

Telecourse

UTAH HIGHER EDUCATION
TECHNOLOGY INITIATIVE
CURRICULUM DEVELOPMENT RFP

17

APPLICATION

1. DATE OF APPLICATION: 1/13/95 APPLICANT INSTITUTION(S): University of Utah SPONSORING UNITS: Liberal Education/Undergraduate Studies/Engineering		
2. COURSE TITLE: Science Without Walls: Art COURSE NUMBER: Lib Ed 144 UNITS OF CREDIT: 5		
3. PROJECT DIRECTOR: J.D. Andrade NAME: Liberal Education Program/College of Engineering COLLEGE/UNIT: Center for Integrated Science Education PHONE: 581-4379 E-MAIL ADDRESS: jdandrad@cc.utah.edu MAIL DROP: 2480 MEB Univ. of Utah SLC, UT 84112		
4. MAJOR GOAL OF THE PROJECT: To develop the first in a series of three Liberal Education courses titled Science Without Walls, 20 broadcast hours, together with experimental kits.		
5. HETI CATEGORY IMPACTED BY THE PROJECT: 3a. General Educ. Core		
6. SUMMARIZE ESSENTIAL ELEMENTS OF THE PROPOSAL: <ul style="list-style-type: none">• Develop a 20 hour, Channel 9-based, distance learning Liberal Education course titled Science Without Walls: Art, Lib Ed 144, based in part on the existing Lib-Ed sequence 144, 145 Science Without Walls, being piloted this Winter/Spring 1995;• Develop a hands-on, experiential kit, tentatively titled Science Through Art, which will enable the student participants in the course to individually and collectively experiment and discover all of the major concepts and activities developed in the lectures;• Develop a comprehensive syllabus for the course, probably to be followed with a published textbook, which thoroughly develops and extends the lectures and integrates the experimental kit;• Offer the Science Without Walls: Arts as a Channel 9 course, probably in Winter, 1996;• Lay the groundwork for the second quarter of such a course, Science Without Walls: Music, although the development of that course will be the basis of a separate proposal.		
7. BUDGET: HETI \$ 67,750 MATCH \$ 18,500 TOTAL \$ 87,250		
Signatures Project Director: <i>J. D. Andrade</i> Chief Academic Officer:		

Part I: Abstract

"Just as eating against one's will is injurious to the health, so study without a liking for it spoils the memory, and it retains nothing it takes in." This quote is attributed to Leonardo da Vinci, but it is particularly appropriate in modern science education.

Everyone is interested in *something*. This is the assumption behind our Science by Seduction approach, pioneered by the Center for Integrated Science Education at the University of Utah, and the basis of several unique and novel courses now offered through the Liberal Education program. Interest-based science via inquiry is also the basis of the Utah Science/Arts Center, a modern science museum/science center now being developed in Salt Lake City.

We propose to develop, produce, and implement Science Without Walls: Art, a 5 credit hour science core Liberal Education Course to be offered through the Channel 9 instructional television mechanism. The course will be a modified version of the existing Lib-Ed 144 Science Without Walls, now being taught by University Professor J.D. Andrade. The course will be modified and enhanced for instructional television, with completion of the script and syllabus during Summer, 1995 and filming and production during Fall, 1995. The first Channel 9 offering is anticipated for the Winter 1996 schedule.

We propose to develop an experimental science kit based on a topic of major interest to the undergraduate and non-traditional student population: Art. An interest-based approach to science facilitates the involvement of the student in topics and activities in which they are already interested and makes it easy and straightforward to increase their interest spectrum and so doing to make them aware of much of the great breadth of science and thereby the opportunities available to them. We will connect their interests to the basic sciences, mathematics, and technology.

This project falls into the HETI development category, A) courses from the Liberal Education Core, and F) Technology enhanced modules for courses, and meets most of the goals of the HETI.

Part II: Project Proposal

A. Importance

This project falls into the HETI development category, A) courses from the Liberal Education Core, and F) Technology enhanced modules for courses, and meets most of the goals of the HETI. No similar course is now available over broadcast television. This course and an anticipated companion course, Lib-Ed 145, Science Without Walls: Music, would meet the Lib-Ed core science requirement for undergraduates.

One of the major problems with the use of educational television for university courses in the sciences is the lack of a suitable laboratory hands-on component. This project proposes, in addition to producing a course for television, to utilize hands-on, experimentally-based kits for each student taking the course.

