SACRAMENTO STATE

Program Proposal
Form B

Academic Group *(College)*: **NSM**	**Date of Submission to College Dean: September 29, 2008**
Academic Organization *(Department)*: **Biological Sciences**	**Requested Effective: Fall X, Spring___, 2009.**
Department Chair: **Rose Leigh Vines**	**Contact if not Department Chair:** **Shannon Datwyler or Thomas Peavy**
Title of the Program: Master of Arts in Biological Sciences	

Type of Program Proposal:

_____ Modification in Existing Program:
- **___ Substantive Change**
- **___ Non-Substantive Change**
- **___ Deletion of Existing Program**

___X__ New Programs
- **___ Initiation (Projection) of New Program on to Master Plan**
- **_X_ New Degree Programs**
  - **___Regular Process**
  - **_X_Fast Track Process**
  - **___Pilot Process**
- **___ New Minor, Concentration, Option, Specialization, Emphasis**
- **___ New Certificate Program**

PLEASE NOTE: **Form B is to be used only as a Cover Form. Additional information is requested for each of the above as noted in the corresponding procedure in the Policies and Procedures for Initiation, Modification, Review and Approval of Courses and Academic Programs found at http://www.csus.edu/acaf/univmanual/index.htm**

Briefly describe the program proposal (new or change) and provide a justification.
In an effort to sustain and strengthen our graduate program in the Department of Biological Sciences,

We propose to expand our graduate program offerings within the Department of Biological Sciences at CSUS by adding a Master of Arts (MA) non-thesis degree to our pre-existing Master of Science (MS) thesis degree. One of our main goals is to serve individuals whose primary motive is for professional career advancement in a biology-related field that do not need a thesis degree program (e.g. teaching, patent law, science journalism, biotechnology, and state agency positions). There is a demand for such non-thesis graduate degree programs as evidenced by our survey of K-12 teachers in the region and the establishment of similar programs by biology departments at six other CSU campuses. The coursework requirements for both the MA and MS programs will be identical so as to provide rigorous advanced course preparation (total of 30 units). However, in lieu of a research thesis, the culminating requirement for students in the MA program will be a written project based on a research problem in biology under the supervision of a faculty advisor. The primary objectives of the MA program are to produce students with an advanced understanding of biology and the ability to apply the scientific process to biological problems. Our proposed MA program will serve an unaddressed need in the Sacramento region by providing graduate education in biology for individuals who do not need a thesis degree for their professional development.

Approvals:

Department Chair: Ron Leigh Vinz **Date:** 10/16/08

College Dean: Laurel Heffernan **Date:** 10/20/08

University Committee: _____ **Date:** _____

Associate Vice President and Dean for Academic Affairs: _____ **Date:** _____

8/27/07

PROPOSAL FOR THE MASTER OF ARTS DEGREE IN BIOLOGICAL SCIENCES

Thomas R. Peavy, PhD
Biological Sciences Department
Fall 2008

1. Complete Form B – see attached

2. Definition of the Proposed Degree Major Program

a. Campus: Sacramento
Degree Terminology: Master of Arts in Biological Sciences
Intended implementation: Fall 2009

b. Department: Biological Sciences
Contact: Dept. Chair Rose Leigh Vines or Thomas Peavy

c. Proposer: Thomas R. Peavy, PhD, Assistant Professor of Biological Sciences and Chair of the Graduate Task Force subcommittee.

d. Objectives:
The main objective of the MA program is to produce students with an advanced understanding of biology and the ability to apply the scientific process to biological problems without a thesis requirement. We currently offer a Master of Science thesis degree based on original research in biology; however, not all individuals that would like to pursue graduate education need a thesis-based degree for their career development. We are thus proposing that in lieu of thesis research, students in the MA program would be required to complete a written project based on a research problem in biology under the supervision of a Biological Sciences faculty advisor.

