

ACS Mellon Foundation Faculty Renewal Grant Final Report

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Institution: Centre College

Name of Project: Development of an Interdisciplinary Human and Animal Nutrition Course at Centre College

Dates of Project: June 1, 2008-May 31, 2009

Amount Awarded: \$7300.00

Original Goals and Objectives

The goals and objectives of this project were to develop an interdisciplinary course in human and animal nutrition at Centre College and to make the course materials available to faculty at all ACS schools. The development of this course was to involve consultations with nursing and veterinary school admission/curriculum directors, the selection of an appropriate text or texts, the creation of a syllabus and course program that will meet the requirements of nursing and veterinary schools as well as the needs of science students at Centre, and the selection and development, if needed, of instructional materials for the class. This course was envisioned as a sophomore-level lecture course that would be cross-listed as a Biology course, a Biochemistry/Molecular Biology course and/or a Chemistry course. The development of this course was to occur throughout the year beginning June 1, 2008 with the goal of adding this course to the Centre College course schedule for the 2010-11 academic year.

The goals and objectives of the project were met. Bio 230 Vertebrate Nutrition will be offered in the spring of 2010 (earlier than the stated goal). This course will be an introduction to the study of the principles of nutrition in vertebrates. This introduction will include an overview of the physiological requirements and metabolism of proteins, lipids, carbohydrates, vitamins,

minerals and water; the anatomy and physiology of digestion, absorption and transport of nutrients; the role of nutrition throughout human development; the application of the principles of nutrition to animal diet formulations; the role of diet in the development of chronic diseases; nutritional disorders and weight management; and food safety. This course will be a three hour per week lecture course and the prerequisites for the course are introductory biology (Bio 110 at Centre) and introductory general chemistry (Che 131 and 132; or Che 135 at Centre). This course will be offered on an alternate year schedule. The course syllabus and information, including the textbooks required for the course, are available at <http://web.centre.edu/bio/richey/bio230.htm> and in Appendix I of this report. All members of the original grant proposal participated in the development and/or review of the course and two members, Mike Barton and Peggy Richey will co-teach the course. This course has been approved by Auburn University as the required nutrition course for veterinary students and by five Nursing programs (to which Centre students typically apply) as the required nutrition course for 2nd degree nursing students. Instructional materials for the course have been purchased and are detailed in the financial statement. The course will be listed as a Biology course and will not be as a BMB or Chemistry course.

Evaluation/Assessment Process

First, a detailed syllabus and list of assignments for the proposed course was sent to the College of Veterinary Medicine at Auburn University and to five Nursing programs (Bellarmine University, the University of Louisville, Spalding University, Northern Kentucky University, and Vanderbilt University) which requirement a nutrition course prior to matriculation. All of these schools approved the course. Second, the proposed course was approved by the Biology program of Centre College as a sophomore-level elective course. Third, the Curriculum and

Academic Standards Committee of Centre College approved the addition of this course to the curriculum.

In the spring of 2010, the course will be evaluated by students in the class at the end of the term and those evaluations will be reviewed by the Associate Dean for Academic Affairs, the Chair of the Division of Science and Mathematics, and the course instructors (see Appendix II—Centre College Course Evaluation Form). Adjustments to the course will be made, as needed, based upon these reviews and the instructors' analysis of the course.

We will also contact the students in the course who pursue nursing and veterinary degrees upon completion of their post-graduate degree and survey them about the value of this course to their preparation for graduate work in these fields. On this survey we will ask these students about the content and rigor of the course in meeting their needs for their post-graduate work.

Lessons Learned

The development of this course proceeded as expected and we would not do anything significantly differently. We underestimated the cost of software licenses and we were only able to purchase nutrition analysis software and not virtual dissection software. This will not negatively impact the course because it became apparent as we developed the syllabus that the course does not require the use of dissection software. We were able to purchase more in-class demonstration and viewing equipment (physiology probes and digital microscope and video camera) than originally planned because the anatomical models were not as costly as expected. These additional purchases will allow us to do hands-on exercises in class.