This is part of an initiative of the Center for Integrated Science Education (CISE) called the Labless Lab. We have already developed a Labless Lab for polymer science for undergraduate polymer materials courses which do not have a separate laboratory component. Indeed, this Labless Lab, developed in part by the Center for Integrated Science Education, is now being developed by a local spin-off company, Protein Solutions, Inc. (PSI) in Salt Lake City. Labless Lab is a registered trademark of PSI (31).

Protein Solutions, Inc. (PSI) is now developing a Labless Lab® on Science Through Art. They have submitted a grant to the NIH through the Small Business Technology Transfer Program, which includes the development of Labless Lab® kits in Science Through Art and a separate kit in Science Through Music. They are also committed to developing these kits whether or not their NIH grant is funded.

The availability of the Lables Lab for Science through Art will make it possible for individual students and groups of students in remote locations to fully experience the experiential laboratory part of the course.

Students will also be organized into groups which will "meet" via electronic mail and/or telephone conferencing.

B. Course Description

There has been considerable concern in the past decade in the growing disinterest in science studies and careers among high school, college, and university students (1,2). Although there has been an increasing number of programs designed to interest students in the sciences, there has been little concerted effort in directly addressing those populations which express considerable *disinterest* in the sciences.

The Science by Seduction approach, now being actively pursued in the University of Utah's Center for Integrated Science Education, is based in large part on Howard Gardner's *Frames of Mind: Theory of Multiple Intelligences* (3). Fundamentally, the approach accepts the fact that different segments of the population have different aptitudes and interests, and may even be wired differently. Rather than ignoring this fact or trying to change it, courses and workshops have been developed which build on it (11,12). There is a great deal of science in music, for example, and many famous scientists have been outstanding accomplished musicians. Although examples in the arts are not as common, Leonardo da Vinci is always given as an example of an individual with incredible accomplishments and skills in the arts, the sciences, and engineering/technology.

The so called right vs. left brain model, which is often employed to "explain" or rationalize the different interests and aptitudes of various individuals, was well analyzed by Shlain (4) concluding in part that the real goal of education ought to be to show students how they can indeed synthesize or connect their right and left brain to achieve enhanced levels of creativity and productivity.

Shiela Tobias, in her important study, *They're Not Dumb -- They're Different* (13), showed that Arts and Humanities students are not necessarily disinterested in the sciences, but they are put off by the way the sciences are presented and taught.

We propose to take students with interests and aptitudes in art and music and enhance and expand their interests to include science -- *not* to substitute for their interest in art, but rather to enhance those interests, and to *employ* their art skills, modes of thinking, and creativity *in the sciences*. We expect to produce a small group of individuals with levels of creativity and perception enhanced (4) over those who, however smart and accomplished, take the more traditional, direct route into the through the sciences.

The Project 2061 report, *Science for All Americans*, argues strongly and persuasively for an integrated approach to the sciences (1,2). We feel that it is important that at least some small subset of the population go even beyond that report and consider an integrated approach to education in general (14).

J. Andrade is Professor of Bioengineering and Co-Director of the Center for Integrated Science Education at the University of Utah. Joe has almost no skills, and up until recently had little interest, in the arts. Reputed by his wife to be completely tone deaf and incapable of dealing with primary colors, he does enjoy listening to music, and has occasionally made some limited, but futile, attempts to produce art.

With the founding of the Center for Integrated Science Education, and the realization and adoption of Project 2061's goals and guidelines, Joe began to develop a set of courses and workshops designed initially for elementary teachers, called Integrated Science Concepts and Themes (11). As he got into these workshops, and began to study the work of Howard Gardner and other educational psychologists (3,14), he began to realize that the people which we must interest in science are *disinterested* because they are really very interested in something else, and the only way to effectively and successfully interest them and involve them in science is to find out what does interest them and to connect through that interest. We call it interest-based science, or *Science by Seduction*.

In working with elementary teachers in Utah Joe found that what really interests them are the things that they would rather be doing if they could be doing anything at all. Some of those topics include: gardening, cooking, outdoor activities, sports, dance, sex, music, and art, as well as many others. We have adopted one of those interests for this distance learning course. We hope to address the other ones in subsequent proposals and activities.

