including chemistry, processing and storage will be presented. The lipid component of foods will be discussed including a review of lipid chemistry, processing of fats and oils, and functional properties.

FD SC 490.0 Honours Seminar 1&2(1S)

FD SC 491.3 Research Project 1/2(3P)

Designed for students in the B.Sc.(Honours) program. For details see

the College of Arts and Science section of the *Calendar*.

MECHANIZED AGRICULTURE

MECAG 215.3 Agricultural Machinery I 1(3L-3P)

A study is made of machinery for grain production with reference to machine function, use, selection and operation. Included are basic mathematics and physics essential for problem solving. Machines studied are those used for tillage, seeding, chemical application, haying and for grain harvesting, handling, drying and conditioning.

MECAG 309.3 Water Management 2(3L)

Introduction to processes of water management with emphasis on the Prairie setting. Topics include: meteorology, hydrology, irrigation principles and practices, soil moisture, soil salinity, soil erosion, and snow management. Students actively participate in these discussions by preparing and presenting papers on selected topics. Designed for students who are not specializing in Mechanized Agriculture.

MECAG 411.3 Welding 1&2(3P)

Oxy-acetylene: study of the equipment for welding and brazing steel, cast iron and aluminum and of procedures for hard surfacing and flame cutting. Electric welding: A study of transformer and direct current welders and procedures for welding mild steel and aluminum and for hard surfacing.

MECAG 415.3 Agricultural Machinery II 2(3L-3P)

Prerequisite(s): MECAG 211, 212, 215.

A study of agricultural machinery with emphasis on functional requirements and features of design used to achieve these requirements. Topics include: design and selection of component parts, performance efficiency, cost studies, properties of materials and methods of fabrication.

MECAG 417.3 Agricultural Building Systems 1(3L-3P)

Building and farmstead planning for agricultural production, including systems analysis and materials handling. Functional requirements of space and environment are emphasized.

MECAG 421.3 Principles of Food and Feed Processing Equipment 2(3L-3P)

Studies basic systems used in food processing including facilities, power requirements, equipment for primary and secondary processes. The specific unit operations and equipment studies include pumps and blowers, heat exchangers, drying, freezing, absorption, distillation, size reduction, and mixing. Discusses materials

of construction for food process equipment and the layout of plant equipment.

SPECIAL TOPICS

MECAG 498.3

These courses are offered occasionally by visiting faculty and in other special situations. Students interested in these courses should contact the department for more information.

PLANT SCIENCES

PL SC 113.3 Introduction to Soils and Horticulture 1(3L)

Introduction to general characteristics of soils and some of the processes and relationships associated with them. The horticultural portion includes an introduction to the various areas in horticulture, the growth and development of various horticultural crops and the effect of various environmental conditions. Numerous horticultural practices will also be demonstrated.

Note: Non-credit for B.S.A. students.

PL SC 213.3 Principles of Ecology 2(3L-3P)

Designed for students in the College of Agriculture. It considers the nature of ecosystems and of processes associated with energy flow and material cycling within them. Particular attention is given to ecosystems of Western Canada and the effect that man exerts on them, especially through agricultural practices.

Note: Students with credit for BIOL 253 may not take this course for credit.

PL SC 220.3 Fundamentals of Horticulture 1(3L-2P)

Prerequisite(s): BIOL 110.

An introduction to the economic, nutritional and aesthetic value of horticulture emphasizing its importance and impact. Consideration is given to vegetable, fruit, turfgrasses, nursery, and greenhouse production as well as landscaping, herbs, spices and forestry. Emphasis is placed on Saskatchewan production in relation to regional, national and international markets. Laboratories consist of field trips and hands-on exercises.

PL SC 301.3 Principles of Agronomy 2(3L)

Ecological factors affecting production of field crops, with particular reference to the Canadian prairies. The physical environment. Adapting crops and management practices to the environment. Soil and water conservation.

PL SC 311.3 General Apiculture 2(3L)

Introduction to the science and practice of beekeeping. Subjects include the morphology and physiology of the honey bee, beekeeping equipment, manipulation of bees, swarm control, increase, honey production, bee diseases and wintering.

PL SC 314.3 Statistical Methods 1/2(3L-2P)

An introduction to statistical methods and their application to experiments. Includes probability, means and variances, "t" tests, analysis of variance, experimental designs, simple regression and correlation, and chi-square tests. Designed for students in the biological sciences.

PL SC 322.3 Rangeland Resource: Ecology and Management 1(3L-2P)

Prerequisite(s): BIOL 253 or PL SC 213 is strongly recommended.

Emphasizes principles of managing rangeland to ensure productivity and multiple-uses. Inventory, evaluation and planning for multiple-use management. Plant morphology and physiology, palatability, energy flow, nutrient cycling and the hydrologic cycle are integrated and discussed in relation to impacts of grazing on the soil-plant-animal system.