e. Total number of units required for the major: 30 (note: same as the Master of Science thesis degree program in the Biological Sciences)

List of required courses (note: No new core courses are proposed, however a new culminating requirement (BIO 502) is needed since it is a project rather than a thesis)

Required Core Courses *(7 units)*
(2) BIO 220 Research Methods in Biological Sciences
(1) BIO 294 Seminar
(2) BIO 299 Problems in Biological Sciences (normally, up to 4 units may be applied to meet coursework requirements, however up to 8 units of 299 may be counted for students pursuing internship-based research in departmentally approved placements)

Select one of the following:
(2) BIO 221A Cell & Molecular Methods and Techniques
OR
(2) BIO 221B Methods in Ecology, Evolution and Conservation

***Culminating Requirement** (2 units)*
(2) BIO 502 Master's Project.
Catalog description: Completion of a written project based on a research problem in biology approved for the Master of Arts degree. Should be taken in final semester prior to the completion of all requirements for the degree. 2 units.

f. List of Elective Courses: (21 units; also up to six units of undergraduate upper division coursework taken as a graduate student may be applied to the MA degree if approved by advisory committee)
(3) BIO 214 Advanced Plant Ecology (BIO 160)
(3) BIO 222 Molecular Biology (BIO 184, CHEM 161)
(3) BIO 223 Human Molecular Genetics (BIO 139, BIO 184, CHEM 161)
(3) BIO 224 Genomics, Proteomics, and Bioinformatics (BIO 184, BIO 222 or instructor permission)
(2) BIO 233 Review of Human Gross Anatomy (BIO 22, BIO 122)
(3) BIO 245 Host/Pathogen Interactions (BIO 121, BIO 139, BIO 184)
(2) BIO 247 Contemporary Topics in Immunology (BIO 149A or instructor permission)
(3) BIO 260 Population and Community Ecology (BIO 160)
(3) BIO 269 Behavioral Ecology (BIO 160 or instructor permission)
(2) BIO 270 Conservation Policy and Administration (BIO 118, BIO 173 or BIO 179)
(3) BIO 273 Advanced Fishery Biology and Management (BIO 173 or instructor permission)
(3) BIO 279 Conservation Biology and Wildlife Management (BIO 160, BIO 179 or instructor permission)
(3) BIO 282 Evolution
(3) BIO 283 Biogeography
(3) BIO 292 Biological Concepts
(2) BIO 293 Research Conference (instructor permission)
(1-3) BIO 296 Experimental Offerings in Biological Sciences
(1) BIO 297A Teaching Biology Seminar (acceptance in GTA program or instructor permission)
(1) BIO 297B Laboratory Teaching (acceptance in GTA program or instructor permission)

g. Formal options, concentrations, or special emphases: none proposed

h. Course prerequisites and criteria for admission or continuation in the proposed program:

Prerequisites for individual courses are listed above in parentheses.

Admission critera:

- a baccalaureate degree;
- completion of a major in biological sciences or closely related field; or completion of 24 units of upper division biological science courses or courses in closely related fields, each of which must be passed with a "C-" or better;

- a minimum GPA of 2.75 in all biology courses and a minimum GPA of 3.0 in upper division biology courses
- GRE General Test scores;
- GRE Subject Test scores (either Biology, Biochemistry, or Cell and Molecular Biology scores are acceptable);
- two letters of recommendation from persons qualified to judge the applicant's potential for successful graduate study; and
- a statement of purpose

Continuation in proposed program is contingent upon the following:

- minimum grade point average of 3.0 is required for all courses used to meet degree requirement (courses in which a student earns a grade of C- or less may not be used to meet degree requirements)
- Student removes admission deficiencies identified by the admission committee (e.g. undergraduate upper division coursework) by the end of their second semester
- A biology faculty member has agreed to serve as their faculty advisor
- Student passes the Writing Proficiency Examination (WPE) or secured approval for a WPE waiver
- Student advances to candidacy prior to enrolling in BIO 502 (culminating requirement)

i. Explanation of special characteristics: not applicable

j. Articulation with community college programs: not applicable

k. Provision for meeting accreditation requirements:
Biology programs are not accredited by any outside agencies or organizations.

