

NEW COURSE PROPOSAL

DATE OCTOBER 25, 2005
PROGRAM AREA BIOLOGY

1. Catalog Description of the Course. *[Follow accepted catalog format.]*

Prefix BIOL **Course#** 403 **Title** FOUNDATIONS OF STRUCTURAL BIOLOGY **Units** (4)

3 hours Lecture **per week**

3 hours Lab per week

☒ **Prerequisites** BIOL 300

☐ **Corequisites**

Description Three hours lecture and three hours laboratory per week.

Study of structure and function of biological macromolecules. Topics include basic structures and properties of macromolecules in biological systems, molecular evolution, conformational changes of macromolecules and their biological implications and techniques used to determine molecular structure of biological macromolecules. Special emphasis will be placed on the role of structural biology in the design and understanding of both biological and chemical pharmaceuticals. A lab fee is required.

☐ **Gen Ed**

Categories

☒ **Lab Fee Required**

Graded

☐ **CR/NC**

☐ **Repeatable for up to** **units**

☒ **A - F**

☐ **Optional** (Student's choice)

Total Completions Allowed

☐ **Multiple Enrollment in same semester**

2. Mode of Instruction.

	Units	Hours per Unit	Benchmark Enrollment	Graded Component	CS # (filled in by Dean)
Lecture	3	1	20	<input checked="" type="checkbox"/>	
Seminar				<input type="checkbox"/>	
Laboratory	1	3	20	<input checked="" type="checkbox"/>	
Activity				<input type="checkbox"/>	

3. Justification and Learning Objectives for the Course. (Indicate whether required or elective, and whether it meets University Writing, and/or Language requirements) *[Use as much space as necessary]*

Justification: This is an upper-division elective course for biology majors or other students.

Learning Objectives:

Upon completion of this course students will be able to:

(Press enter for the next bulleted item)

- develop a working knowledge of the techniques required to resolve the atomic structure of proteins and small molecules.
- describe various patterns and forms of macromolecules in the biological systems
- describe the role of individual amino acids with respect to structure and function.
- identify the properties of biological macromolecules;
- state principles of molecular evolution;
- cite examples of conformational changes of macromolecules;
- explain the effects of conformational changes of macromolecules on their biological functions;
- using computational systems to visualize proteins in a virtual 3D setting and predict modifications of structure and binding of small molecules..

4. Is this a General Education Course YES ☐

NO ☒

If Yes, indicate GE category and attach GE Criteria Form:

A (English Language, Communication, Critical Thinking)

A-1 Oral Communication

☐

A-2 English Writing	<input type="checkbox"/>
A-3 Critical Thinking	<input type="checkbox"/>
B (Mathematics, Sciences & Technology)	
B-1 Physical Sciences	<input type="checkbox"/>
B-2 Life Sciences – Biology	<input type="checkbox"/>
B-3 Mathematics – Mathematics and Applications	<input type="checkbox"/>
B-4 Computers and Information Technology	<input type="checkbox"/>
C (Fine Arts, Literature, Languages & Cultures)	
C-1 Art	<input type="checkbox"/>
C-2 Literature Courses	<input type="checkbox"/>
C-3a Language	<input type="checkbox"/>
C-3b Multicultural	<input type="checkbox"/>
D (Social Perspectives)	<input type="checkbox"/>
E (Human Psychological and Physiological Perspectives)	<input type="checkbox"/>
UD Interdisciplinary	<input type="checkbox"/>

5. Course Content in Outline Form. *[Be as brief as possible, but use as much space as necessary]*
(Press enter for the next bulleted item)

- The building blocks of biological systems
- Basic principles of structures of the building blocks
- DNA recognition in procaryotes and eucaryotes
- Enzyme catalysis
- Membrane proteins
- Antibodies
- Peptidbodies
- Fusion Proteins
- Biological Human Therapeutics
- Fibrous proteins
- Recognition molecules of the immune system
- Signal transduction
- Structure of viruses
- Conformational changes of structure
- Molecular evolution
- Prediction, engineering and design of protein structures
- Determination of structure of macromolecules of the biological systems
- Rational Drug Design of small molecules

Does this course overlap a course offered in your academic program? YES ☐ NO ☒

If YES, what course(s) and provide a justification of the overlap?

Does this course overlap a course offered in another academic area? YES ☐ NO ☒

If YES, what course(s) and provide a justification of the overlap?

Signature of Academic Chair of the other academic area is required on the consultation sheet below.

6. Cross-listed Courses (Please fill out separate form for each PREFIX)

List Cross-listed Courses

Signature of Academic Chair(s) of the other academic area(s) is required on the consultation sheet below

Department responsible for staffing: Biology

7. References. *[Provide 3 - 5 references on which this course is based and/or support it.]*

(Press enter for the next number)

1. Structure and Mechanism in Protein Science : A Guide to Enzyme Catalysis and Protein Folding by Alan Fersht, W. H. Freeman; 3r.e. edition (September 15, 1998) ISBN: 0716732688
2. Foundations of Structural Biology (Plastic Comb) by Leonard J. Banaszak, Academic Press; 1st edition (February 15, 2000) ISBN: 0120777002
3. Introduction to Protein Architecture: The Structural Biology of Proteins (Paperback) by Arthur M. Lesk, Oxford University Press (2001) ISBN: 0198504748

8. List Faculty Qualified to Teach This Course.

Biology faculty member.

9. Frequency.

a. Projected semesters to be offered: Fall ☐ Spring ☒ Summer ☐

10. New Resources Required. YES ☒ NO ☐

If YES, list the resources needed and obtain signatures from the appropriate programs/units on the consultation sheet below.

a. Computer (data processing), audio visual, broadcasting needs, other equipment)

b. Library needs

c. Facility/space needs

The equipment needed for this course include a Molecular Structure lab and a x-ray crystallography defractor. Both will be established with the funding from Amgen.

11. Will this new course alter any degree, credential, certificate, or minor in your program? YES ☐ NO ☒

If, YES attach a program modification form for all programs affected.

Ching-Hua Wang
Proposer of Course

9/18/2005
Date

Approvals

Program Chair

Date

General Education Committee Chair

Date

Curriculum Committee Chair

Date

Dean

Date