The Center for Integrated Science Education (CISE) has thus embarked on a major effort to develop interest-based science courses for the university undergraduate population. Joe is now teaching a two quarter liberal arts course, Science Without Walls: Science for the Science Resistant, which is an interest-based approach. He regularly gives workshops for elementary teachers which, although called Integrated Science Concepts and Themes (11), are based on the teacher's personal interests

Protein Solutions, Inc. is a Salt Lake City firm which is a spin-off of some of the Center for Integrated Science Education's activities. It now manufactures bioluminescence science kits, the Science in the Dark product line. It is also developing the Labless Lab™ product line, using National Science Foundation support. PSI is well aware of hobby and science product marketing and distribution

This course is expected to have a life expectancy of at least five years and to be made available practically every quarter, depending on demand and on air time. The budget includes one hour broadcast time for updating and correction purposes, after we have had about 2 years experience with this particular course.

The syllabus will be revised annually and the Labless Lab for Science and Art will be modified as necessary to reflect the changes in the syllabus. We will draw from a number of excellent texts and other resource materials which develop concepts of physics, chemistry, and biology through art, form, and patterns (see Reference List). Since much of this material is well known and can even be traced to older, historical manuscripts, copyright issues are not a major concern, although the budget includes some funds for

securing of permission to use materials in modern texts and sources. However, the great bulk of our materials will be developed locally as part of this project, or will be derived from classical sources wherein copyright has long since expired.

C. Implementation Strategies

One: A version of this course is now being offered as Lib-Ed 144, Winter Quarter, 1995 by J. Andrade as part of his University Professorship. Based on the experience in this course and on individual student projects, as well as group projects in the course, a modified syllabus and script will be produced during the Spring Quarter. We have budgeted funds for a small group of these students in the present course to work with J. Andrade and his colleagues during the summer to prepare a script of lessons and lectures suitable for the instructional television version.

A prototype Labless Lab in Science Through Art will be available from Protein Solutions, Inc. in about June of this year. PSI has agreed to work with us (see letter) to optimize the kit to the instructional television script and lectures.

No funds in this proposal will be used towards the the Labless Lab in Science Through Art. The Labless Lab in Science Through Art will be developed and commercialized by Protein Solutions, Inc. (PSI), a local Salt Lake City company which already has a Labless Lab product line (see attached letter). PSI is already negotiating with a number of publishers of science and art textbooks to have the Labless Lab in Science Through Art distributed through normal textbook college and university bookstore mechanisms.

The kit components are relatively straightforward, involving a set of light sources, filters, a variety of paints and other media, experiments related to perspective, two vs. three dimensions, symmetry, texture, use of various computer *Paint* programs, etc.

Our art-based activities will rely upon two excellent texts: Falk, et al.'s *Seeing the Light: Optics in Nature, Photography, Color, Vision, and Holography* (6), and

Williamson and Cummins', *Light & Color in Nature & Art* (10). From the preface of the Williamson book: "This book is an introduction to the science of light and color in its applications to photography, art, natural phenomena, and other related areas. It is intended primarily as a text for a one semester or one quarter college course for students with little or no background in science or mathematics." In the case of the Falk preface, many students "came with a definite interest -- a 1, vision, photography, holography, illusions, the visible world around them -- a large variety of specific interests was already there before we said the first word." Although these two books connect a range of physical and biological concepts to art and vision, they do not really *begin* with interests and aptitudes related to art. Our task is more difficult. *We choose to start with art* -- those activities and interests which an art student would naturally choose and through those activities have them derive and discover a range of scientific concepts, perhaps by attempting to paint the iridescent colors of a butterfly, and thereby getting into the optics of butterfly wings, for example.

This will require working closely with art educators and with a variety of physical and biological scientists who have personal interests in painting and art. A good, although unfortunately dead, example is the famous physicist Richard Feynman, who became quite interested in artists and art and became a fairly accomplished artist in his own right. The best example, of course, is Leonardo da Vinci, who basically studied human anatomy and the human form in order to be able to perfect his art. We will, of course, borrow heavily from Leonardo's sketchbooks and his own treatise on art (19), as well as the Feynman example (18). We will also draw heavily on the Thompson's *On Growth and Form* (16), and related books dealing with design and symmetry in biology. This will also be connected closely to mathematics, particularly geometry and topology based on the arguments and methods presented in the recent mathematics education study, *On the Shoulders of Giants* (17).

J. Andrade is professor of Materials Science & Engineering and of Bioengineering and has been on the University of Utah faculty for over 25 years. His was named University Professor for 1994-'95 and, as part of this assignment, has developed the Science Without Walls offerings, Lib-Ed 144-145, which are presently being taught. He has a strong interest in undergraduate science education. He founded, and now co-directs, the Center for Integrated Science Education and has been involved with a variety of inservice courses for elementary and jr. high teachers throughout the state of Utah. Some 400 teachers have taken his course, Integrated Science Concepts and Themes (11). Joe also developed the Labless Lab in Polymer Science, basically to support his own teaching activities in Materials Science & Engineering 519, Polymer Materials, a course which does not have a laboratory. He founded Protein Solutions, Inc. (PSI) in 1988 to develop unique and novel science education materials, including the Labless Lab product line. PSI has a technology transfer agreement with the University of Utah and has the right of first refusal to educational technologies emanating from Joe's laboratory.

PSI is developing the Labless Lab® in Science Through Art with its own funds and expects to obtain federal NIH Small Business Innovation Research Funds for this purpose. The company is committed to the Labless Lab® product line and will have a prototype Labless Lab® in Science through Art available in early summer. No funds from this proposal or project will flow to PSI.

Joe will be assisted in this project by Mary McDonald, Manager of the Center for Integrated Science Education, who is now completing a Bachelor of University Studies degree in Science Education, and by Mr. James Biggs, a graduate student in Bioengineering who is also the Manager of the Leonardo Laboratory, a unique, hands-on, science laboratory which has been set up in University space in the Research Park and is the laboratory component of the Center for Integrated Science Education.

In addition, funds have been budgeted for one or two faculty in the Department of Art to participate in this project during the Spring and Summer of 1995. Funds have also

been requested for several advisors and consultants who will be brought onto campus for lectures and seminars in Science Through Art and will be directly involved in the lecture and laboratory materials for this course.

Production of the instructional television component will be handled by the University of Utah staff already experienced in such activities, with the advice and assistance of K. Rodin-Popich in the Division of Continuing Education.

E. Financial Match (see footnote on Budget Page)

Joe will donate his services during the Summer Quarter of 1995 nearly full time to this project. All of this can be considered a significant personal and institutional match.

F. Evaluation & Dissemination

The Division of Continuing Education (DCE) and Channel 9 have mechanisms in place to evaluate the effectiveness of instructional television courses. We will utilize the standard mechanisms which the University of Utah, DCE, and Channel 9 use.

It is hoped and expected that the course will prove effective and popular. We expect that the University of Utah and its Division of Continuing Education will make the course available to other institutions in the state system. There is also the possibility that the tapes and syllabi might be of interest to distance learning initiatives in other states and regions. If this is indeed the case, it is expected that the University and the Division of Continuing Education will develop a mechanism with which to sell and/or license the course to those other institutions.

In addition, J. Andrade expects to present papers and workshops related to the course at appropriate meetings and conferences related to telecourses and distance learning. He will collaborate closely with the staff in the Division of Continuing Education and Channel 9 in preparing joint publications, workshops, and talks.

Reference List

1. F.J. Rutherford and A. Ahgren, *Science for All Americans* (The Project 2061 Report), Oxford University Press, 1990.
2. Project 2061, *Benchmarks for Science Literacy*, Oxford University Press, 1993.
3. H. Gardner, *Frames of Mind: Theory of Multiple Intelligences*, Basic Books, 1985.
4. L. Shlain, *Art and Physics*, Morrow, 1991.
5. R. Baierlein, *Newton to Einstein: The Trail of Light*, Cambridge University Press, 1993.
6. D. Falk, et al., *Seeing the Light*, Wiley, 1986.
7. D. Ackerman, *A Natural History of the Senses*, Vintage Books, 1990.
8. D. Dusenbery, *Sensory Ecology*, Freeman, 1992.
9. M.I. Sobel, *Light*, University of Chicago Press, 1987.
10. S.J. Williamson and H.Z. Cummins, *Light & Color in Nature & Art*, Wiley, 1983.
11. J.D. Andrade, "Integrated Science Concepts and Themes," a 10 hour inservice course, Center for Integrated Science Education, University of Utah.
12. J.D. Andrade, et al., *Using Novel Biological Phenomena to Enhance Integrated Science Education*, in A. Campbell, ed., *Bioluminescence and Chemiluminescence*, Wiley, 1994, in press.
13. S. Tobias, *They're Not Dumb, They're Different!*, Research Corp., Tucson, AZ, 1990.
14. S. Kovalik, *Integrated Thematic Instruction*, Books for Educators, Oak Creek, AZ, 1993.
15. *A Curious Alliance: Role of Art in a Science Museum*, The Exploratorium Publications, San Francisco, 1994.
16. D'arcy W. Thompson, *On Growth and Form*, Cambridge University Press, 1971.
17. L.A. Steen, Ed., *On The Shoulders of Giants: New Approaches to Numeracy*, National Academy Press, 1990.
18. C. Sykes, *No Ordinary Genius: The Illustrated Richard Feynman*, Norton, 1994.

**UTAH HIGHER EDUCATION
TECHNOLOGY INITIATIVE
CURRICULUM DEVELOPMENT RFP**

BUDGET SUMMARY

PROJECT TITLE: Science Without Walls: Art
 PROJECT DIRECTOR(S) J. Andrade
 TOTAL HETI REQUEST: \$ 68,750
 TOTAL INSTITUTIONAL MATCH: \$ 18,500

EXPENDITURE CATEGORIES:

Note: Please be very specific in kind and type of hardware/software to be purchased. It is equally important to detail the inservice hours and type of training to be given. This will assist the reviewers in the evaluation of your project.

CATEGORY		HETI FUNDS	MATCH
<u>PERSONNEL</u>	J. Andrade - released time	\$6,000	\$12,000
Salaries	Student Assistant - Undergraduate	\$4,000	--
Benefits	Mary McDonald - CISE	\$4,000	\$4,000
	James Biggs - Leonardo Lab	\$4,000	\$2,000
	Art Professor - released time	\$2,000	--
<u>EQUIPMENT AND SUPPLIES</u>			
General Supplies		\$2,000	--
<u>INSTRUCTIONAL DEVELOPMENT/PRODUCTION</u>			
Instructional Development Costs			--
Production Costs 20 hrs @ 2,000/hr		\$40,000	--
License Fees		\$3,000	--
Library/Learning Resources			--
<u>EVALUATION</u>			
Advisors/Consultants		\$1,500	\$500
<u>INSERVICE:</u>			
		--	--
<u>OTHER: (e.g., travel, duplication costs, etc.)</u>			
Travel for dissemination and evaluation		\$750	--
Syllabus production/duplication		\$1,500	--
<u>Totals</u>		<u>\$68,750</u>	<u>\$18,500</u>

* Fall Quarter, 1995 will be made available to spend full time on this project. Released time funds requested will be used to partially compensate Andrade's 2 home departments for the teaching that he would not otherwise be doing, much as has been done this year with the University Professorship award. Funds for Mary McDonald and James Biggs are provided via grants and resources available through the Center for Integrated Science Education. The evaluation component for consultants is provided via CISE and a grant it has with the Utah Science/Arts Center.

Protein Solutions, Inc. (PSI)
Science Education Innovators

January 26, 1995

J.D. Andrade, Ph.D.
Co-Director, Center for
Integrated Science Education
2480 Merrill Engineering Building
University of Utah
Salt Lake City, Utah 84112

Dear Joe:

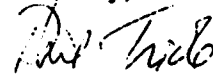
I was pleased to learn of your proposal through the State's Higher Education Technology Initiative to partially develop a Labless Lab® for Science Through Art and to develop an educational television version of your current Liberal Education course, Science Without Walls.

As you know, Protein Solutions, Inc. is developing the Labless Lab® line of science and technology educational kits. Our first such kit, a Labless Lab® for Polymer Science, will be announced at the October 1995 meeting of the National Science Teachers Association here in Salt Lake City. We have already initiated work on our Labless Lab® for Chemistry. Our recent STTR proposal to the National Institutes of Health, which includes a sub-contract to the Center for Integrated Science Education, is to develop the Science by Seduction product line, that is, a set of science kits which indeed use art and music as the vehicles to interest students in science.

Our Labless Lab® in Science Through Art complements and augments your proposed telecourses. We are pleased to lend our experience and expertise to your project and look forward to working with you in optimizing our prototype kit for your educational television course. As you know, we are already developing the marketing and licensing relationships to permit such a kit to be nationally and even internationally marketed and distributed in early 1996.

We look forward to continuing to work with you in the enhancement of science education at all levels.

Sincerely,



Phil Triolo, Ph.D.
President, PSI

psi/17jan95

350 West 800 North, Suite 218
Salt Lake City, Utah 84103-1441
Phone/FAX: (801) 596-2675



Center for
Integrated Science
Education (CISE)

*copies to
Pershing
from fellow
Tom Mayor
K Roden - Persch
(CISE)*

MEMO

To: Andrea Dugan
Ken Jameson

From: J.D. Andrade

Date: January 26, 1995

Subject: Utah Higher Education Technology Initiative RFP and Proposal.

Thank you for the reviewer's comments and your suggestions regarding my Utah Higher Education Technology Initiative Curriculum Development Proposal. The revised proposal is attached.

Please be advised that I have clarified the proposal with respect to the interaction with Protein Solutions, Inc., a local spin-off company in which the University has an equity position, and in which I have a personal interest as founder. There will be no funds flowing from this project to Protein Solutions, Inc., PSI is developing the Labless Lab® in Science Through Art solely with its own funds. It also anticipates federal SBIR funds to aid in this development. PSI has agreed to customize its prototype lab to meet the needs of our proposed distance learning course.

Given the existing Technology Transfer agreement between PSI and the University of Utah, an automatic royalty would be paid to the University for any and all Labless Lab® in Science Through Art kits which are sold -- not because they are funded by or are part of this project, but because of my involvement with PSI and my potential conflict of interest. This automatic royalty payment mechanism insures that the University receives appropriate compensation and credit for my activities which might be indirectly beneficial to PSI.

Any and all royalties and income from the video tapes, or other audio visual media which might be produced as a result of this project, will be the sole property of the University of Utah unless the University at some later date chooses to make alternative arrangements.

Cont/...



Center for
Integrated Science
Education (CISE)

I trust this clarifies the concerns which one of the reviewers had regarding a potential conflict of interest between my involvement in this project and my involvement in Protein Solutions, Inc. (PSI).

Please let me know if you need any further clarification. Signed endorsements from my Department Chair, G. Stringfellow, Materials Science & Engineering, and my Dean, David Pershing, College of Engineering are given in the next page. Dr. Slava Lubrumudov is sending his endorsement directly to your attention.

I trust that the proposal is now suitable for submission and that you will see to it that it is submitted to the State Board of Regents by the deadline date for the first round competition, February 3, 1995.

cc: G. Stringfellow, MSE
D. Pershing, College of Engineering
S. Lubrumudov

cise/25jan95



MEMO

To: Andie Dugan
205 Park Building

From: J.D. Andrade *[Signature]*

Date: January 18, 1995

Subject: Course Development Proposal for the Utah Higher Education
Technology Initiative Curriculum Development RFP.

Enclosed are three copies of a proposal in response to the above mentioned RFP. I have discussed this project with Dr. Reebea Keele, Dean for Undergraduate Studies, and Dr. K. Roden Popich in the Division of Continuing Education. I have also discussed it with my dean and department chair and they are supportive.

I trust that you will see to it that the proposal is submitted to the State Board of Regents by the deadline date for the first round competition, i.e., February 3.

Please let me know if you need any further information.

cc: G. Stringfellow, Chair, Materials Science & Engineering
D. Pershing, Dean, College of Engineering
R. Keele, Dean, Undergraduate Studies

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*I strongly support Professor
Andrade in this activity and
hope that you will seriously
consider his request. His ideas
do excite kids about science.*

Dave Pershing

Department of Bioengineering
2480 Merrill Engineering Building
Salt Lake City, Utah 84112
(801) 581-8528
FAX: (801) 585-5361

THE
UNIVERSITY
OF UTAH

MEMO

To: Andie Dugan
205 Park Building

From: J.D. Andrade

Date: January 18, 1995

Subject: Course Development Proposal for the Utah Higher Education
Technology Initiative Curriculum Development RFP.

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I trust that you will see to it that the proposal is submitted to the State Board of Regents by the deadline date for the first round competition, i.e., February 3.

Please let me know if you need any further information.

cc: ~~R. Norman, Chair, Bioengineering~~
D. Pershing, Dean, College of Engineering
R. Keele, Dean, Undergraduate Studies

© Stringfellow, C. 1992,
MSE

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Jan. 19, 1995
Joe,
Good luck with
this project. We
will allow the one
quarter release from
teaching during Autumn
1995.

Department of Bioengineering
2480 Merrill Engineering Building
Salt Lake City, Utah 84112
(801) 581-8528
FAX: (801) 585-5361

DGA
G.D. Stringfellow
Chair, MSE