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Submission Date: _____
Action-Date: 9-29-98

CURRICULUM PROPOSAL COVER SHEET
University-Wide Undergraduate Curriculum Committee

*Approved by Senate
11/3/98*

I. CONTACT

Contact Person Michael H. Kesner Phone 357-2309
Department Biology

II. PROPOSAL TYPE (Check All Appropriate Lines)

COURSE Comp Vert Anat
Suggested 20 character title

New Course* _____
Course Number and Full Title

Course Revision BI 432/532 Comparative Vertebrate Anatomy
Course Number and Full Title

Liberal Studies Approval+ _____
for new or existing course Course Number and Full Title

Course Deletion _____
Course Number and Full Title

Number and/or Title Change BI 432/532 Comparative Vertebrate Anatomy
Old Number and/or Full Old Title
BI 242 Comparative Vertebrate Anatomy
New Number and/or Full New Title

Course or Catalog Description Change BI 432/532 Comparative Vertebrate Anatomy
Course Number and Full Title

PROGRAM: Major Minor Track

New Program* _____
Program Name

Program Revision* _____
Program Name

Program Deletion* _____
Program Name

Title Change _____
Old Program Name

_____ New Program Name

III. Approvals (signatures and date)

Arthur C. Hahn 11-11-98
Department Curriculum Committee

Robert P. ... 5/8/98
Department Chair

[Signature]
College Curriculum Committee

John B. ... 3/12/98
College Dean

+ Director of Liberal Studies (where applicable)

*Provost (where applicable)

Digestive Respiratory lecture 1 [shark & <i>Necturus</i> digestive & respiratory]	9	Chapter 13 Chapter 11	Chapter 8 Chapter 8
Respiratory lecture 2 [mammalian digestive & respiratory] Circulatory: fish/[shark circulatory]	10	Chapter 11 Chapter 12	Chapter 8 Chapter 9
Circulatory: tetrapods / [shark-mammal circulatory] Circulatory: thermoregulation/ [mammal circulatory]	11	Chapter 12 Chapter 12	Chapter 9 Chapter 9
EXAMINATION Urogenital lecture 1	12	Chapter 14	
Urogenital lecture 2/ [urogenital lab] Sensory: radiation receptors Intro Central Nervous System/ [shark nervous]	13	Chapter 14 Chapter 17,16	Chapter 10 Chapter 7
Sensory: mechanoreceptors & electroreceptors/ [sensory] Nervous system/[mammalian nervous]	14	Chapter 17 Chapter 16	Chapter 7 Chapter 7
FINAL EXAMINATION	15		

IV. Evaluation Methods

The final grade for the course will be determined as follows:

- 90% Tests. Four tests (3 during the semester plus the final) each of which will contain a lecture portion (75 points) and a laboratory portion (25 points). The lecture portions of the each exam will be of the mixed subjective-objective type with (typically) a series of short answer (e.g. identification, matching), a series of short essay (e.g. "answer 7 of the following 8 questions") and some longer essay questions (e.g., "answer 3 of the following 4 questions completely"). The laboratory portion of the exam will be primarily identification.
- 10% Student Examination Questions. Each student will be required to submit 3 sets of 2 examination questions which each set worth 15 points each (see attached Appendix A: "Required Examination Questions - BI 242" for details)

A student amassing 90% or more of the total points available will receive an "A", those amassing 80-89% will receive a "B", 70-79% a "C", 60-69% a "D" and 59% and lower a "F".

V. Required textbooks, supplemental books and readings

Textbook: Vertebrates: Comparative Anatomy, Function, Evolution, by K. V. Kardong, 1995
 Laboratory textbook: Structure and Function of Vertebrates by A. Feduccia, 1975

VI. Special resource requirements

Dissection kit
 Latex gloves (if you don't want the hamburger you eat after class to taste like a dead, pickled shark)

VI Bibliography

Feduccia, A. and E. McCrady. 1991. *Torrey's Morphogenesis of the Vertebrates*, 5th Edition. John Wiley and Sons, New York. 517pp.

- Hildebrand, M. 1995. Analysis of Vertebrate Structure, 4th Edition. John Wiley and Sons, New York. 657pp.
- Randall, D., W. Burggren and K. French. 1997. Eckert Animal Physiology, 4th Edition. W. H. Freeman and Co., New York. 728pp.
- Strickberger, M. W. 1996. Evolution, 2nd Edition. Jones and Bartlett Publishers, New York. 670pp.
- Telford, I. R. and G. F. Bridgeman. 1990. Introduction to Functional Histology. Harper and Row Publishers, New York. 598pp.
- Walker, W. F. Jr. and K. F. Liem. 1994. Functional Anatomy of the Vertebrates, 2nd Edition. Saunders College Publishing, Forth Worth, Texas. 788pp.
- Wolff, R. G. 1991. Functional Chordate Anatomy. D. C. Heath and Co., Lexington, Massachusetts. 752pp.

2. A Listing of the Proposed Change(s) Giving the Old Title and Number and the New Title and Number, the Old Course or Catalog Description and the Revised Description and a Summary of the Proposed Revisions

Old title and number: BI432/532 Comparative Vertebrate Anatomy
 New title and number: BI242 Comparative Vertebrate Anatomy

Old course description: Discussion of anatomy of representative vertebrates from a comparative point of view. Stresses major organization changes observed in vertebrate history. Two hours lecture, three hours lab per week.