Project Impact

The results of this project will broaden the sophomore-level elective offerings in the sciences and provide pre-vet and pre-nursing students with the opportunity to fulfill their

nutrition course requirement. We utilized the expertise and experience of Sandra Larson, formerly of Furman University, in developing this course, although the product of this project (Bio 230) is distinctly different from the nutrition course that Dr. Larson taught at Furman. We hope that our course materials will be widely disseminated to faculty on other campuses who have similar goals and objectives.

Dissemination

The course materials are available at <http://web.centre.edu/bio/richey/bio230.htm>. We ask that these material also be disseminated via the Associated Colleges of the South Mellon Foundation web page and that the availability of these materials be announced via appropriate ACS communications, including The Palladian. No publications have resulted from this project as of June 18, 2009.

Next Steps

We will implement the course in the spring term of 2010 and the course will be evaluated as described above.

Financial Statement (see Appendix III for detailed purchases)

- Reference texts: Human and Animal/Veterinary Anatomy & Physiology and Nutrition texts.

Estimated cost: \$1200.00

Actual cost: \$502.58

- Software: Nutrition Analysis

Estimated cost: \$600.00

Actual cost: \$1330.00 (network license for nutrition analysis software)

- Anatomical Models, posters, trinocular microscope and physiology probes for in-class use:

Estimated cost: \$5500.00

Actual cost: \$5405.54

Total Estimated Costs: \$7300.00

Total Actual Costs: \$7238.12

Summary

An interdisciplinary course in human and animal nutrition at Centre College was developed and the course materials will be available to faculty at all ACS schools. The development of this course involved consultations with nursing and veterinary school admission/curriculum directors, the selection of appropriate or texts, the creation of a syllabus and course program that will meet the requirements of nursing and veterinary schools as well as the needs of science students at Centre, and the selection of instructional materials for the class. This course will be a sophomore-level Biology lecture course that will be offered on an alternate year schedule beginning in the spring term of 2010.

Appendix I

Bio 230

Vertebrate Nutrition

Texts: Understanding Nutrition, 11th edition, Whitney & Rolfes (W & R)

Basic Animal Nutrition and Feeding, 5th edition, Pond *et al.* (Pond)

Lecture #	Date	Topic	Reading Assignment
1		Introduction/Overview: Nutrition Basics	W & R: Ch 1; Pond: Ch 1, 3
2		Biochemistry of Nutrition – Enzymatic Processes	W & R: Ch 7; Pond Ch 2
3		Energetics and Intermediary Metabolism in Cells	W & R: Ch 7, 8
4		Energetics (cont.)	W & R: Ch 8
5		Biochemistry of Nutrition - Carbohydrates	W & R: Ch 4; Pond Ch 7 (p. 85-90)
6		Biochemistry of Nutrition – Lipids	W & R: Ch 5; Pond Ch 8 (p. 106-112)
7		Biochemistry of Nutrition - Proteins	W & R: Ch 6; Pond, Ch 9 (p. 132-143)
8		Exam I	
9		Biochemistry of Nutrition – Vitamins	W & R: Ch 10, 11;
10		Biochemistry of Nutrition – Vitamins, Minerals	W & R: Ch 11, 12
11		Biochemistry of Nutrition – Minerals, Water	W & R: Ch 12, 13; Pond, Ch 6
12		Biochemistry of Nutrition – Minerals	Pond: Ch 12
13		Anatomy and Physiology of the Vertebrate Gut	Pond: Ch 4
14		Anatomy (cont.)	Pond: Ch 5
15		Anatomy (cont)	
16		Omnivore Adaptations – Introduction to Digestive Processes in Humans	W & R: Ch 3
17		Human Digestion Absorption, Transport	W & R: Ch 3
18		Human Digestion (cont.)/Role of Symbionts	W & R: Ch 3
19		Human Nutrition and Development	W & R: 15
20		Human Nutrition and Development	W & R: Ch 15, 16
21		Human Nutrition and Development	W & R: Ch 16, 17
22		Exam II	
23		Introduction to Veterinary Nutrition : Feeding Standards and Feedstuffs	Pond: Ch 18
24		Feeding Standards and Feedstuffs (cont.)	Pond Ch 19
25		Biochemistry of Carnivore Nutrition	Pond: Ch 28
26		Anatomy and Physiology of Carnivore Gut	
27		Veterinary Nutrition – Herbivores: Biochemistry	Pond: Ch 22
28		Biochemistry of Herbivores/Gut Symbionts	Pond: Ch 23
29		Anatomy and Physiology of Herbivore Gut	Pond: Ch 24
30		Anatomy and Physiology of Herbivore Gut (cont.)	Pond: Ch 27, 30
31		Feeds and Diet Formulation	Pond: Ch 20, 21
32		Exam III	
33		Special Topics: Food safety	W & R: Ch 19
34		Special Topics: Nutrition and chronic disease	W & R: Ch 18
35		Special Topics: Nutrition and chronic disease	W & R: Ch 18
36		Special Topics: Eating disorders, weight management	W & R: Ch 8, 9
37		Special Topics: Pet food industry, aquaculture	Pond: Ch 29 Plus Selected Readings
38		Special Topics: Large scale animal rearing	Pond: Ch 25, 26
39		Special Topics: Nutrition and zoonoses	Selected Readings
		Final Exam	