3. Need for Proposed Degree Major Program

a. List of CSU campuses and nearby institutions offering a non-thesis masters degree in the Biological Sciences:

i. CSU San Bernardino (MS, non-thesis program plan II)
ii. San Jose State University (MA, coursework master's degree)
iii. CSU East Bay (MS, Plan B, non-thesis)
iv. Cal Poly San Luis Obispo (Plan 2, non-thesis "Course Work Plan")
v. CSU Bakersfield (MS non-thesis option)
vi. CSU Channel Islands (MS non-thesis programs)

b. Differences between the proposed program and those listed above:
Description of other non-thesis masters degree programs:

i. CSU San Bernardino (MS, non-thesis program plan II)
In addition to 45 units of coursework (same for their MS thesis program plan I), non-thesis students are required to pass a comprehensive exam administered by the Biology department.

ii. San Jose State University (MA, coursework master's degree)

In addition to 30 units of coursework (same as their MS thesis program), MA students are required to pass both written and oral examinations administered by the biological sciences faculty.

iii. CSU East Bay (MS, Plan B, non-thesis)
In addition to 45 units of coursework (same for their MS thesis program, Plan A), MA students are required to complete a review paper based on "intensive study and analysis of the scientific literature" on a topic approved by the major professor and advisory committee. The student also needs to pass an oral defense centered on their chosen review topic.

iv. Cal Poly San Luis Obispo (Plan 2, non-thesis "Course Work Plan")
Additional coursework is required in place of the thesis units (9 units) for a total of 45 units (same total units as for their MS thesis option). Non-thesis students are also required to complete two comprehensive exams (the GRE biology subject test with score >650, and an essay exam covering three general areas of biology), and a written report on an "Independent study" project that is to be approved by the student's advisor.

v. CSU Bakersfield (MS non-thesis option)
In addition to 45 units of coursework (same for their MS thesis option), students are required to complete a project on a topic that is approved by the Graduate Committee (presented at time of advancement to candidacy).

vi. CSU Channel Islands (MS non-thesis programs)
The biology program has no thesis options but rather has two non-thesis degree offerings. The first is a MS degree in Biotechnology and Bioinformatics which is in essence simply coursework (33-34 units) with no culminating requirement. This track is designed to "prepare students with analytical, business and managerial skills along with sophisticated expertise in biotechnology and computational sciences for a diverse set of vocations." The second is a MS degree in Biotechnology & MBA Dual Degree (71 units) which requires a capstone project. This track is targeted for individuals interested in business-related careers within the biotechnology industry.

Comparison of our proposed non-thesis master's program to other programs:

Our program proposal is for 30 coursework units which is most similar to San Jose State University's MA coursework requirements. It should be noted that CSU Sacramento and San Jose State University are both on the semester system, whereas all of the campuses listed above that require 45 coursework units are on the quarter system. Our culminating requirement is a written project which is most similar to CSU East Bay but differs significantly. Students in our program will have two options for their written report. One option is to write a grant proposal that incorporates a literature review for background information (similar to CSU East Bay), but then goes a step beyond by challenging the student to apply the scientific process to identify a biological problem within this topic area and propose a means to experimentally solve it. Alternatively, a student can perform short-term internship-based research in departmentally approved placements, and then provide a formal written report on the project (i.e. Lab Project Report). Most other non-thesis programs require students to pass an exam for the culminating requirement.

c. List of other related curricula (at CSUS):
MS degree in Biological Sciences (thesis)

d. Results of formal survey:

An online survey was performed during the summer of 2008 to assess the demand for a non-thesis master's degree in the biological sciences to a population of K-12 teachers (one of the main target audiences for this degree program). The teacher database was created and generously shared by the Center for Mathematics & Science Education (MASE). The teachers in their database are local, credentialed, and have participated in the MASE center's professional development activities. The survey was constructed using the software within the web-site SurveyMonkey.com (http://www.surveymonkey.com/) so as to enable anonymous responses and automatic tabulation of results. Although 100 responses were collected and analyzed, even more responses could have been collected had it not been for the collection number limitation within the free version of the online software (as evidenced by teacher emails and phone calls received after the survey was closed).

Within the survey, the target audience was provided with an overview of our non-thesis program with respect to its goals, admission requirements, and degree requirements prior to answering four questions. The results of the survey are summarized below.

Question 1: Would it be of interest to you to have a Master's degree in the biological sciences for your professional development?
All 100 individuals responded with 50 of them stating Yes (50%) and the other 50 stating No (50%).

Question 2: If so, would you consider applying for admission into our proposed non-thesis MA degree program?
Of the 80 respondents to this question (the non-responding 20 individuals were from the No category above), 48 stated Yes (60%) and 32 stated No (40%).

Question 3: What is your current occupation? (Note: teachers, please specify which grade level you teach)
Elementary school level: 42 respondents (34 of these responded to question #2 and 15 replied Yes which is 44%)
Middle school level: 29 respondents (21 of these responded to question #2 and 18 replied Yes which is 86%)
High school level: 23 respondents (16of these responded to question #2 and 11 replied Yes which is 69%)
The remaining 6 respondents were comprised of administrators connected to curriculum development or implementation (e.g. coordinators or program directors) of which 3 of the 6 responded Yes to question #2.

Question 4: Would you be willing to be contacted by a faculty member (by email or phone) to provide us with valuable feedback so as to fine tune the program to match your needs? If so, please provide your contact information.
Thirty-seven individuals responded yes.

Analysis:

It seems evident that there is a significant amount of interest within the teacher population to warrant such a non-thesis program in the biological sciences in the Sacramento region. A thesis program does not seem to be the highest priority for a teacher's professional development. When teachers of different grade levels were subdivided and analyzed separately to assess their interest in our program within their subgroups (yes response to question 2), middle and high school teachers tended to have more interest (elementary 44%; middle school 86%, high school 69%). Since the focus of our program is on advanced coursework in the biological sciences, we anticipated that teachers of upper grade levels would likely have professional development goals more aligned with our program.

In addition to those surveyed above, one local law student attending McGeorge School of Law expressed a desire to join our non-thesis master's program. The law student stated that their career goal is to become a patent lawyer specializing in the biological sciences and that a master's degree in the biological sciences would augment their credentials and credibility in this profession. In addition, they stated a preference for a non-thesis program since a thesis was not necessary for their professional development.

e. Number of declared undergraduate majors and the degree production over the preceding years for the corresponding baccalaureate program:

Number of declared majors:

	2003-04	2004-05	2005-06	2006-07	2007-08
Department Total	674	763	881	916	910
College Total	1,169	1,323	1,531	1,603	1,588
% of College	57.7%	57.7%	57.5%	57.1%	57.3%

Degree Production:

	2003-04	2004-05	2005-06	2006-07	2007-08	5 yr Mean
Bachelor's	96	99	134	150	136	123
Second Bachelor's	2	0	1	0	1	1
Master's	6	16	13	15	12	12
Total	104	115	148	165	149	136

f. Professional uses of the proposed degree major program:

- K-12 teachers: professional advancement
- Lawyers: enrich credentials for biological applications (e.g. patent law, environmental law, medical law, genetic privacy)
- Biotechnology: enhance job opportunities and professional advancement
- State agencies: enhance job opportunities and professional advancement
- Students: additional preparation to increase student opportunities for admission into Ph.D programs, medical school, and other biology-related and health professional schools (e.g. pharmacy, dentistry, etc)