New course description: An investigation of the comparative structure and function of the vertebrate body with emphasis on the diverse solutions to the problem of design for survival and the evolutionary mechanisms that provide those solutions.

Summary of the proposed revisions: Comparative Vertebrate Anatomy will be revised to

- better reflect the content of the field
- make the course available to students earlier in their tenure at IUP by changing the course number from BI432/532 to BI242
- change the current weekly schedule of 2 hours of lecture, 3 hours of lab spread over three meetings per week to two 2 1/2 hour integrated lecture/lab meetings per week.

3. Justification/Rationale for the Revision

The purpose of this revision is to:

1. update course content
2. assure that students have earlier access to a basic vertebrate anatomy course
3. restructure the course to allow for better integration of lecture and laboratory.

The field of comparative anatomy has changed over the last 20 years with an increasing emphasis on functional morphology (please note the repeated appearance of the word "function" in the titles of bibliography listed above). The core of the field remains an evaluation of the structure of vertebrates in the context of evolutionary theory, but it is now widely recognized that any evaluation of the selective advantage of a structure must include an analysis of the functioning of that structure. The revised course states that a full appreciation of vertebrate anatomy is possible only if both structure and function are studied in the context of evolutionary theory.

The Biology Department continues to have a large number of students whose interest lies primarily in vertebrate zoology (e.g. our pre-professional students). Although students do have (limited) exposure to the basic vertebrate body plan in BI 112 Principles of Biology II and BI220 General Zoology, there is a need for access to a more intensive study of vertebrate anatomy

early in the curriculum. These goals will be accomplished by changing Comparative Vertebrate Anatomy from BI432/532 (a senior-graduate course) to BI242 (a sophomore level course). Typically our majors complete BI111 Principles of Biology I and BI112 Principles of Biology II in their freshman year. They then (typically) take BI220 General Zoology in their sophomore year. The revision will position Comparative Vertebrate Anatomy to allow those students whose primary interest is in vertebrate zoology to take Comparative Vertebrate Anatomy following BI220 but prior to courses in areas such as physiology, evolution, developmental biology and ecology. In this way the students can obtain a detailed appreciation for the vertebrate body plan early enough for this information to provide a solid foundation for the remainder of the curriculum.

Anatomy is an extremely visual course with no substitute for hands-on investigation of the organism under study. Over the past several years, experimentation has revealed that a discussion of the functioning of (for example) the ruminant stomach, immediately followed by an investigation of a prepared cow stomach and comparison with the non-ruminant condition in cats, rats, rabbits and humans is much more effective than the more traditional separation (in time and space) of the lecture and lab. It required several years to work out the mechanics but the students have benefited from the immediate reinforcement of the material presented in lecture. It is therefore proposed that in the future Comparative Vertebrate Anatomy be scheduled for two 2 1/2 blocks of time per week instead of the traditional 2 lecture hours with a separate 3-hour lab.

Catalog Information

BI 432/532 COMPARATIVE VERTEBRATE ANATOMY

3 cr.

Prerequisite BI 120

Discussion of anatomy of representative vertebrates from a comparative point of view. Stresses major organization changes observed in vertebrate history. Two hours lecture, three hours lab per week.

Syllabus Content:

I. Summary of objectives:

- A. Obtain a knowledge of the vertebrate body plan.
- B. Obtain an understanding of the modifications of the basic vertebrate body plan through the process of evolution.
- C. Obtain a knowledge of the major concepts and methodologies of vertebrate functional anatomy.

II. Evaluation Techniques:

REQUIREMENTS 3 Lecture Examinations, Semi-cumulative - 100 pts each
 2 Laboratory Practicals, Non-cumulative - 100 pts each
 1 page written synopsis of a current journal article with background information as necessary - 25 pts
 Undergraduates only
 Option 1 - A 2nd written synopsis (1 page) of a current journal article - 35 pts
 Option 2 - A term paper - 100 pts
 Graduate Students - A term paper - 100 pts

III. Lecture topical outline:

Text: Functional Anatomy of the Vertebrates by W.F. Walker

<u>TOPIC</u>	<u>No. LECTURES</u>	<u>READINGS</u>
Vertebrate Embryology	1	Chap 4
Phylogenetic Principles	1	Chap 1
Vertebrate Phylogeny	2	Chap 3
Skeletal System	4	Chap 6,7,8
EXAMINATION		
Muscular System	2	Chap 9
Mechanics of Movement	2	chap 7,8 (parts)
Digestive System	2	Chap 14, 15
Resiratory System	1	Chap 16
Circulatory System	2	Chap 17
EXAMINATION		
Urogenital System	2	Chap 18,19

Nervous System	4	Chap 11,12
Ear and Lateral Line	1	Chap 10
Eye	2	Chap 10
FINAL EXAMINATION		

IV. Text: Structure and Evolution of Vertebrates by A. Feduccia

<u>TOPIC</u>	<u>No. LABORATORIES</u>	<u>READINGS</u>
Amphioxus, Cranial Skeleton	1	Chap 1,4
Cranial Skeleton	1	Chap 4
Postcranial Skeleton	1	Chap 5
Musculature	2	Chap 6
LABORATORY EXAMINATION		
Carnegie Museum Visit	1	
Digestive System	1	Chap 8
Circulatory System	2	Chap 9
Urogenital System	1	Chap 10
Nervous System	1	Chap 7
Review	1	
FINAL LABORATORY EXAMINATION		