NAME: Joseph D. Andrade	RANK: Professor	
DEPARTMENT: Bioengineering	CHAIR: R. Normann	
	•	
CAMPUS ADDRESS: 2480 M.E.B.	PHONE: 1-4379	
When would the grant activities be undertak	Cen? Spring Quarter, 1996	
SUMMARY OF PROJECT (not more than 150 words):		

I propose-to develop and pilot a new course, "Novel Biological Phenomena With Potential Engineering Application: Bio-Based Engineering," Spring Quarter, 1996, designed primarily for advanced undergraduates in biology, chemistry, physics, and engineering. This course will bridge biology and engineering using topics which are not well developed in existing courses. One of the objectives is to show that there are notes well known biological phenomena which can be applied to practical engineering problems. Another objective is to motivate the students to look beyond their immediate disciplines for ideas and inspiration.

The course is planned to focus on four key topics, developed by the instructor with the aid of faculty colleagues and student teams:

Photons in Biology

Water in Biology

Heat in Biology

Electricity and Magnetism in Biology.

DATE:__1/10/96

University Teaching Committee SEND TO:

120 Park Bldg.

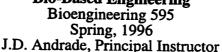
UNIVERSITY TEACHING GRANT BUDGET

Supplies and Travel

1. Supplies (please specify):	
Lab Supplies for Demonstrations & Experiments	\$_500.00
Literature Searching & Retrieval Supplies and Assistance	\$500.00
·	\$
	\$
	\$
2. Travel Costs (please specify):	
Hastings Laboratory	\$650.00
Jelinski Laboratory	\$650.00
University of California Davis Laboratory	\$250.00
	\$
	\$
TOTAL (\$3,000 Maximum)	\$2,550.00

University Teaching Committee Proposal January 1996

Novel Biological Phenomena With Potential Practical Applications: Bio-Based Engineering





Objectives and Rationale:

- 1. To research, design, develop, and preliminarily implement a new course for advanced undergraduates in biology, chemistry, physics, and engineering.
- To bridge biology and engineering using topics which are not well developed in existing courses.
- 3. To demonstrate that there are not well known biological phenomena which can be applied to practical engineering problems.

The basic rationale is that biology has had nearly 4 billion years to develop an enormous diversity of reactions, structures, and even phenomena, many of which are relatively unknown or unapplied

Design of Course:

The precise selection of topics will be based in part on student interests and backgrounds and on participating faculty interests. A tentative topic list and schedule is:

Week 1: Life science - physical science; biochemistry, biophysics, biomedical engineering -- toward bio-based engineering: Projects and Case Studies

Week 2: Topic 1 - Photons in Biology: Vision and Photosynthesis

Week 3: Topic 1 - Photons in Biology: Photon Production-Bioluminescence

Week 4: Topic 2 - Water in Biology: Drought Resistance and Anhydrobiosis

Week 5: Topic 2 - Water in Biology: Water Purification and Collection

Week 6: Topic 3 - Heat in Biology: Thermogenesis and Thermophilia

Week 7: Topic 3 - Heat in Biology: Collection and Dissipation

Week 8: Topic 4 - Electricity and Magnetism in Biology: Electroreception

and Sensing

Week 9: Topic 4 - Electricity and Magnetism in Biology: Magnetoreception

and Sensing

Week 10: Biological Backwaters -- Critical Engineering needs and problems

The instructor proposes to visit experts in several of the areas during the month of March in order to fully develop the topics.

In the case of Topic 1 he would work with Dr. J. Woody Hastings in the Department of Biology at Harvard. In the case of Topic 3 he would work with Dr. Lynn Jelinski of the Biotechnology Program and College of Engineering at Cornell University. Dr. Jelinski has offered an undergraduate biophysics course in which topic 3 was a major component. In the case of Topic 2, he expects to visit with the group at the University of California Davis that has done much of the pioneering work in anhydrobiosis.

It may also be possible to induce these experts to come to campus during the first several weeks of the course in late March and have a quick, fast-paced set of lectures and discussions on these topics. It is highly probable that this would work with Woody Hastings, as he has been to Utah several times in the past and is quite fond of the area, particularly if the snow conditions are good.

Joe Andrade has also talked with Lynn Jelinski in the past about visiting and it is likely that she could participate as well. If this is the case, then the funds budgeted for travel would also be used for the travel and expenses of these speakers.

Announcing a new course inspired by the Whitaker Bio-Based Engineering Program Dept. of Bioengineering

From Biology to Engineering:

Novel Biological Phenomena with Potential Engineering Application

Instructor: J.D. Andrade

Bioengineering 595 - 4; Special Topics Spring, 1996

Tuesdays & Thursdays, 5:00 - 6:30 p.m. 3 credit hours

Prerequisites: Upper Division or graduate standing in science, math, engineering, or other

technical major.

Week 1: Life science - physical science; biochemistry, biophysics, biomedical

engineering -- toward bio-based engineering: Projects and Case Studies

Week 2: Topic 1 - Photons in Biology: Vision and Photosynthesis

Week 3: Topic 1 - Photons in Biology: Photon Production-Bioluminescence

Week 4: Topic 2 - Water in Biology: Drought Resistance and Anhydrobiosis

Week 5: Topic 2 - Water in Biology: Water Purification and Collection

Week 6: Topic 3 - Heat in Biology: Thermogenesis and Thermophilia

Week 7: Topic 3 - Heat in Biology: Collection and Dissipation

Week 8: Topic 4 - E and M in Biology: Electroreception and Sensing

Week 9: Topic 4 - E and M in Biology: Magnetoreception and Sensing

Week 10: Biological Backwaters -- Critical Engineering needs and problems