

# **PROPOSED CURRICULUM FOR RANCH MANAGEMENT AT MONTANA STATE UNIVERSITY**

Prepared for:

The Rural Landscape Institute

Prepared by:

Scott G. Hibbard  
Scott G. Hibbard Ranch Management, Inc.  
P.O. Box 835  
Helena, MT 59624  
406-442-1805  
[scotthibbard@qwestoffice.net](mailto:scotthibbard@qwestoffice.net)

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## Introduction

This report proposes a curriculum for a Certificate of Ranch Management, and a curriculum for a Bachelor of Science in Ranch Management, at Montana State University (MSU). This report is a follow-up to a report titled "University Education in Ranch Management," prepared for The Rural Landscape Institute (formerly The Cook Center for Sustainable Agriculture in the American West), dated May 26, 2006.

Central to understanding the difference between the Certificate and the Bachelor of Science degree are the duties and responsibilities with which the manager is charged. The Certificate is designed for one level of responsibility, and the B.S. degree for another. As stated in the Rural Landscape report:

Delineation can be made between degrees, or levels, of ranch management. There are three basic levels:

1. *Ranch foreman.* A hands-on manager who plans, leads, and does daily work activities, including fencing, irrigating, livestock movement, haying, facility maintenance, mechanical repair, etc. Responsibilities include developing and implementing weekly work plans, timely communication with the ranch owner or manager, and employee management (hiring, firing, motivating, and supervising). The ranch foreman works for an owner or ranch manager who is responsible for general business management.
2. *Ranch manager.* Responsible for general business management, including developing personnel policies, marketing, budgeting, annual ranch operations plans, bookkeeping, enterprise analysis, etc. Depending on the size of the ranch and the scope of its activities, the ranch manager may participate in, and be responsible for, certain daily or seasonal hands-on ranch work. There are several levels, or roles, a ranch manager can fill depending on the ranch managed:
  1. Manage a ranch for an absentee owner.
  2. Manage a ranch for the family, of which the ranch manager is a member.
  3. Manage a ranch for himself/herself as owner.

Although the responsibilities vary with each of these roles, for the purposes of this report they will be lumped together under the title of "ranch manager."

3. *Working ranch manager.* On some ranches, the manager fills the role of foreman and manager. This may be the case with smaller ranches

owned by absentee owners, or smaller ranches owned by the working ranch manager.

This distinction is central to defining the differences between the Certificate and the B.S. degree. The Certificate is geared to the ranch foreman, and the B.S. degree is geared to the ranch manager and working ranch manager.

This report revises the curriculum proposed in the author's earlier report to The Rural Landscape Institute. Generally, the primary changes are:

- The proposal for splitting credits between the Certificate and the degree programs was discarded as unworkable and confusing, and as not well suited to the purpose of a Certificate program.
- The Certificate program was more closely modeled after the Certificate of Ranch Management offered by the Ranch Management Program at Texas Christian University (TCU). The purpose of the Certificate is to more adequately address the needs of the student who will perform the duties of a ranch foreman.
- Consistent with its mission to provide a liberal arts education, Montana State University requires a core curriculum, known as CORE 2.0. The curriculum presented in this report for a B.S. degree in Ranch Management stipulates which courses will be taken to fulfill most of the CORE 2.0 requirements.
- Many courses in the current curriculum offered at MSU in the Department of Range Science were incorporated into the Certificate program. To be relevant to the ranch foreman, the assumption is that those aspects of selected courses which are directly relevant to this purpose would be used. Course content not useable by the hands-on practitioner would not be taught in the Certificate program.
- Two 400-level seminars were added to the B.S. degree: Case Studies in Ranch Management, which would explore different issues and problems facing different ranches; and Culture and Agriculture, which would examine ranching in a broader social context.
- Skills like horse training and stockmanship were not included in the earlier curriculum. The revised curriculum allows for exposure to these skills at the Certificate level. Not all students will have had suitable introduction to these skills. Providing that introduction would be an appropriate function of the Certificate program.

Who the customer is (student, employer), what the customer wants (practical, employable education), what the customer needs (skills appropriate to different levels of management), and what the desired outcome is (capable ranch managers for today's world) were paramount in designing the curricula.

## **Certificate of Ranch Management**

The Certificate program consists of ten required courses and six electives, from which the student will select three, for a total of thirteen courses worth 36 credits (see Appendix A and Appendix B).

Similarities with the program at TCU are:

- A program covering one academic year (in the MSU program, two semesters plus a one-month "minimester" of Spanish).
- Full-day class instruction (when not on field trips), five days per week, Certificate classes only.
- Field trips, varying in length from one day to one week.
- The Certificate is either stand-alone or part of a Bachelor of Science in Ranch Management.

Like the program at TCU, the Certificate program covers the basics in ranch management and ranch operations. Topics covered in management include: basic computer use in ranching, finance and financial statements, business law, ranch records, communications, personnel management, law, and accounting. The goal is not to train the student to be an expert in any of these fields. Obviously, that is time prohibitive. Rather, the goal is to expose the student to business basics as they pertain to ranching.

Topics covered in ranch operations include: livestock nutrition and health, plants and soils, range management, cattle management, reproduction, crop production and forestry. Included in these will be hands-on veterinary skills as practiced by most ranchers, tillage practices, livestock handling (stockmanship), assessing bovine body condition and frame score, range monitoring, and other practical skills.

Also like TCU, extensive field trips to different ranching operations in different geographies would be integral to the program. Consistent with the emphasis on practical application of knowledge, field trips allow the student to see classroom information and ideas applied in working operations. It is important for a ranch foreman to be receptive to new ideas, particularly given the speed of change in today's world.

Visits to operations as different as a large-scale, commercial cow-calf operation geared to producing feeders for Midwest feedlots, and a family operation raising organic products for local markets, could do much to foster an open-minded attitude to ranch operations.

A variation on the field-trip theme would be to bring an off-campus instructor to the classroom to present a workshop if a field trip is not appropriate or the best use of time. For instance, a clinician who teaches low-stress stockmanship may present a workshop, covering several days, for Certificate students at MSU.

Although the Certificate program proposed for Montana State University is based on that offered through Texas Christian University, it is different in a number of respects. These are:

- A one-month immersion in Spanish.
- Course work addressing hands-on basics in mechanics, plumbing, electrical repair, and construction.
- Electives to allow the student to tailor a course of study to better his/her needs or interests.
- Course content designed for ranches at northern latitudes in the West.
- Total credit hours of 36 instead of 34, reflecting the addition of one-month of Spanish.

Unlike the program at TCU, electives are allowed. Electives allow the student to study bison management, sheep and goat management, equine management, fisheries and wildlife, meats, marketing, and hospitality services. Some of the Certificate students might expect to run a bison ranch. Others might see a place for sheep and goats in weed control. Others might see themselves managing a ranch for an outside owner whose primary concern is a high quality fishery, habitat that would host trophy elk and mule deer, and well-maintained buildings and grounds. Given the trends in ranch ownership in Montana and neighboring states, given the goal of producing readily employable ranch managers, and recognizing that many new ranch owners have interests different from traditional ranch owners, it is assumed that the Certificate program should address these interests. Electives serve that purpose.

Given the increasing difficulty ranchers face in finding capable, local ranch labor, and given a labor force that is willing and able which is primarily Hispanic, some familiarity with Spanish is required. To address this, a one-month immersion in Spanish was added. The student should learn enough Spanish for simple, spoken communication with laborers. A “minimester” between the fall and spring semesters, requiring immersion in Spanish for six to eight hours per day, could well suit this requirement. If

this is not practical, a one-month summer program would suffice. The focus would be on Spanish as spoken by Hispanic labor force as seen in agricultural operations in the U.S.

Much of the course content in the Certificate program is drawn from courses offered in the Department of Animal and Range Sciences. However, the Certificate program offers none of these courses in its entirety. Elements from many are used with the idea of giving the student what the student will need. A key focal point is to direct the program to the needs of its students. In this case, those needs focus on daily, hands-on ranch operations. Many of these students would not find the science behind the subject to be useful. The goal is to teach the “how-to” rather than the “how come.”

Issues that need to be addressed to further define a Certificate program include:

- When the Certificate program should be completed (prior to junior year? Senior year? Does it matter?).
- Class size, presumably capped at a number manageable in a prescribed curriculum, where all students attend each class (electives excepted).
- When students can begin the program (begin at any semester or trimester, or fall semester only?).
- Where the program will be housed (a dedicated classroom to be used exclusively by Certificate students, with other classrooms available for electives?).
- How electives will be incorporated into the program. For instance, if four electives are offered in the spring semester as proposed, whether it is feasible or practical for the university to staff each elective, particularly if there are fewer than ten students per course.
- Whether credits will be offered for each course, or for each semester, or for the program as a whole, and whether 36 credits is the right number.
- To what extent the Certificate of Ranch Management at TCU should be used as the model for a program at MSU. Specifically, should a Ranch Management Program be established at MSU to administer the Certificate program, and should there be a dress code?

## **CORE 2.0**

MSU requires 30 credits in its core curriculum, required of all students graduating with a Bachelor degree. The university stipulates a number of categories which must be satisfied (see Appendix C, Core Curriculum). These include university seminar, diversity, college writing, quantitative reasoning, and so forth. With the exception of College Writing I, the university does not stipulate which course a student will take in any of these categories. The curriculum proposed in this report, however, stipulates specific courses that must be taken to satisfy all but 9 of 30 core credits required.

This approach may not be consistent with university policy. These courses were proposed because of their relevance to a ranch management curriculum. With the exception of the ARNR course requirement (see Appendix B, CORE 2.0 Courses), the proposed courses would be applicable to a broad array of majors.

Of the two seminars proposed for the B.S. in Ranch Management, one was assumed to be appropriate to fill the humanities requirement (Culture and Agriculture).

## **Bachelor of Science in Ranch Management**

In addition to completing the CORE 2.0 requirements, the B.S. candidate would also be required to complete the Certificate of Ranch Management. Like any business, the manager who has worked in the business from the ground floor up will generally have a more complete understanding of the business than one who has not had that experience. Because the Certificate program is geared largely to the ground level, it helps build a degree program that addresses the different strata in business operations and management. That is, when incorporated in a larger degree program, the Certificate builds a degree from the bottom up rather than the top down. This practical aspect of the degree program, particularly when combined with required internships, should make the B.S. in Ranch Management more appropriate to managing ranches, and more employable as a result.

As mentioned above, two 400-level seminars were added for their course content and to emphasize critical thinking and communication skills. As agriculture changes with demographics and land-use demands in the West, ranchers are apt to find themselves increasingly in the public arena. At different points in his/her career, the ranch manager will likely participate in a multitude of meetings, many of which will be part of a decision-making process. Like any successful business manager, the ranch manager must be able to interact constructively with diverse groups of people, must be able to adapt to

changing social and business environments, must be able to sift through multitudes of information to develop reasonable opinions, and must be able to communicate effectively to defend those opinions. Seminars are a good academic format to develop skills needed by managers to work with confidence, and with competence, in those arenas. These seminars were not assigned to departments since that is the province of university administration.

As currently constructed, the B.S. degree is 123 credits, which exceeds MSU's minimum requirement of 120 credits. Although this is less than the 124 credit minimum required by TCU, there may need to be an adjustment to make the credit count more consistent with MSU policy. Currently the required internship(s) are included as non-credit courses and are not included in this count. University policy will dictate their credit or non-credit status.

To graduate with a B.S. degree, the Department of Agricultural Business requires 42 credits to be from courses numbered 300 or above. This limit is reached if the 4-credit course ARNR 434 is taken instead of the 3-credit course ARNR 403 (see Appendix B, CORE 2.0 Courses). This credit requirement would be exceeded if any of the three unassigned CORE 2.0 courses are 300 level or above (see Appendix B, CORE 2.0 Courses).

Also as currently constructed, the degree offers the student minimal flexibility in selecting electives. This may need to be revisited.

Some courses represented in the Certificate are required in their entirety for the B.S. degree. An example would be Managerial Communication, BUS 201. Elements of this course would be taught to the Certificate students, emphasizing communication to employees and owner. Communication skills are essential for good business managers, so further development of these skills is important to the manager charged with broader business management. The course is therefore required in its entirety for the B.S. candidate.

## **Assumptions and Limiting Conditions**

- Faculty & instructors appropriate for the subject material are available as needed.
- Electives in the Certificate program could be accommodated.
- A one-month immersion in Spanish could be accommodated.
- Appropriate field trips could be identified and secured.
- Course content appropriate to the Certificate program can be created from existing courses at MSU. Where this is not the case, appropriate course content can be developed from sources other than current courses at MSU.
- Where prerequisites were disregarded, it is assumed that this would not cripple the curriculum as proposed, and that the goals of the proposed curriculum could be accommodated.

# Appendix A: Certificate of Ranch Management – Course Detail

## 1. Ranch Business Management I

- Spreadsheets, word processing, internet research, email with attachments (including photos), data processing (e.g., livestock weights), QuickBooks
- Ranch production records (hay, sale prices and weights), grazing records, income and expenses, budget reports, crop and livestock inventories
- Finance, business law as it applies to agriculture

Take elements from:

- Microcomputers in Agriculture, AGED 105
- Business Software Applications, BUS 211
- Agricultural Law, AGECE 337
- Agricultural Finance and Credit Analysis, AGECE 345

Create course content re: production records – review TCU's Certificate course, "Ranch Records and Finance"

## 2. Livestock Nutrition

- Nutrition, feeds and feeding for cattle, sheep and horses; body condition score (BCS) and frame score

Take elements from:

- Introduction to Animal Science, ARNR 100
- Introduction to Livestock Evaluation, ARNR 309

## 3. Plants and Soils

- Plant reproduction and growth; soils and their importance in plant type and density; soil management and conservation for water retention and erosion control

Take elements from:

- Soil Resource, LRES 201IN
- Plant Science, Resources and the Environment, PSPP 102CS

#### **4. Range Management**

- Livestock grazing and its affect on plant health and range condition; assessment of range condition, carrying capacity and stocking rate; field trips to develop grazing plans, noxious weed control

Take elements from:

- Natural Resource Conservation, ARNR 101
- Montana Range Plants Lab, ARNR 102
- Range Livestock Production, ARNR 230
- Range and Pasture Monitoring, ARNR 235

#### **5. Cattle Management**

- Stockmanship; corral design; herd improvement with EPDs, carcass data, feedlot data with retained ownership; calving management, including dystocia, calf survival, pulling calves

Take elements from:

- Calving Management, ARNR 215
- Applied Techniques in Livestock Management – Beef Cattle, ARNR 234

Visiting instructors as needed.

#### **6. Spanish**

- One-month immersion in basic Spanish as spoken by seasonal Hispanic workers, in “minimester” between fall and spring semesters

#### **7. Mechanics and Construction**

- Basic mechanics, small engine repair, vehicle and tractor maintenance, equipment maintenance and repair, shop tools, service logs
- Basic plumbing and electrical repair; construction and maintenance of basic ranch improvements (buildings, stock water developments, corrals, fences)

Visiting instructors from Colleges of Technology in the relevant fields for hands-on, how-to instruction in mechanics, plumbing, electrical repair, and construction.

#### **8. Reproduction and Livestock Health**

- Reproduction, genetics, breed selection, breeding programs (cross breeding, terminal cross), heifer development, artificial insemination, bull selection

- Livestock diseases and disease prevention, vaccinations, basic veterinary care (hands-on instruction for treating typical problems like foot rot, pink eye, pneumonia, scours), herd health plans

Take elements from:

- Physiology of Reproduction, ARNR 321
- Principles of Animal Breeding and Genetics, ARNR 322
- Diseases of Domestic Livestock, ARNR 337

## **9. Crop Production and Forestry**

- Crop varieties, irrigation, fertilizer, tillage practices, weed control, harvesting
- Sustainable forestry, forest health and management, harvest practices, marketing
- Range improvement, interseeding

Take elements from:

- Field Crop Production, PSPP 341
- Forages, PSPP 342

May require some lectures from a visiting instructor from the School of Forestry, University of Montana

## **10. Ranch Business Management II**

- Communications, human resource management, personnel policies, hiring and firing, leadership
- Basics of accounting, cash flow, income statements
- Federal and State agency assistance

Take elements from:

- Economics of Agricultural Business, AGECE 210IS
- Farm and Ranch Management, AGECE 341
- Survey of Accounting for Non-Business Majors, ACCT 220
- Managerial Communication, BUS 201
- Leadership Development for Agribusiness and Industry Employees, AGED 251US
- Supervision and Leadership, MGMT 103

### **11. Meats (elective)**

- Feedlot finishing, grass finishing, and product quality; carcass evaluation and pricing; USDA grading standards; consumer demand and trends; muscle structure, tenderness, flavor, and meat cuts

Take elements from:

- Introduction to Meat Evaluation, ARNR 205
- Meat Science, ARNR 316

### **12. Outfitting and Hospitality Services (elective)**

- Guest services for amenity ranch owners and their guests; horse pack trips, camps, dining services, accommodations, identifying and meeting owner and guest expectations
- Care for game animals, identifying trophy game animals, scoring
- Entomology of fisheries

Visiting and resident instructors as appropriate.

### **13. Equine Management (elective)**

- Horse handling and health care, evaluation, breaking and training, nutrition and feeding, breeding and reproduction
- Marketing, enterprise analysis

Take elements from:

- Today's Equine Industry, ARNR 202
- Intermediate Western Equitation, ARNR 208
- Colt Breaking and Training, ARNR 211
- Applied Techniques in Livestock Management - Horses, ARNR 233
- Equine Lameness, ARNR 327
- Equine Form to Function, ARNR 347

### **14. Bison, Sheep and Goats (elective)**

- Bison management, marketing, handling, corral design and fencing
- Sheep and goat nutrition, grazing, corrals and fencing, use in noxious weed control, marketing, wool and mohair production, lambing and kidding, herd health

Take elements from:

- Applied Techniques in Livestock Management – Sheep, ARNR 232
- Sheep Management, ARNR 432

Visiting and resident instructors as appropriate.

**15. Fisheries and Wildlife Habitat (elective)**

- Land management and grazing practices to improve fisheries and wildlife habitat

Take elements from:

- Introduction to Fish and Wildlife, F&WL 201
- Principles of Fish and Wildlife Management, F&WL 301
- Wildlife-Livestock Range Nutrition, ARNR 325
- Wildlife-Livestock Habitat Restoration, ARNR 355

**16. Marketing (elective)**

- Market assessment and enterprise analysis; cow-calf, stocker, retained ownership, direct marketing, seedstock; futures and hedging

Take elements from:

- Economics of Agricultural Marketing, AGECE 321
- Principles of Marketing, BUS 341
- Advanced Agricultural Marketing, AGECE 421

## Appendix B: Proposed Curriculum

### **CERTIFICATE COURSES**

#### **Fall Semester**

- 1 Ranch Business Management I
- 2 Livestock Nutrition
- 3 Plants and Soils
- 4 Range Management
- 5 Cattle Management

*One of the following two electives:*

- 11 Meats
- 12 Outfitting and Hospitality Services

#### **Minimester (January)**

- 6 Spanish (minimester immersion)

#### **Spring Semester**

- 7 Mechanics and Construction
- 8 Reproduction and Livestock Health
- 9 Crop Production and Forestry
- 10 Ranch Business Management II

*Two of the following four electives:*

- 13 Equine Management
- 14 Bison, Sheep and Goats
- 15 Fisheries and Wildlife Habitat
- 16 Marketing

#### **Electives : three of the following:**

- 11 Meats
- 12 Outfitting and Hospitality Services
- 13 Equine Management
- 14 Bison, Sheep and Goats
- 15 Fisheries and Wildlife Habitat
- 16 Marketing

Total Certificate of Ranch Management  
credits

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36

**CORE 2.0 COURSES**

	<u>Dept</u>	<u>Course #</u>	<u>Suffix</u>	<u>Credits</u>	
	BIOL	103	CS	3	
	ECON	101	IS	3	
	ENGL	121	W	3	
	STAT	216	Q	3	
	ARNR	403	R	3	
<b>OR</b>	ARNR	434	R		4
	MLS	102	D	4	
<b>NEW</b>		4XX	IH/RH	3	
			US	3	
			IA/RA	3	
			IN/RN	3	
				<b>31</b>	min

**B.S. DEGREE COURSES**

	<u>Dept</u>	<u>Course #</u>	<u>Suffix</u>	<u>Credits</u>	
	ECON	102		3	
	BUS	201		3	
	AGEC	210	IS	3	
	ENGL	221		3	
	BUS	221		3	
	ACCT	223		3	
	AGEC	337		3	
	ARNR	320		4	
	ARNR	322		3	
	AGEC	345		3	
	ARNR	353		3	
	LRES	421		4	
	ARNR	438		3	
	MGMT	468		3	
<b>NEW</b>		4XX		3	
<b>NEW</b>	AGEC	476		0	
Two of the following:				6	
	MATH	101			4
	MATH	103			3
	MATH	105			3
	MATH	150	Q		3
	MATH	160	Q		4
	MATH	170	Q		4

One of the following:				3
Leadership in Business Organizations	MGMT	402		
Human Resources Management	MGMT	403		

Combine into one course:				3
Economics of Agricultural Marketing	AGEC	321		
Farm & Ranch Management	AGEC	341		

Total proposed credits for B.S. in Ranch Management, in addition to Certificate Courses and Core Courses	<u><u>56</u></u>
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<b>Total proposed credits for B.S. in Ranch Management</b>	<b>123</b>
<i>Total credits required by Department of Agricultural Business</i>	<i>120</i>

Proposed course credits, 300-level or above	41
<i>Course credits, 300-level or above, required by Department of Agricultural Business</i>	<i>42</i>

## Appendix C: Core Curriculum

<u>Suffix</u>	<u>Foundation Courses</u>	<u>Credits Required</u>
US	University Seminar	3
D	Diversity	3
W	College Writing	3
Q	Quantitative Reasoning	3
CS	Contemporary Issues in Science	3
	<u>Ways of Knowing: Inquiry and Research &amp; Creative Experience</u>	
IA or RA	Arts	3
IH or RH	Humanities	3
IS or RS	Social Sciences	3
IN or RN	Natural Sciences	3
R, RA, RH, RN, or RS	Research & Creative Experience	3
		<hr/>
<b>Total core credits</b>		<b>30</b>

### Note

I = Inquiry

R = Research & Creative Experience

## Appendix D: Courses by Department

<b><u>COURSES IN PART – CERTIFICATE</u></b> <i>Elements of these courses are used for course content in the Certificate of Ranch Management.</i>	ACCT	AGEC	AGED	ARNR	BIOL	BUS	ECON	ENGL	F&WL	LRES	MATH	MGMT	PSPP	MLS	STAT
Microcomputers in Agriculture			105												
Business Software Applications						211									
Agricultural Law		337													
Agricultural Finance & Credit Analysis		345													
Introduction to Animal Science				100											
Introduction to Livestock Evaluation				309											
Soil Resource										201 IN					
Plant Science, Resources and the Environment													102 CS		
Natural Resource Conservation				101											
Montana Range Plants Lab				102											
Range Livestock Production				230											
Range and Pasture Monitoring				235											
Calving Management				215											
Applied Techniques in Livestock Management - Beef Cattle				234											

<b><u>COURSES IN PART – CERTIFICATE</u></b> <b>(continued)</b>	ACCT	AGEC	AGED	ARNR	BIOL	BUS	ECON	ENGL	F&WL	LRES	MATH	MGMT	PSPP	MLS	STAT
Physiology of Reproduction				321											
Principles of Animal Breeding and Genetics				322											
Diseases of Domestic Livestock				337											
Field Crop Production													341		
Forages													342		
The Economics of Agricultural Business		210 IS													
Farm & Ranch Management		341													
Survey of Accounting for Non-Business Majors	220														
Managerial Communication						201									
Leadership Development for Agribusiness & Industry Employees			251 US												
Supervision & Leadership												103			
Introduction to Meat Evaluation				205											
Meat Science				316											
Today's Equine Industry				202											
Intermediate Western Equitation				208											
Colt Breaking and Training				211											
Applied Techniques in Livestock Management - Horses				233											

<b><u>COURSES IN PART – CERTIFICATE (continued)</u></b>	<b>ACCT</b>	<b>AGEC</b>	<b>AGED</b>	<b>ARNR</b>	<b>BIOL</b>	<b>BUS</b>	<b>ECON</b>	<b>ENGL</b>	<b>F&amp;WL</b>	<b>LRES</b>	<b>MATH</b>	<b>MGMT</b>	<b>PSPP</b>	<b>MLS</b>	<b>STAT</b>
Equine Lameness				327											
Equine Form to Function				347											
Applied Techniques in Livestock Management - Sheep				232											
Sheep Management				432											
Introduction to Fish & Wildlife									201						
Principles of Fish and Wildlife Management									301						
Wildlife-Livestock Range Nutrition				325											
Wildlife-Livestock Habitat Restoration				355											
Economics of Agricultural Marketing		321													
Principles of Marketing						341									
Advanced Agricultural Marketing		421													
<b><u>CORE 2.0 COURSES</u></b>	<b>ACCT</b>	<b>AGEC</b>	<b>AGED</b>	<b>ARNR</b>	<b>BIOL</b>	<b>BUS</b>	<b>ECON</b>	<b>ENGL</b>	<b>F&amp;WL</b>	<b>LRES</b>	<b>MATH</b>	<b>MGMT</b>	<b>PSPP</b>	<b>MLS</b>	<b>STAT</b>
Environmental Science & Society					103 CS										
Economic Way of Thinking							101 IS								
College Writing I								121 W							

<b><u>CORE 2.0 COURSES (continued)</u></b>	<b>ACCT</b>	<b>AGEC</b>	<b>AGED</b>	<b>ARNR</b>	<b>BIOL</b>	<b>BUS</b>	<b>ECON</b>	<b>ENGL</b>	<b>F&amp;WL</b>	<b>LRES</b>	<b>MATH</b>	<b>MGMT</b>	<b>PSPP</b>	<b>MLS</b>	<b>STAT</b>
Elementary Statistics															216 Q
One of the following two:															
Sustainable Animal and Resource Management				403 R											
Beef Cattle Management				434 R											
Elementary Spanish II														102 D	
Seminar - Culture and Agriculture 4XX IH/RH															
Any course with US suffix															
Any course with IA or RA suffix															
Any course with IN or RN suffix															
<b><u>COURSES IN THEIR ENTIRETY</u></b>	<b>ACCT</b>	<b>AGEC</b>	<b>AGED</b>	<b>ARNR</b>	<b>BIOL</b>	<b>BUS</b>	<b>ECON</b>	<b>ENGL</b>	<b>F&amp;WL</b>	<b>LRES</b>	<b>MATH</b>	<b>MGMT</b>	<b>PSPP</b>	<b>MLS</b>	<b>STAT</b>
Principles of Macroeconomics and International Economics							102								
Managerial Communication						201									
The Economics of Agricultural Business		210 IS													
College Writing II								221							
Principles of Accounting I						221									
Principles of Accounting II	223														
Agricultural Law		337													

<b><u>COURSES IN THEIR ENTIRETY</u></b> <b>(continued)</b>	ACCT	AGEC	AGED	ARNR	BIOL	BUS	ECON	ENGL	F&WL	LRES	MATH	MGMT	PSPP	MLS	STAT
Animal Nutrition				320											
Principles of Animal Breeding and Genetics				322											
Agricultural Finance and Credit Analysis		345													
Grazing Ecology and Management				353											
Holistic Thought & Management										421					
Wildlife Habitat Ecology				438											
Business, Ethics and Society												468			
Seminar - Case Studies in Ranch Management 4XX															
Internship (non-credit)		476													
<i>Two of the following:</i>															
Introductory Algebra											101				
Introductory Algebra											103				
College Algebra											105				
Liberal Arts Mathematics											150 Q				
Precalculus											160 Q				
Survey of Calculus											170 Q				

<b><u>COURSES IN THEIR ENTIRETY</u></b> <b>(continued)</b>	<b>ACCT</b>	<b>AGEC</b>	<b>AGED</b>	<b>ARNR</b>	<b>BIOL</b>	<b>BUS</b>	<b>ECON</b>	<b>ENGL</b>	<b>F&amp;WL</b>	<b>LRES</b>	<b>MATH</b>	<b>MGMT</b>	<b>PSPP</b>	<b>MLS</b>	<b>STAT</b>
<i>One of the following:</i>															
Leadership in Business Organizations												402			
Human Resources Management												403			
<i>Combine into one course:</i>															
Economics of Agricultural Marketing		321													
Farm & Ranch Management		341													

## Appendix E: Course Descriptions

### **CERTIFICATE OF RANCH MANAGEMENT**

*Use elements from the following courses:*

#### **Ranch Business Management I**

##### **AGED 105 MICROCOMPUTERS IN AGRICULTURE**

S 3 cr. LEC 1 LAB 2

-- Utilizing and selecting microcomputer software for the broad field of agriculture. Decision aid software, spreadsheets, database, telecommunication and financial records are emphasized. Application of computers to control, monitor, and calibrate devices in addition to aiding management decisions. IBM

##### **BUS 211 BUSINESS SOFTWARE APPLICATIONS**

F,S 3 cr. LEC 3

PREREQUISITE: Placement exam or CS 150.

-- Focuses on best business practices with word-processing, presentation, spreadsheet, and database software. Emphasis on producing and evaluating effective and efficient information designs with applications in finance, accounting, marketing, and management.

##### **AGED 337 AGRICULTURAL LAW**

F,S 3 cr. LEC 3

PREREQUISITE: Junior standing.

-- Application of general principles of law to ownership and operation of farming business and its relationship with other agribusiness firms, government agencies and people.

##### **AGED 345 AGRICULTURAL FINANCE & CREDIT ANALYSIS**

F 3 cr. LEC 3

PREREQUISITE: ECON 201 or ECON 250.

-- Alternatives available to farmers for acquiring and maintaining control over resources used in agriculture production. Emphasis is on the management of cash, credit, debt, taxes, and interest in relation to agricultural price levels and general economic conditions.

#### **Livestock Nutrition**

##### **ARNR 100 INTRODUCTION TO ANIMAL SCIENCE**

S 3 cr. LEC 3

-- Introductory Animal Science includes basic principles of animal genetics, nutrition, live animal evaluation, reproduction, and their application to the production of beef and dairy cattle, sheep, swine, horses, and poultry.

##### **ARNR 309 INTRODUCTION TO LIVESTOCK EVALUATION**

F 2 cr. LAB 2

PREREQUISITE: ARNR 100 and ARNR 205, or consent of instructor.

-- Techniques and experience in live animal evaluation. Practical use of production data and other evaluation techniques.

## **Plants and Soils**

### **LRES 201IN SOIL RESOURCE**

F 3 cr. LEC 2 LAB 1

PREREQUISITE: MATH 103 or equivalent.

-- Soils and their properties as components of landscapes and ecosystems. Application of soils knowledge to problems in environmental sciences and management of agricultural, wildland, and urban landscapes.

### **PSPP 102CS PLANT SCIENCE, RESOURCES AND THE ENVIRONMENT**

S 3 cr. LEC 3

-- Provides an understanding of basic plant science principles and environmental components that impact humankind and develop solutions to problems. Real-life case histories will be emphasized with a career goal emphasis on science, resources, the environment, and the transfer of technologies.

## **Range Management**

### **ARNR 101 NATURAL RESOURCE CONSERVATION**

F 3 cr. LEC 3

-- Description of the rangelands of the Western U.S., historical, present, and potential use. Explanation of how uses affect the biological cycles of rangelands. Concepts of ecological condition and trend are introduced.

### **ARNR 102 MONTANA RANGE PLANTS LAB**

F 1 cr. LAB 1

COREQUISITE: ARNR 101

-- The laboratory exercises are designed to complement the lectures of ARNR 101. Rangeland inventory and classification methods will be reviewed. Sixty common native and introduced plants will be identified in the field and the classroom.

### **ARNR 230 RANGE LIVESTOCK PRODUCTION**

S 3 cr. LEC 3.

PREREQUISITE: ARNR 100, ARNR 101.

-- Principles of beef and sheep production in rangeland environments. Breeding, reproduction, nutrition, marketing, and distribution.

### **ARNR 235 RANGE AND PASTURE MONITORING**

F 1 cr. LAB 1

PREREQUISITE: ARNR 100, ARNR 101, ARNR 102.

-- Methods which can be used by private operators as well as state and federal land managers to identify site potential, inventory forage resources, evaluate range and pasture condition, estimate stocking rates, and measure forage utilization by wildlife and livestock.

## **Cattle Management**

### **ARNR 215 CALVING MANAGEMENT**

S 2 cr. LEC 1 LAB 1

PREREQUISITE: ARNR 100 and ARNR 230 or consent of instructor.

-- Procedures to correctly identify calving problems and subsequently assist the birthing process and application of techniques to maximize calf survival.

### **ARNR 234 APPLIED TECHNIQUES IN LIVESTOCK MANAGEMENT-BEEF CATTLE**

S 1 cr. LAB 1

PREREQUISITE: ARNR 100

-- Hands-on laboratories to familiarize students with the principles of beef cattle handling and management.

## **Reproduction and Livestock Health**

### **ARNR 321 PHYSIOLOGY OF REPRODUCTION**

F 4 cr. LEC 3 RCT 1

PREREQUISITE: VTMB 271.

-- A study of the anatomy and physiology of reproduction with major emphasis on domestic animal species. This class introduces students to emerging concepts and current technologies for improving reproductive efficiency in domestic animals.

### **ARNR 322 PRINCIPLES OF ANIMAL BREEDING AND GENETICS**

S 3 cr. LEC 3

PREREQUISITE: ARNR 100, BIOL 102, and either STAT 216 or STAT 332 or PSPP 318.

-- Genetic improvement of farm animals through performance testing, methods of selection, and application of mating systems such as crossbreeding.

### **ARNR 337 DISEASES OF DOMESTIC LIVESTOCK**

S 3 cr. LEC 3.

