APPENDIX H: UPDATED STUDENT OUTCOMES ASSESSMENT PLAN

Student Learning Outcomes Assessment Plan
Master of Biotechnology Program
Department of Biology
California State University, Fresno
Revised March 1, 2016

Background:

The Master of Biotechnology (M.Bt.) Degree is an interdisciplinary graduate program housed in the Department of Biology in the College of Science and Mathematics, but integrated across Departments in several Colleges and Schools of the University.

The M.Bt. degree is a designated Professional Science Master's (PSM) degree, a relatively new inter-disciplinary degree concept (developing nationally since 1997) wherein students are fundamentally educated in the sciences, but also engage in so-called "plus" courses and an internship experience as part of the core curriculum, in order to promote rapid transition of students into business, industry, non-profit organization or government agency careers. As is common with most PSM degrees, the "plus" component of the M.Bt. degree emphasizes business courses and experiences.

Biotechnology includes an incredibly wide diversity of applications including, for example, pharmaceutical development, crop and livestock improvement, diagnostic and therapeutic medicine, industrial processing, and bioremediation of contaminated environments. The M.Bt. degree will encourage students with interests in many of these areas, but, due to unique regional resources, the program will emphasize the areas of: agricultural biotechnology, medical diagnostics, bioremediation, and biofuels development.

Mission Statement:

Biotechnology is a multidisciplinary endeavor that increasingly requires employees fluent in both science and business to enable the development of new technologies and products based on the unique applications of the cellular and molecular life sciences. The Professional Science Master's Degree in Biotechnology at the California State University, Fresno offers students, who are fundamentally educated in various scientific disciplines, the opportunities to acquire the knowledge and skills required to comprehend and commercialize these emerging technologies and/or their products.

The graduate program of the Department of Biology will provide state-of-the-art educational experiences that will prepare students to make valuable contributions to society where a knowledge and understanding of biological organisms and processes are required (e.g., biodiversity, conservation and the environment, health sciences, and biotechnology). Students will learn laboratory and/or field techniques and will conduct independent research within the biological sciences. They will also acquire the skills necessary for communicating biological information to professional scientific peers as well as to the lay public.

Learning Goals and Objectives for Biotechnology Graduate Students

A. Student will show competence in writing, and also in developing/planning their research project. This will require careful analysis of the scientific literature. This will be shown by scores earned on the graduate writing requirement. Their project committee determines the scores.
B. Students will complete biotechnological research project/thesis and show competence in writing, speaking and presenting their research. Completion of the project/thesis will demonstrate the ability to plan experiments (including controls0 and analyze results suing appropriate statistical methods. This occurs in the project report both written and oral.
C. Research will be of high quality as determined by the number of presentations made at local, regional, and national/international meetings and papers published.
D. Students will demonstrate competence in speaking and presentation skills as appropriate for industry. This will be evaluated in their internship formal talk on campus and including industry partners for the program. Completed by audience members.
E. Students will demonstrate an understanding of business ethics, culture and practices. Furthermore the

students will demonstrate professionalism and competence at industry location internships. This will be evaluated through survey completed at the end of the internship by the students' supervisor at the internship location.

Courses	Objectives				
	A	B	C	D	E
Bio/Chem 248 (Fall)	I		I	I	I
Bio/Chem 248 (Spring)	A		I	I	I
Bio/Chem 241A & B	I, R	I, R			
MBA 270			R	R	C
MBA 272 or 273			R	R	C
Biotc 275			A	A	A
Biotc 299/298		A			

I = introduced, R = reinforced, A = advanced

C. Direct measures
1. Exit seminar with research results evaluation by faculty present. (rubric attached)
2. Internship oral report evaluated by faculty and industry members present. (rubric attached)
3. Graduate writing requirement evaluation by faculty members (at least three) assigned to the student's project committee. (rubric attached)
4. Publication and presentations as total numbers
5. Internship sites review students understanding of business ethics, culture and practices. Also students' professionalism and competence at industry location internships. (survey attached)

D. Indirect measures
1. Graduate student survey (survey attached)
2. Alumni survey (survey attached)

Assessment Matrix

Assessment measure	Objectives					
	A	B	C	D	E	F
A1	x	x				
A2				x	x	X
A3	x	x				
A4				x	x	X
A5				x	x	X
B1	x	x	X	x	x	X
B2	x	x	X	x	x	X
B3			X			

Timeline:
All objective will assessed through the years 20016 -2021, except alumni survey which will be done in 2021.