GRADING:

Mid-term exams (3) - 100 pts. each	50% of total grade
Comprehensive final exam (150 pts)	20%
Oral Presentation, including research paper based on presentation	20%
Diet diary and analysis	10%

ASSIGNMENTS:

Assignment 1: Food Diary, Nutritional Analysis and Diet Planning

This assignment will be done in several steps. Step 1: Each student is to maintain a complete food and beverage diary (control diary) for 7 days. This diary should record everything that is consumed each day, with a good approximation of amounts (e.g. a chicken breast the size of your palm; 1 medium apple; a ½ cup of broccoli). *Try to eat and drink as you normally would on each day—otherwise this won't be a good control!* Step 2: At the end of the seven days, you will do a nutritional analysis of your diary using diet analysis software (we will discuss how to use this software in class). Step 3: Once you have generated the nutritional analysis, you will compare the results to dietary reference intakes (DRI) and determine your average daily intakes for the recommended nutrients. Step 4: Create a 7 day plan that meets the DRI and is feasible for you to implement on this campus (remember to think about average daily intakes). Step 5: Maintain a complete food and beverage diary (experimental diary) while you follow the 7 day plan. Step 6: Do a nutritional analysis of the experimental diary and determine whether or not you met the average daily DRI for the recommended nutrients and compare the experimental diary analysis to your control diary analysis. Turn in a 8-10 page paper that discusses and analyzes the results of this assignment at the beginning of the 14th class meeting. Please see the “Guidelines for Writing Assignments” handout for details on written assignments.

Assignment 2: Choose one of the following:

Assignment 2A: Nutrition and Disease

This assignment will allow you to investigate the role of nutrition in a food-borne or chronic disease and how to treat the disease via medical and dietary measures. You will present your research to the class in the form of a 15-20 minute oral presentation during class meetings 33-36 (exact date TBD). Your presentation should reflect your knowledge and understanding of human nutrition as well as the extent of your research on your topic. Please select your topic (consult your textbook and the syllabus) and have it approved by the 7th class meeting. Please see the “Guidelines for Oral Presentations” handout for details on oral presentations.

Assignment 2B: Nutritional Deficiencies and Disorders

This assignment will allow you to investigate a nutritional deficiency or disorder and how to treat it via medical and dietary measures. You will present your research to the class in the form of a 15-20 minute oral presentation during class meetings 33-36 (exact date TBD). Your presentation should reflect your knowledge and understanding of human nutrition as well as the extent of your research on your topic. Please select your topic (consult your textbook and the syllabus) and have it approved by the 7th class meeting. Please see the “Guidelines for Oral Presentations” handout for details on oral presentations.