PL SC 331.3 World Crops 2(3L-1P)

A study of the origin, botany, distribution, production and utilization of the world's major cereal, pulse, oil, sugar, fiber and beverage crops. Some industrial and medicinal crops will also be discussed.

PL SC 332.3 Horticulture Entomology 1(3L-3P)

Prerequisite(s): BIOL 110; or permission of the instructor.

Introduction to insect problems of horticultural crops. This involves a practical emphasis on problem diagnosis and some consideration of subsequent management in an ecological context. The diagnosis and management of insect problems are specifically oriented towards vegetable, fruit, and ornamental crops in commercial fields, protected environments, recreational areas and gardens.

Note: Students planning to enrol in this course are expected to make a collection of at least 30 examples of horticultural insect pests and associated damaged plant material during the summer preceding the class. The instructor must be contacted the preceding spring for details.

PL SC 340.3 Weed Biology and Ecology 1(3L-2P)

Prerequisite(s): AGRIC 111; AGRIC 112; or at least one 200-level botany course (e.g., BIOL 202 or 205).

Growth, reproduction and spread of weeds, influence of agronomic and edaphic factors on weed community structure, weed-crop competition, and biological and mechanical control of weeds. Concludes with a discussion of the use of combined control methods (biological, mechanical and chemical) in integrated weed management.

**PL SC 345.3
Biological Activity and Fate of
Herbicides
2(3L-2P)**

Prerequisite(s): CHEM 251; PL SC 340; or permission of the instructor.

The use of herbicides for weed control, factors affecting herbicide activity and fate of herbicides in the environment are discussed. Includes the biological activity of soil and foliar applied herbicides, herbicide modes of action and resistance, and dissipation of herbicides in soil. Herbicide registration, environmental legislation and residue tolerance levels in various products are also discussed.

**PL SC 361.3
Agricultural Meteorology
2(3L-3P)**

A study of atmospheric processes as they affect organisms of agricultural importance. Emphasis is placed on the physical factors that make up the agricultural environment. Includes weather processes, energy and mass exchange, agricultural climate indices and crop forecasting, water management, and microclimate modification.

**PL SC 405.3
Evolution and Population Genetics
2(3L-2P)**

Prerequisite(s): BIOL 211.

A discussion of the roles of mutation, recombination, selection, hybridization, polyploidy and reproductive isolation in the micro-evolution of living organisms. Basic population genetic theory is one means used to illustrate these roles.

**PL SC 411.3
Plant Breeding
1(3L-2T)**

Prerequisite(s): BIOL 110 and 202; PL SC 314.

Introduces the principles of genetics and plant breeding. Tutorials involve topic discussion and problem solving.

**PL SC 412.3
Physiological Plant Ecology
1(3L-3P)**

Prerequisite(s): BIOL 253 or PL SC 213.

Studies the physiological basis for the interaction of the individual species with its environment. Includes the energy environment of the plant and how temperature, light, water status, soil conditions, etc. affect plant function and distribution.

**PL SC 416.3
Applied Plant Biotechnology
2(3L-2P)**

Prerequisite(s): BIOCH 220; BIOL 202 and 211.

Introduces techniques of biotechnology which have the potential to be utilized in plant improvement. Includes wide hybridization, cytoplasmic male sterility, tissue and cell culture, protoplast fusion and gene transfer at the DNA level.

**PL SC 417.3
Crop Physiology
1(3L-3P)**

Prerequisite(s): BIOL 331.

An outline of interrelationships between physiological activity and crop growth with emphasis on energy conversion and analysis of autotrophic growth in an

agronomic environment. Germination, growth integration, flowering and senescence are also to be considered. Physiological responses to environmental stresses such as water, temperature, salinity, nutrients and disease are related to crop productivity.

**PL SC 418.3
Management of Arable Grassland
2(3L)**

Physiology and growth analysis of the more important pasture species. Effect of climate, soil type and fertilizers on yield. Influence of grazing on composition and yield. Establishment and maintenance of temporary, short rotation and permanent pasture. Irrigation in pasture management. Weed control. Plot techniques used in pasture analysis.

**PL SC 420.3
Grain Chemistry and Technology
1(3L)**

Chemical composition, processing and utilization of the principal starch, sugar, oil, protein and fiber crops of the world. The effects of variations in seed characteristics and composition on the quality of the final food, feed and industrial products is emphasized.

**PL SC 423.3
Landscape Ecology and Vegetation
Management
2(3L-2P)**

Prerequisite(s): BIOL 253 or GEOG 270 or PL SC 213; or permission of the instructor.

Current theories relating to structure, functioning, and composition of landscapes and human impacts on natural ecosystems, landscape-level processes and patterns, and succession. Developing management plans for natural and remnant landscape elements, and inducing successional changes, and monitoring impacts will be covered. Field trips will be required.

**PL SC 430.3
Ornamental Plants
1(3L-2P)**

Prerequisite(s): PL SC 220.

Studies the identification of ornamental trees, shrubs, perennials, biennials, and annuals commonly grown in Saskatchewan. Consideration is also given to culture, propagation and use.

**PL SC 432.3
Conservation of Plant Genetic
Diversity
1(3L-2P)**

Prerequisite(s): BIOL 110.

Introduction to the ecological, environmental and genetic aspects of diversity in plants. Factors affecting diversity in agricultural and horticultural species and their wild relatives. Global efforts to conserve biological diversity and their consequences will be critically reviewed.

**PL SC 433.3
Greenhouse Structures and Crops
2(3L-2P)**

Prerequisite(s): PL SC 220.

Review of greenhouse construction and plant operation. The commercial production, timing, harvesting, diseases and pests of floriculture crops are discussed.

**PL SC 434.3
Range Ecosystems and Plants
2(2L-4P)**

Prerequisite(s): BIOL 253 or PL SC 213; BIOL 323 or 424; PL SC 322; or permission of the department.

Identification, ecology, management and importance of major rangeland ecosystems and their plants in Western Canada and United States. Emphasizes the identification, management considerations, habitat and forage value for wildlife and livestock, uses in ecosystem restoration. A collection of 100 plants is required and must be made by each student the summer before taking the course.

**PL SC 435.3
Landscape Design
2(2L-2P)**

Prerequisite(s): PL SC 220 and 430; or permission of the instructor.

An introduction to the principles and practices of landscape design. A variety of landscape settings are considered with emphasis on residential properties.

**PL SC 436.3
Wildland Ecology
1(3L-3P)**

Prerequisite(s): BIOL 253 or PL SC 213.

Designed to instruct the advanced student in ecological principles and problems pertaining to the vegetated landscapes of non-agricultural areas, particularly Canada's forests, peatlands and tundra. Laboratory periods will emphasize familiarization with Canada's wildland regions and the application of ecological methods in their study.

**PL SC 441.3
Advanced Fruit Growing
2(3L-2P)**

Prerequisite(s): PL SC 220.

Fundamentals of commercial fruit production including environmental adaptation, breeding, site development, marketing, cultural management, tree fruits, small fruits, tropical fruits, harvesting, diseases and pests.

**PL SC 451.3
Advanced Vegetable Growing
1(3L-2P)**

Prerequisite(s): PL SC 220.

Principles of production and management of vegetable crops are reviewed with illustrations from contemporary research literature. The content is focused on crops, production situations and limitations encountered in Saskatchewan. Local field trips are planned.

**PL SC 452.3
Current Issues in Crop Science
2(3L)**

Prerequisite(s): PL SC 301, 330, 340, 411, 418.

Designed to ensure that graduates in crop science are familiar with the current issues and problems in the field of their specialization and are aware and knowledgeable of recent technological advances. Topics will vary from year to year but in all cases will relate to practical aspects of crop productivity.

**PL SC 461.3
Post-Harvest Management of HORT
Crops
2(3L)**

Prerequisite(s): PL SC 220; or permission of the department.

Principles of storage and handling of horticultural crops are reviewed with illustrations from contemporary research literature. Physiological processes underlying management practices are examined. The focus is on commodities and practices of local importance.

**PL SC 462.3
Plants and Microclimate
2(3L-3P)**

Prerequisite(s): PL SC 361 (or GEOG 233 or PHYS 322) or AGRIC 210; PHYS 111; or permission of the instructor.

A treatment of the physical basis for the interactions between plants and their atmospheric and edaphic environments. The main emphasis will be placed on the study of the exchange of radiation, heat and matter between the environment and individual leaves, soil surfaces and, particularly, plant communities.

**PL SC 470.3
Plant Propagation and Nursery
Management
1(3L-2P)**

Prerequisite(s): PL SC 220.

The principles and the commercial practices of multiplication of plants by seeds and asexual methods, cultural practices, storage and sale station operation. Local field trips are planned.

**PL SC 480.3
Turfgrass Culture
1(3L)**

Prerequisite(s): PL SC 220.

The principles of environmental effects and the management practices involved in the production and maintenance of refined turf for landscape and athletic purposes. Local field trips are planned.

SPECIAL TOPICS

PL SC 398.3

These courses are offered occasionally by visiting faculty and in other special situations. Students interested in these courses should contact the department for more information.

SOIL SCIENCE

**SL SC 220.3
Environmental Soil Science
1(3L-2P)**

Prerequisites: AGRIC 111 or GEOG 111 and 112 or GEOL (6 credit units).

Focuses on soils as an integrator of a broad range of environmental processes and as a critical component in human-induced environmental change. Major topics include the influence of the environment on soil formation; local, regional and global scales of soil formation; and the physical, chemical, and microbial/biochemical soil processes of relevance to environmental science.

Note: Students with credit for SL SC 240 may not take this course for credit.

AGRICULTURE

SL SC 240.3 Agricultural Soil Science 1(3L-2P)

Prerequisite(s): AGRIC 111 and 112.

Introduces the student to the major areas of soil science and develop an understanding of how soils influence crop production, with special emphasis on fertility management and cropping systems in Western Canada. Pertinent chemical, physical, and biological processes in soil will be discussed in relation to their role in crop production. The impact of agricultural activities on the soil resource will also be examined.

Note: Students with credit for SL SC 220 may not take this course for credit.

SL SC 312.3 Soil Fertility and Fertilizers 1(3L-2P)

Prerequisites: SL SC 220 or 240.

The forms, flows, and transformations of plant nutrients in soils are examined, with emphasis on Western Canadian agricultural systems. The fate of applied fertilizers is stressed, especially as to how agronomic practices affect the utilization of soil and fertilizer nutrients by plants. Techniques for soil fertility evaluation and the development of suitable fertilizer recommendations are covered, along with approaches to fertilizer application. The relationship of nutrient cycling in soil-plant systems to global nutrient cycles is considered.

SL SC 313.3 Soil Chemistry and Mineralogy 1(3L)

Prerequisite(s): CHEM 111 and 251; SL SC 220 or 240.

The lectures and reading assignments cover the structural and chemical properties

of major soil components and the principles of soil chemical equilibria and kinetics in soil solution and surface chemistry in relation to pedogenesis and physical, chemical and biological properties of soils and environmental protection.

SL SC 322.3 Applied Soil Physics 1(3L-3P)

Prerequisites: SL SC 220 or 240.

Aims to give students an understanding of the physical properties of soils, their effects on the use of the soil, and the management of these properties. Topics include a discussion of the solid, liquid, and gaseous phases of the soil and the interactions between the phases, the movement of water, air, and heat in soils, and the effects of these on plant growth. The laboratory involves the measurement of selected properties and their interpretation.

SL SC 332.3 Soil Genesis and Classification 1(3L)

Prerequisite(s): SL SC 220 or 240.

Deals with soil systems and their environments from the perspective of soil development and soil classification. Attention is given to the biotic, geological and physical factors that influence soil formation, and the response of soils to altered environments. The primary emphasis is on Canadian soils and classification, with significant attention to global soils. Soil survey and land evaluation is included. A one-day field trip takes place early in the term.

SL SC 343.3 Soil Microbiology 2(3L-3P)

Prerequisite(s): AP MC 212 or MICRO 214.

Lectures and reading assignments stress microbial population dynamics and activity in soils. The role of soil microorganisms in nutrient cycling and their effects on plant growth are discussed. Introduction to contemporary research problems in soil microbiology. Lab work illustrates and complements the lectures.

SL SC 403.3 Environmental Soil Analysis 2(2L-3P)

Prerequisite(s): SL SC 313; or permission of the instructor.

Focuses on theoretical and practical aspects of soil analysis pertinent to current environmental issues. Principles of soil sampling in environmental analysis and principles of chemical analysis in soil and environmental science will be covered. The laboratory is designed for students to acquire practical skills in sampling and analysis of soils and in the interpretation of the data.

SL SC 412.3 Integration and Application of Soil Science 1(2L-3P)

Prerequisite(s): 12 credit units of 300-level soil science courses; or permission of the instructor.

Integrates soil science principles and applies these principles to agronomic and environmental problems. Focuses on the field techniques used in soil and land resource science and on the use of Geographical Information Systems and related techniques in the analysis of field and laboratory data. The specific

techniques taught in the course will be applied to current agronomic and environmental issues.

SL SC 460.3 Forest Soils 1(3L)

Prerequisite(s): SL SC 332; or permission of the instructor.

Forest soils and forestry practices are discussed, with emphasis on boreal soils. Attention will be given to forest soil development, forest land capability and the effects of management practices (harvesting, fertilization, and site preparation) on soil properties. Interrelationships among natural occurrences (fire), nutrient and carbon cycling and environmental concerns will be examined. A three-day field trip takes place early in the term.

SL SC 470.3 Evaluation of Land Resources 1(3L-2P)

Prerequisites: SL SC 332; or permission of the instructor.

Provides students with a broad background in the principles and practice of land evaluation. Special emphasis will be given throughout the class on the use of soil resource survey information in land management. Specific evaluation systems for forestry and agricultural applications in Western Canada will be examined. The use of Geographic Information Systems in land evaluation will be discussed and students will use this technology to complete a major assignment in the class.

For descriptions of courses given by other colleges, please refer to the appropriate section of the *Calendar*.