PREREQUISITE: VTMB 271.

-- This course is structured to familiarize students with the common diseases of domestic livestock. Infectious and non-infectious diseases of horses, cattle, sheep and swine will be covered. Particular emphasis will be placed on regional diseases.

## **Crop Production and Forestry**

### **PSPP 341 FIELD CROP PRODUCTION**

S alternate years, to be offered even years 3 cr. LEC 3

PREREQUISITE: PSPP 102.

-- Production of field crops using practical and applied crop management principles. Emphasis includes understanding of crop management principles and application of problem solving capabilities to field crop management situations.

### **PSPP 342 FORAGES**

F 3 cr. LEC 3

PREREQUISITE: PSPP 102.

-- Principles of applied forage crop management including establishment, irrigation, fertilization, pests, harvesting, and forage integration of many legume and grass species.

## **Ranch Business Management II**

### **AGEC 210IS THE ECONOMICS OF AGRICULTURAL BUSINESS**

S 3 cr. LEC 3

PREREQUISITE: ECON 101.

-- This course provides an introduction to marketing, trade, risk, strategic, resource, and financial management of farms/ranches and agribusiness firms in the domestic and global economy. Basic economic principles will be applied to farm/ranch and agribusiness management, marketing, and international agricultural trade issues.

**AGEC 341 FARM & RANCH MANAGEMENT**

S 3 cr. LEC 3

PREREQUISITE: ECON 201 or ECON 250 and ECON 309.

-- Basic tools of economic decision making useful to farm and ranch managers are examined.

**ACCT 220 SURVEY OF ACCOUNTING FOR NONBUSINESS MAJORS**

On Demand 3 cr. LEC 3

-- A survey of the basic accounting model, accounting records, recording business transactions, preparation and analysis of financial statements, and elementary income tax issues in a small business environment. This course is intended for non-business majors and may not substitute for any required business course.

**BUS 201 MANAGERIAL COMMUNICATION**

F,S,Su 3 cr. LEC 3

PREREQUISITE: Completion of University Seminar and Writing University Core Requirement.

-- Strategies for written, oral, visual, and nonverbal communications in business organizations.220

**AGED 251US LEADERSHIP DEVELOPMENT FOR AGRIBUSINESS & INDUSTRY EMPLOYEES**

F,S 3 cr. LEC 2 LAB 1

-- Process of developing and managing individuals by providing leadership and guidance at all levels of personnel development. Self concepts developed through situational leadership and management, principles of people management, goal setting, and belief systems. Collaborative learning and field experience utilized.

**MGMT 103 SUPERVISION AND LEADERSHIP**

On Demand 3 cr. LEC 2 RCT 1

-- Management principles as they apply to first-line supervision and to the function of leadership and motivation in any organization. This course may not substitute for any required business course.

**Meats****ARNR 205 INTRODUCTION TO MEAT EVALUATION**

F 2 cr. LAB 2

PREREQUISITE: ARNR 100

-- Techniques for the evaluation of carcasses. Procedures include U.S. grading standards, introduction to carcass pricing and objective carcass measurements.

**ARNR 316 MEAT SCIENCE**

S 4 cr. LEC 3 LAB 1

PREREQUISITE: ARNR 100 and BIOL 102 and CHEM 121.

-- The meat industry within North America and beyond will be discussed. Live animal evaluation, pricing and carcass evaluation will be discussed. The class will include an explanation of muscle structure and function and its effect on tenderness and functionality.

**Equine Management****ARNR 202 TODAY'S EQUINE INDUSTRY**

F 1 cr. SEM 1

PREREQUISITE: ARNR 100

-- Introduction to today's horse industry. This course will expose students to career paths in the industry and how they may better prepare themselves for jobs in this industry.

### **ARNR 208 INTERMEDIATE WESTERN EQUITATION**

F,S 2 cr. LAB 2

PREREQUISITE: ARNR 110 or permission of instructor.

-- Students will learn advanced movements and maneuvers such as collection, roll-backs, turn-arounds, and lead changes. Students must have secure seat and hands. Training methods for the green horse and tuning techniques for the older broke horse will be covered.

### **ARNR 211 COLT BREAKING AND TRAINING**

F 2 cr. LAB 2

PREREQUISITE: ARNR 208.

-- Principles and techniques of breaking and training young horses.

### **ARNR 233 APPLIED TECHNIQUES IN LIVESTOCK MANAGEMENT-HORSES**

F 1 cr. LAB 1

PREREQUISITE: ARNR 100.

-- Laboratory designed to familiarize students with approved management practices for horse enterprises.

### **ARNR 327 EQUINE LAMENESS**

F 3 cr. LEC 3

(Change in credit effective Fall 2005) PREREQUISITE: VTMB 271.

-- This course is structured to familiarize students with the many types of lameness in the horse. Students will be instructed on the correlation between anatomy, conformation, locomotion and lameness. Selected diseases of the bones, joints, and soft tissue will be discussed. Significant time will also be spent on lameness diagnosis, treatment, prognosis, as well as shoeing principles for sound and lame horses.

### **ARNR 347 EQUINE FORM TO FUNCTION**

F 3 cr. LEC 2 LAB 1

PREREQUISITE: VTMB 271 and Junior standing.

-- Development of methods for analyzing a horse's conformation along with a good understanding of anatomy and its relationship to performance.

## **Bison, Sheep and Goats**

### **ARNR 232 APPLIED TECHNIQUES IN LIVESTOCK MANAGEMENT-SHEEP**

S 1 cr. LAB 1

PREREQUISITE: ARNR 100.

-- Management practices associated with farm flock and range sheep enterprises.

### **ARNR 432 SHEEP MANAGEMENT**

S 3 cr. LEC 2 LAB 1

PREREQUISITE: ARNR 230, ARNR 232, ARNR 320, and ARNR 321 or consent of instructor.

-- Management of the ewe flock, nutrition, reproduction, economics, breeding, and health related to efficient sheep production will be discussed. Production preparation and wool marketing in U.S. and world markets and economics of Montana wool production will be covered.

## **Fisheries and Wildlife Habitat**

### **F&WL 201 INTRODUCTION TO FISH & WILDLIFE**

F 1 cr. SEM 1

-- An introduction to the issues, ethics, challenges, and opportunities associated with management of wildlife and fisheries. For Fish and Wildlife Majors or those interested in the field.

### **F&WL 301 PRINCIPLES OF FISH & WILDLIFE MANAGEMENT**

S 3 cr. LEC 3

PREREQUISITE: BIOL 101 and BIOL 102.

-- Overview of history and ecological principles underlying fish and wildlife management. In-depth discussion of current issues.

### **ARNR 325 WILDLIFE-LIVESTOCK RANGE NUTRITION**

S 3 cr. LEC 3

PREREQUISITE: ARNR 100 and ARNR 101 and ARNR 102, and ARNR 230.

-- Nutrition of free ranging ungulates including deer, elk, antelope, bison, sheep, cattle and feral horses. Topics will include digestive systems, intake, food habits, feeding behavior and management.

### **ARNR 355 WILDLIFE-LIVESTOCK HABITAT RESTORATION**

F 3 cr. LEC 2 LAB 1

PREREQUISITE: ARNR 101 or LRES 110 or F&WL 301, and BIOL 230, and ARNR 240 or BIOL 303.

-- Improvement and rehabilitation of habitats used by wildlife and free-ranging livestock in the western United States. Topics include methods used to improve wildlife habitat as well as livestock forage. Design criteria for stock ponds, off-site water development, construction of bird/small mammal guzzlers, use of prescribed fire, mechanical, chemical and biological techniques to rehabilitate and improve wildlife and livestock habitats.

## **Marketing**

### **AGEC 321 ECONOMICS OF AGRICULTURAL MARKETING**

F 3 cr. LEC 3

PREREQUISITE: ECON 201 or ECON 250.

-- Issues in marketing agricultural products and the economic principles that assist in analysis of these issues. Factors affecting market prices, and topics associated with methods of marketing are considered. Emphasis on Montana products.

### **BUS 341 PRINCIPLES OF MARKETING**

F,S,Su 3 cr. LEC 3

PREREQUISITE: Junior standing and ECON 102.

-- Marketing management decision-making in the product, price, promotion, and distribution areas. The behavioral, legal, ethical, competitive, technological, and economic environments as they affect decisions in the domestic and international organization.

### **AGEC 421 ADVANCED AGRICULTURAL MARKETING**

S 3 cr. LEC 3

PREREQUISITE: AGEC 321.

-- Economic analysis of current issues in agricultural marketing including market structure, risk, and efficiency; commodity promotion; futures and options markets; price forecasting; and retained ownership options.

## **CORE 2.0**

### **BIOL 103CS ENVIRONMENTAL SCIENCE & SOCIETY**

F,Su 3 cr. LEC 3

-- The relationship between people and the environment using the earth as an ecosystem to show the effects of people's activities on natural ecosystems. Environmental issues such as wilderness, wolf reintroduction, global warming, fire ecology, whirling disease, and grizzlies are covered.

### **ECON 101IS ECONOMIC WAY OF THINKING**

F,S 3 cr. LEC 3

--Introduces important tools and methods of economics, including the core reasoning that underlies decision-making, analytical thinking and problem solving, demand and supply analysis, and indicators of economic performance. Emphasis is on application of the tools of economics to current issues of social and personal importance.

### **ENGL 121W COLLEGE WRITING I**

F,S,Su 3 cr. RCT 3

-- Studies in the discovery and written expression of ideas, stressing organization, support, audience awareness, clarity, and persuasive presentation. Taught around a particular topic or theme varying with each offering.

### **STAT 216Q ELEMENTARY STATISTICS**

F,S,Su 3 cr. LEC 3

PREREQUISITE: C- or better in any 100 level or above MATH course, or Math Placement Test within the past 12 months.

-- Traditional and robust estimates of location and variability, fundamentals of probability theory, confidence intervals, and tests of hypothesis for normal distributions.

### **ARNR 403R SUSTAINABLE ANIMAL AND RESOURCE MANAGEMENT**

S 3 cr. LEC 1 RCT 2.

PREREQUISITE: Senior standing in an agriculture or natural resources oriented curriculum.

-- Seniors have the opportunity to evaluate an agricultural production system for economic and environmental sustainability. Student teams will use various data bases and market trends to evaluate a local production system, and to make recommendations for maintaining long-term economic output and environmental quality.

### **ARNR 434R BEEF CATTLE MANAGEMENT**

F 4 cr. LEC 2 LAB 2

PREREQUISITE: ARNR 230, ARNR 240, ARNR 320, ARNR 321, ARNR 322 and AGECE 210 or AGECE 341.

-- Integration of the principles of nutrition, genetics, physiology, range ecology, and economics into practical and profitable ranch management and business plans. Utilization of performance and financial records, budgeting, feed resource planning, marketing strategies, breeding plans, computer applications, and case studies.

### **MLS 102D ELEMENTARY SPANISH II**

F, S,Su alternate years 4 cr. RCT 4

PREREQUISITE: MLS 101 or equivalent, or two years of high school Spanish. Offered on a rotating basis with French and German in Summer.

-- This course builds upon the foundation established in 101. Greater emphasis is placed upon oral and

written expression. Reading and discussions are designed to increase comprehension of more linguistically complex texts and more conceptually complex cultural issues.

**New: CULTURE AND AGRICULTURE**

400-level seminar, 3 cr.

--Economic and environmental sustainability in agriculture, issues in artisanal and industrial food production, agriculture's value to society as a cultural force, and urban-rural interdependence.

## **BACHELOR OF SCIENCE IN RANCH MANAGEMENT**

**ECON 102 PRINCIPLES OF MACROECONOMICS AND INTERNATIONAL ECONOMICS**

F,S,Su 3 cr. LEC 3

PREREQUISITE: ECON 101.

-- Topics include inflation, unemployment, interest rates, money, and the impact of government surpluses or deficits. Government policies of growth, employment, income distribution, and international trade are examined.

**BUS 201 MANAGERIAL COMMUNICATION**

F,S,Su 3 cr. LEC 3

PREREQUISITE: Completion of University Seminar and Writing University Core Requirement.

-- Strategies for written, oral, visual, and nonverbal communications in business organizations.

**AGEC 210IS THE ECONOMICS OF AGRICULTURAL BUSINESS**

S 3 cr. LEC 3

PREREQUISITE: ECON 101.

-- This course provides an introduction to marketing, trade, risk, strategic, resource, and financial management of farms/ranches and agribusiness firms in the domestic and global economy. Basic economic principles will be applied to farm/ranch and agribusiness management, marketing, and international agricultural trade issues.

**ENGL 221 COLLEGE WRITING II**

F,S 3 cr. RCT 3

PREREQUISITE: ENGL 121.

-- Study and practice of strategies and devices of expository and argumentative prose. Builds upon writing skills learned in ENGL 121.

**BUS 221 PRINCIPLES OF ACCOUNTING I**

F,S,Su 3 cr. LEC 3

PREREQUISITE: MATH 105 or Math Placement Test.

-- An introduction to the principles of financial accounting for students of all business curricula. Specific topics include key accounting concepts, accounting transaction recording, financial statement preparation, accounting systems overview, business entity structures and financial statement analysis.

**ACCT 223 PRINCIPLES OF ACCOUNTING II**

F,S 3 cr. LEC 3

PREREQUISITE: BUS 221.

-- A continuation of the financial accounting topics introduced in BUS 221. The course helps students learn how to prepare and analyze financial statements, and understand the role that accounting plays in business decisions. Additional topics include: stock and bond investments, cash flow reporting, financial statement analysis techniques, and manufacturing and cost accounting issues.

**AGEC 337 AGRICULTURAL LAW**

F,S 3 cr. LEC 3

PREREQUISITE: Junior standing.

-- Application of general principles of law to ownership and operation of farming business and its relationship with other agribusiness firms, government agencies and people.

**ARNR 320 ANIMAL NUTRITION**

F 4 cr. LEC 3 LAB 1

PREREQUISITE: ARNR 230 and BCHM 122 and VTMB 271 or consent of instructor.

-- Digestion and metabolism of nutrients, nutrient requirements, feed composition, diet formulation, and practical feeding of various classes of domestic animals.

**ARNR 322 PRINCIPLES OF ANIMAL BREEDING AND GENETICS**

S 3 cr. LEC 3

PREREQUISITE: ARNR 100, BIOL 102, and either STAT 216 or STAT 332 or PSPP 318.

-- Genetic improvement of farm animals through performance testing, methods of selection, and application of mating systems such as crossbreeding.

**AGEC 345 AGRICULTURAL FINANCE & CREDIT ANALYSIS**

F 3 cr. LEC 3

PREREQUISITE: ECON 201 or ECON 250.

-- Alternatives available to farmers for acquiring and maintaining control over resources used in agriculture production. Emphasis is on the management of cash, credit, debt, taxes, and interest in relation to agricultural price levels and general economic conditions.

**ARNR 353 GRAZING ECOLOGY AND MANAGEMENT**

S 3 cr. LEC 2 LAB 1

PREREQUISITE: ARNR 101, ARNR 102, and ARNR 230 or ARNR 240.

-- Ecological perspectives of livestock grazing in the major biomes of the western United States and southern Canada. Impacts on soils, individual plants, plant communities, livestock, wildlife, and hydrology will be reviewed in the scientific literature.

**LRES 421 HOLISTIC THOUGHT & MANAGEMENT**

S 4 cr. LEC 4

PREREQUISITE: Junior standing.

-- Application of holism and systems thinking to natural and human resource management issues. Use of Holistic Management for decision-making, research, and policy formation. Use of real case studies involving BioRegions Program work in Greater Yellowstone, Japan, Mongolia, Nepal, or other locations.

**ARNR 438 WILDLIFE HABITAT ECOLOGY**

S 3 cr. LEC 3

PREREQUISITE: F&WL 301, and either ARNR 240 or BIOL 303 and senior standing.

-- Principles of habitat importance and management. Habitat requirements within wildlife population constraints will be emphasized with consideration of other natural resource demands.

**MGMT 468 BUSINESS, ETHICS AND SOCIETY**

On Demand 3 cr. LEC 3

PREREQUISITE: Senior standing or permission of the instructor. For business majors: Formal admission to the College of Business.

-- The relationship between business and society in the social, ethical and natural environment. A focus on issues of business responsibility and ethics with emphasis on practical business problems of leadership and accountability.

**New: CASE STUDIES IN RANCH MANAGEMENT**

400-level seminar, 3 cr.

Case studies of different ranch enterprises in different landscapes with different resources, goals and issues. Focus will be to define problems and map solutions to those problems.

**New: AGECE 476 INTERNSHIP**

**Non-Credit**

**PREREQUISITE: Consent of instructor and approval of department head.**

**-- An individualized assignment arranged with an agricultural operation to provide guided experience in the field of Agricultural Business Management.**

**Two of the following:**

**MATH 101 INTRODUCTORY ALGEBRA (COT)**

F,S,Su 4 cr. LEC 4

PREREQUISITE: Qualifying admission assessment score within the past 3 years, or instructor approval.

-- This instructor-taught course initiates development in students' ability to organize thought processes and systematically solve problems while preparing students for studies in other courses. Includes manipulation of variables, exponential applications, scientific notation, polynomials, factoring trinomials, solving equations, systems of equations, and graphing quadratic equations. This course is intended for students who have not studied algebra but have a firm background in basic mathematics or who wish it as a review. Offered in partnership with the COT in Bozeman.

**MATH 103 INTRODUCTORY ALGEBRA**

F,S 3 cr. IND 3

PREREQUISITE: MATH 065 or MATH 085 or Math Placement Test within the past 12 months.

-- A flexible paced course designed for a wide range of students needing anything from extensive practice to a quick review of algebraic concepts and problem solving. Students have access to a variety of resources as well as a personalized course webpage to keep track of their progress. Topics include linear equations and inequalities and their graphs, systems of linear equations and inequalities, exponents, polynomials, factoring, rational expressions, and square roots.

**MATH 105 COLLEGE ALGEBRA**

F,S,Su 3 cr. LEC 3

PREREQUISITE: MATH 103 or Math Placement Test within the past 12 months.

-- Further development of algebraic skills through the study of linear, quadratic, polynomial, exponential, and logarithmic functions.

**MATH 150Q LIBERAL ARTS MATHEMATICS**

F,S,Su 3 cr. LEC 3

PREREQUISITE: MATH 103 or Math Placement Test within the past 12 months.

-- Basic skills in applicable mathematics including linear, quadratic and exponential models; financial mathematics, trigonometry and some elementary statistics.

**MATH 160Q PRECALCULUS**

F,S,Su 4 cr. LEC 4

PREREQUISITE: MATH 105 or Math Placement Test within the past 12 months.

-- Functions, graphs, and the use symbols for expressing mathematical thoughts. Polynomials, rational, exponential, logarithmic, and trigonometric functions.

**MATH 170Q SURVEY OF CALCULUS**

F,S,Su 4 cr. LEC 4

PREREQUISITE: MATH 105 or Math Placement Test within the past 12 months.

-- A survey of basic calculus including limits, differentiation, and integration with applications to business, biology, and social science problems.

**One of the following:**

**MGMT 402 LEADERSHIP IN BUSINESS ORGANIZATIONS**

F 3 cr. LEC 3

PREREQUISITE: BUS 301 or permission of the instructor. For business majors: Formal admission to the College of Business.

-- Theories, issues, and current topics related to the emergence and effectiveness of leaders, with focus on leadership behaviors and processes in business organizations. Emphasis placed on examination of how individual and organizational leadership capacity is developed.

**MGMT 403 HUMAN RESOURCES MANAGEMENT**

S 3 cr. LEC 3

PREREQUISITE: BUS 301. For business majors: Formal admission to the College of Business.

-- The functions and tools used in procurement, development, compensation, integration, and maintenance of human resources and their impact on the effective attainment of organizational goals.

**Combine into one course:**

**AGEC 321 ECONOMICS OF AGRICULTURAL MARKETING**

F 3 cr. LEC 3

PREREQUISITE: ECON 201 or ECON 250.

-- Issues in marketing agricultural products and the economic principles that assist in analysis of these issues. Factors affecting market prices, and topics associated with methods of marketing are considered. Emphasis on Montana products.

**AGEC 341 FARM & RANCH MANAGEMENT**

S 3 cr. LEC 3

PREREQUISITE: ECON 201 or ECON 250 and ECON 309.

-- Basic tools of economic decision making useful to farm and ranch managers are examined.