Assignment 2C: Advances in Nutritional Physiology

This assignment will allow you to gain some insight into current advances in understanding the physiological functions of the digestive system. You may pursue this topic from either a human or veterinary perspective. You will present your research to the class in the form of a 15-20 minute oral presentation during class meetings 33-36 (exact date TBD). Your presentation should reflect your knowledge and understanding of human or animal nutrition as well as the extent of your research on your topic. Please select your topic (consult your

textbook and the syllabus) and have it approved by the 7th class meeting. Please see the “Guidelines for Oral Presentations” handout for details on oral presentations.

Assignment 2D: Issues in the Animal Feed Industry

You may choose from a number of topics pertaining to the animal feed industry; some suggested topics are indicated below.

- Industrial scale aquaculture – diet formulation, environmental impacts of diets provided
- Commercial pet foods – which are the most appropriate given the dietary needs of pets; regulation of the pet food industry
- Role of diet in maintenance of microbial gut communities – impact in large scale animal rearing facilities

You will present your research to the class in the form of a 15-20 minute oral presentation during class meetings 33-36 (exact date TBD). Your presentation should reflect your knowledge and understanding of animal nutrition as well as the extent of your research on your topic. Please select your topic (consult your textbook and the syllabus) and have it approved by the 7th class meeting. Please see the “Guidelines for Oral Presentations” handout for details on oral presentations.

Appendix II

COURSE EVALUATION FORM

Instructor: _____ Course: _____ Date: _____

Course evaluations give you the opportunity to express views about a course and the way it was taught. The college administration may use your responses to evaluate your instructor's teaching; your instructor may also use your responses to guide improvement. Both tenured and untenured faculty members are evaluated, and so it is important that you answer thoroughly and honestly. Please be specific in your answers and give examples where possible, answering all questions. Thank you.

1. How did this course change, challenge, or focus your thinking on the subject matter?

2. My thinking about this topic was refined by the course:

_____ Strongly Agree _____ Agree _____ Neutral _____ Disagree Strongly _____ Disagree

3. How did this course help improve your academic skills in such areas as writing, analyzing, speaking, and thinking critically?

4. My academic skills improved:

_____ Strongly Agree _____ Agree _____ Neutral _____ Disagree _____ Strongly Disagree

5. What instructional methods (such as lectures, discussions, handouts, activities, etc.) did the teacher use? Describe their effectiveness.

6. The instructor employed effective learning formats:

_____ Strongly Agree _____ Agree _____ Neutral _____ Disagree _____ Strongly Disagree

7. Comment on how well organized the course was, and how clearly the instructor communicated objectives, expectations, and grading policies.

8. The objectives, expectations, and grading policies were clearly stated and consistently implemented:

_____ Strongly Agree _____ Agree _____ Neutral _____ Disagree _____ Strongly Disagree

9. Comment on the instructor's willingness to help, responsiveness to questions, and concern for the students' progress both inside and out of the classroom.

10. The instructor was generally responsive to students' needs.

_____ Strongly Agree _____ Agree _____ Neutral _____ Disagree _____ Strongly Disagree

11. What is your carefully considered judgment of the instructor's overall effectiveness? Note such things as command of subject, clarity, and thoroughness.

12. The instructor was generally effective:

Strongly Agree Agree Neutral Disagree Strongly Disagree

13. You enrolled in this course because it is:

a general requirement a major requirement a minor requirement
 an elective

14. The grade you expect in this course will:

lower your GPA not change your GPA increase your GPA

15. Your expected grade in this course is:

A B C D U

16. Including excused absences, you were absent:

never 1-2 times 3-4 times 5-6 times more often

17. In your opinion, the workload in this course (in relation to other courses of equal level) is:

much lighter lighter about the same heavier much heavier

18. The instructor returned work to you within a reasonable amount of time:

Strongly Agree Agree Neutral Disagree Strongly Disagree

19. Check the special learning opportunities and experiences offered in this course:

paper(s) on-line resources paper conference(s)
 oral presentation(s) field trip(s) laboratory/studio
 help sessions audio-visual aids computer use

20. What changes to the course methods, text(s), or content would help you learn the material better?

21. General Comments: