

New Degree Program Proposal

Bachelor of Applied Science in Biotechnology

Undergraduate Biology Program

College of Liberal Arts & Science – The University of Kansas

June 2013

Basic Program Information

Proposing institution: The University of Kansas

Title of proposed program: Bachelor of Applied Science in
Biotechnology

Degree(s) to be offered: Bachelor of Applied Science in Biotechnology
(BAS-BTEC)

Anticipated date of implementation: Spring 2015

Responsible department(s) or unit(s): Undergraduate Biology

Point of Contact: Greg Burg, Director
(785) 864-4143
gburg@ku.edu

(CIP) code associated with the program: 26.1201

Program Proposal Narrative

Introduction to Applied Science in Biotechnology

The Bachelor of Applied Science (BAS-BTEC) in Biotechnology, grounded in the biological sciences, technology, mathematics and/or computational sciences, is a unique applied-science degree designed for students who wish to move directly into careers in industry, government, and non-profit organizations upon graduation. This program will prepare graduates for life-science careers that require management and communication skills as well as specific laboratory skill sets. By drawing on the expertise of a workforce advisory board, this program will respond current and emerging professional opportunities.

The BAS in Biotechnology is a degree-completion program articulated with Johnson County Community College and other area community colleges. The initial curriculum was developed in collaboration with the Kansas City Area Life Sciences (KCALS) program team and members of the JCCC life-science faculty.

Program Need and Student Characteristics

(1) Centrality of the program to the university.

Offered on the KU Edwards Campus (KUEC), the BAS-BTEC will further the campus mission “to bring the high-quality academic programs, research and public service of the University of Kansas to the greater Kansas City community to serve the workforce, economic and community development needs of the region.”

The BAS in Biotechnology is also closely aligned with two of the four goals of *Bold Aspirations*, the KU strategic plan for Lawrence and Edwards: 1) promoting wellbeing and finding cures, and 2) building communities and expanding opportunities. The combination of managerial skills and hands-on learning built into the program will greatly increase the career opportunities of our graduates, who will work in biotechnology areas that directly serve local, state, national, and global communities. Given its close alliance with regional industries, the program will promote entrepreneurship and vibrant external partnerships in the life sciences critical to the economic growth of the state and region.

(2) Demand for graduates.

Corporate scientific research typically involves team-based projects that are best served by employees who not only know the science, but can also manage the project, work with budgets, apply for grants, and communicate the project status to non-technical decision makers and shareholders. Consequently, there is a national trend to offer science degrees that include training in workforce requirements such as communication, teamwork, and familiarity with business practices.

Feedback from industry leaders in Johnson County surveyed by Patron Insight in 2007 and in 2010 confirmed local needs consistent with this national trend. These leaders identified communication, entrepreneurial spirit, adaptability, and the ability to collaborate in multicultural environments as critical skills beyond those typically developed in science degree programs. The BAS-BTEC will produce graduates with these skills as well as excellent bioscience training matched to industry needs.

The Greater Kansas City region is an ideal location for such a degree program. The region is home to more than 200 life-science companies, including 90 contract research organizations (CROs). These encompass a wide range of research and development services that have created more than 60 currently marketed pharmaceutical products. These organizations employ more than 20,000 people and generate some \$1.8 billion dollars annually. For sustained growth, these companies require a labor force with the range of skills provided by the BAS-BTEC.

As of 2012, in Johnson County alone such contract research organizations included Aerotek Scientific, Alpha IICH Inc., Bayer Healthcare, Beckloff Associates Inc., Beta-Chem, Brakke Consultings Inc., cGMP Validation LLC, CKL Regulatory Solutions, Clinical Reference Laboratory, Clinipace Worldwide, Durrie Vision, EMB Statistical Solutions LLC, GreenTree Technology Partners, Hennessy Research Associates, i3 Global, Integrated Biotech Solutions, Johnson County Clinical Trials, KantarHealth, KCAS Bioanalytical Services, KU-Cancer Center, Lee Research, Ligand Pharmaceuticals, Micron Group, Midwest BioServices LLC., Pace Analytical, Pivot International, PRA International, PRL Central Laboratory Services, Professional Toxicology Services, Propharma Group Inc., PTS Consulting LLC., Quest Diagnostics, Quintiles, SAFC, US Micron, Vince & Associates Clinical Research, Vitalograph and Xenotech LLC.

The 2012 Regional Life Sciences Industry Census, which documented the Kansas City region's growing science industry, provides a strong rationale for the creation of the proposed Biotechnology degree-completion program. Nearly three-fourths of vacant positions identified in the survey called for bachelor's degrees or higher. As many as 1,000 such positions are projected to become available over the next three years. Since 2009, science industries have grown 16.5% to 240 companies (among the life-science companies, 69% focus on human health, 24% on animal health, and 7% on plants.) These numbers indicate the vitality of the life-science industries despite the recession. Nearly 80% of the responding companies indicated that they planned on hiring 2 or more employees by 2015, up 5% from 2009.

Academic institutions, such as the University of Kansas Medical Center National Cancer Institute and the Stowers Institute for Medical Research in Kansas City, will continue to recruit technicians with bachelor's degrees. These future employees will also be well served by the range of skills taught by the BAS-BTEC program.

In general, for employment in life-science companies, a bachelor’s degree is the most commonly sought credential, as shown by the following correlation of degrees with numbers of positions:

*Workforce Needs	2012		2009	
	#	%	#	%
High School Diploma	10	6%	8	6%
Some Post High School Training	26	16%	19	14%
Associate Degree	9	6%	8	6%
Bachelor’s Degree	60	38%	48	36%
Masters	27	17%	24	18%
PhD	28	18%	27	20%

* While 80 companies responded to this question, more than one answer could be chosen, so total responses will total more than 80.

Fig. 1. Comparison of workforce needs by educational training.

(3) Student demand for the program.

This program will draw students from community colleges in the region. It is planned as a 2+2 program with JCCC, which currently has an estimated 35 students each year in its Biotechnology AAS and AS programs. Metropolitan Community College (MCC) usually has 2-3 students in its collaborative partnership with JCCC. We also expect to draw students from Longview Community College in Missouri. Given the MetroKC tuition model, our program will be a financially viable option for them. In addition to attracting recent community college graduates, the program is likely to appeal to students who entered the workforce with associate degrees and would now like to upgrade their skills for career advancement.

Finally, individual courses offered in the program will meet the needs of our industry partners. We expect companies to send employees to the campus for targeted instruction, such as bench/laboratory training, available as part of the BAS-BTEC.

Anticipated student enrollment:

	<u>Full Time</u>	<u>Part Time</u>	<u>Total</u>
Year 1	10	5	15
Year 2	22	10	32
Year 3	27	15	42
Year 4	30	20	50
Year 5	30	20	50
Year 6	30	20	50
Year 7	30	20	50

Fig. 2. Anticipated student enrollment for the BAS-BTEC (7 years)

According to the January 2012 Monthly Labor Review occupational employment projections to 2020, the category of life, physical, and social science occupations is expected to grow nationally to 190,000 jobs, an increase of 15.5%. Medical scientists are expected to be the fastest growing of this group, with 36.4% of the newly created job expectations. (Lockard 2012)

According to the Occupation Projections of the Kansas Labor Report, on average, 447 jobs were listed each month in the Help Wanted Online Listings of job vacancies in Kansas for 2012, up 4% from 2011. Using the national trend of 36.4% for medical scientists, 160 jobs are vacant in Kansas each month that could be filled by holders of the BAS-BTEC.

Local trends agree with this profile. According the KCALSI Industry Census – 2012, 40% of the 80 respondents indicated they would be hiring 6 or more employees in the next three years. Since the number of respondents represents 1/3 of the total number of companies, this number of vacancies could be well over 500 by 2015.

In addition to employer demand, higher earning potential will make this degree attractive. Salaries for biological technicians now average \$39,500 nationally and \$38,140 in Kansas annually, (Fig 3). Moreover, the demand for such skills is expected to increase 14% nationally and 22% in Kansas respectively (Fig. 4).

Location	Pay Period	2011				
		10%	25%	Ave	75%	90%
United States	Hourly	\$11.99	\$15.03	\$18.98	\$24.34	\$30.87
	Yearly	\$24,900	\$31,300	\$39,500	\$50,600	\$64,200
Kansas	Hourly	\$10.68	\$14.64	\$17.14	\$21.60	\$28.19
	Yearly	\$22,200	\$30,500	\$38,140	\$44,900	\$58,600

Fig. 3. Comparison of national and state salaries for 19-4021 biological biotechnicians.

United States	Employment		Percent Change	Job Openings ¹
	2010	2020		
Biological Technicians	80,200	91,100	+14%	3,790
Kansas	Employment		Percent Change	Job Openings ¹
	2010	2020		
Biological Technicians	356	434	+22%	20

Fig. 4. Comparison of national and state employment trends through 2020 for 19-4021 biological technicians.

Several other job classifications that require training like that provided by the BAS-

BTEC. (See Microbiologist and Life Scientist, All Other on Fig. 5). In Kansas alone, nearly 300 employment opportunities are projected through 2020, many of which will be in Johnson County.

Kansas														
Long-term Occupational Projections														
2010 to 2020														
SOC Code ^[1]	Occupational Title	Employment		Employment Change		Job Openings			2011-2nd Quarter Wages			Typical Education Needed for Entry ^[5]	Work Experience in a Related Occupation ^[5]	Typical On-The-Job Training Needed
		Base Year 2010	Projection Year 2020	Numerical	Percent	New Jobs ^[2]	Replacement Needs ^[3]	Total Jobs ^[4]	Average Annual	Average Hourly	Median Annual			
19-1022	Microbiologists	153	172	19	12.4	19	34	53	\$53,770	\$25.85	\$49,260	Bachelor's degree	None	None
19-1099	Life Scientists, All Other	108	111	3	2.8	3	7	10	\$59,140	\$28.43	\$51,760	Bachelor's degree	None	None
19-4021	Biological Technicians	356	434	78	21.9	78	120	198	\$38,140	\$18.34	\$35,650	Bachelor's degree	None	None

Fig. 5. Kansas long-term occupational projections and 2011 average wages for employment through 2020 for potential employment of graduates of the BAS-BTEC degree.(2012)

For the majority of the students in the BAS-BTEC, this will be their terminal degree. However, Professional Science Masters (PSM) programs, such as the PSM in Environmental Assessment coming online at Edwards, provide post-baccalaureate options. Moreover, there is crossover to the Clinical Laboratory Sciences undergraduate program as well as the possibility of continued studies in the Molecular Biology Masters program at the University of Kansas Medical Center.

(4) Locational and comparative advantages.

Every institution in the Kansas Board of Regents System institution offers Bachelor degrees in biology that prepare students to enter graduate and professional programs, but none offers a degree comparable to the proposed BAS-BTEC. Likewise, other schools in the region, including UMKC, Rockhurst University, Avila University, Park University, Graceland University, William-Jewell College, Devry University, and Grantham University have typical biology or biochemistry degrees, but not a biotechnology degree. The closest parallels to the proposed degree are the programs in clinical laboratory sciences at University of Kansas-Medical Center, UMKC, Rockhurst University, Devry University and St. Lukes, but these programs focus on clinical rather than industrial settings.

As indicated above, the Edwards campus is the ideal location for an applied science bachelor’s degree in biotechnology given its proximity to key biotech industries and to the community colleges with logical feeder programs cited above.

The Edwards Campus is also ideal for this program given the likelihood that many of the students who enroll will already be in the workforce, either full or part time. The Edwards Campus focuses on this student population, and offers its courses at night to accommodate work schedules.

The BAS-BTEC will join the successful Molecular Biosciences BS (MB BS) program at Edwards, which is also administered by Undergraduate Biology on the Lawrence campus. The two Edwards programs will share some courses although they have distinct

objectives. (The MB BS is pre-professional degree for students intending to go on to graduate and professional programs, whereas the BAS-BTEC prepares students for immediate employment in industry, government, or non-profit organizations.) The BAS-BTEC core will also utilize existing courses in communications studies, math, and management currently offered on the Edwards campus.

The proposed degree serves the priorities of the Edwards Campus and the Johnson County Educational Research Triangle (JCERT). JCERT was created in November 2008 when residents invested in the county's future by voting for a one-eighth cent sales tax. The initiative included the development of the Business, Engineering, Science and Technology (BEST) Building and ten new degree programs for the Edwards Campus. The BEST Building, housing classrooms, a business conference center and faculty offices, was completed in January 2012. The BAS-BTEC has been chosen as one of the ten new programs.

(5) Characteristics of the students who will participate in this proposed program.

The student cohort will include recent community college graduates and practitioners already in the workforce who seek to expand their skill set and upgrade their technical knowledge.

The typical student will be between the ages of 25 to 45 years. Recent community college graduates may enroll full time, but most students will also be working and will enroll in 1-2 evening courses per semester.

Initially, students are likely to come primarily from the Johnson County. However, but with the expansion of life science industries in the Kansas City metro area, we expect students to come from other Kansas counties as well.

Curriculum for the BAS-BTEC

The BAS-BTEC curriculum is listed in Appendix I. Appendix II depicts the rollout of the curriculum by semester.

The opportunities for student to student and student to instructor interaction will include: typical classroom discussion, class project team interaction, communication and discussion via Blackboard. Extensive laboratory experiences are incumbent in the degree program. Moreover, the students shall pursue internships and industry interactions as part of their independent research experiences as well as their capstone experience. This capstone project will allow for appraisal by both industry leaders and the faculty. Moreover, business partners will make use of the equipment at the Edwards Campus for translational research and this will provide unique opportunities for internships for the students on campus in the form of a fellowship. A seminar series conducted through the Program of Applied Science allows for students to interact with various applied science

industry leaders in engineering, biotechnology and environmental sciences graduate programs. As a result of student internships and capstone projects, students will present their projects as part of the seminar series when applicable. Students may also present their projects through poster and/or oral presentations.

Because the majority of graduates of the BAS-BTEC become professionals in non-academic positions, there is increasing demand by students and employers to integrate appropriate professional skills and employer interaction in their education. The BAS-BTEC is a case in point. It prepare students to enter industry, non-profit, and government careers by including in their curricula both scientific and pre-professional education, the latter stressing the development of management skills and professional qualities that lead to success in careers outside the university. In this way the BAS-BTEC is leading the way in integrating professional skills into their curricula and establishing educational alliances with employers.

A major challenge in the development of such programs is how to assess professional skills and the benefits of interaction with employers. Such assessment is critical for program success because directors of programs must be able to track their effectiveness in order to improve them and to demonstrate accountability to stakeholders. As a way of addressing the challenge of assessing professional skills and employer interaction in this program, an assessment plan below is offered. This plan consists of three objectives, i.e., broad goals that the program seeks to attain, and for each objective a set of outcomes or operational definitions of the objective, indicators that allow a director to monitor how well the program enables students to meet the objectives. These outcomes make explicit what is important for the program's stakeholders, showing students, their parents, potential employers, and others what they can expect of the program. The assessment plan also includes data to be collected for evaluating each outcome, the source of the data, and frequency of collection.

Program Objectives

The BAS-BTEC will provide students with the scientific knowledge, managerial training, and professional skills necessary to move directly into the biotechnology workforce immediately after graduation.

Faculty

Two Ph.D. Lecturers in molecular biosciences are currently employed full time on the Edwards campus. We will add the equivalent of two new full-time positions, either Professors of Practice or Lecturers. (Professors of the Practice will have professional degrees and licensing/certification in their fields, as well as significant records of achievement in working in their specific fields outside of the academy.)

Salaries for Faculty and Staff

Annual salaries:

2.0 Professors of Practice or Lecturers at \$76 K
0.5 Admin support \$22K
1.0 Lab Technician \$55K
Total: \$229K

JCERT funding will be available for these positions.

Academic Support

The Director of the Undergraduate Biology Program and Undergraduate Biology Committee, composed of faculty of the departments of Molecular Biosciences and Ecology and Evolutionary Biology on the Lawrence campus, will provide oversight for the curriculum and instructional staff.

An External Advisory Board drawn from industry and government will serve as a bridge to the job market, consulting on industry needs, internships, and entrepreneurial opportunities.

The College of Liberal Arts and Sciences (CLAS) Student Academic Services will serve students in the BAS-BTEC. Dan Mueller, CLAS Director of Undergraduate Advising at Edwards, advises students in the College's bachelor's degree completion programs on that campus.

There are no special requirements for new library acquisitions.

To support the program coordinator at Edwards and the instructors, two new staff positions will be necessary, an administrative assistant (.5 FTE) and a technician (1.0 FTE). The salaries are budgeted at a total of \$77,000 annually.

Facilities and Equipment

Facilities renovation to Room 21 of the Regents Center: \$44,212

Ventilation expansion from the central lab (Rm. 9) into Rm. 21 \$25,000

Osmotic water extension from the central lab into Rm. 21 \$1,000

Case Work (FormaSpace 4 benches, 8 chairs) \$13,212

Electrical \$5,000

Equipment: \$444,267

Bioreactor 3L \$36,654

Ultracentrifuge Avanti J26S \$38,831

& Rotors (Beckman) JLA-3.1000 \$17,300

Rotor (Beckman) JA-25.50 \$5,459

RT-Thermal Cycler Mx qPCR Agilent \$30,326

MicroArray Scanner SureScan Agilent \$137,903

Fluorescence Microscope	\$33,000
Capillary Electrophoresis	\$99,000
Cryogenic Storage Unit	\$3,634
Automated multichannel pipette	\$2,160
Separation Science components (columns, resin, fraction collectors, etc. [as needed])	\$35,000
Computers	\$5,000
TOTAL	\$488,479

All facilities renovation and equipment will be funded by the Johnson County Education Research Triangle initiative.

The annual budget will include \$35,000 for consumable materials for lab use and \$15,000 for yearly maintenance of equipment and repairs (beginning 2nd year), as well as \$5,000 for office needs in the OOE. Total OOE yearly: \$55,000.

Program Review, Assessment and Accreditation

The proposed program will be regularly reviewed and evaluated in accordance with the standard procedures of the KU Undergraduate Biology Program, the College of Liberal Arts and Sciences, the Provost's Office, and the Kansas Board of Regents.

There are currently no external accrediting agencies for a BAS-BTEC program.

Appendix III lists the rubric for the Program Objectives, Program Assessment and Student Assessment.

Appendix I:

**CURRICULUM OUTLINE
NEW DEGREE PROPOSALS
Kansas Board of Regents**

I. Identify the new degree:

Bachelor of Applied Science of Biotechnology

II. Provide courses required for each student in the major:

Core	Course Name & Number	Credit Hours
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COMS 310 or COMS 330	Organizational Comm. or Business Comm.	3
MATH 365 or PSYC 210	Statistics; Elementary Statistics or Statistics in Psychological Research	3
MGMT 305 or SA&D 402	Management or Project Management	3
BTEC 300	Introduction to Biotechnology	3
BTEC 330	Biotechnology Regulation and Documentation Processes	3
BTEC 340	Biotechnology Research Methods and Applications I	1
BTEC 341	Principles of Bioprocessing Laboratory I	3
BTEC 440	Biotechnology Research Methods and Applications II	1
BTEC 441	Principles of Bioprocessing Laboratory II	3
BTEC 450	Applied Bioinformatics	3
BTEC 460	Introduction to Quality Control/Quality Assurance in Biotechnology	3
BTEC 494	Selected Topics in Biotechnology	1

Electives

BTEC 501	Ethical Issues in Biotechnology	1
BTEC 541	Gene Expression Analysis	2
BTEC 542	Protein Expression in Insect Cells	2
BTEC 545	RNA Interference and Model Organisms	2
BTEC 547	Bioanalytical Lab	2

Research

BTEC 424	Independent Study in Biotechnology	1 - 3
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Practica

BTEC 599	Biotechnology Capstone Experience	3
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Total 39

Appendix II: New BTEC Curriculum Invested by Semester:

	Sem 1	Sem 2	Sem 3	Sem 4	NOTES:			
Core	BTEC 300		BTEC 300		BTEC 300 = 3 credit hours			
Core	BTEC 340	BTEC 440	BTEC 340	BTEC 440	BTEC 340/341 = 4 credit hours; BTEC 440/441 = 4 credit hours			
Core	BTEC 341	BTEC 441	BTEC 341	BTEC 441				
Core	BTEC 460	BTEC 330	BTEC 450	BTEC 330	BTEC 330, 450, 460 = 3 credit hours)			
	BTEC 494	BTEC 599	BTEC 494	BTEC 599	BTEC 494 1 credit; BTEC 599 3 credits)			
	BTEC 424	BTEC 424	BTEC 424	BTEC 424	1 - 3 Credit Hours			
	BTEC 501	BTEC 541	BTEC 542	BTEC 547	2 credit hours (except BTEC 501 @ 1 credit hour)			
	BTEC 545							
To begin the process:	Fall 2014		Spr 2015		Fall 2015		Sp 2016	
	1st Year		1st year		2nd Year		2nd Year	
	1st Sem	credits	Sem	credits	1st Sem	credits	2nd Sem	credits
	BTEC 300	3	BTEC 440	1	BTEC 300	3	BTEC 440	1
	BTEC 340	1	BTEC 441	3	BTEC 340	1	BTEC 441	3
	BTEC 341	3			BTEC 341	3	BTEC 330	3
					BTEC 460	3	BTEC 450	3
					BTEC 494	1	BTEC 599	3
Elective	BTEC 501	1	BTEC 541	2	BTEC 542	2	BTEC 547	2
					BTEC 545	2		
	BTEC 424	1-3	BTEC 424	1-3	BTEC 424	1-3	BTEC 424	1-3
BTEC credits offered		9-12		7-10		16-18		16-18
Less independent study and the capstone		8		6		15		12

Appendix III. Rubric for Program Objectives, Program and Student Assessment

Objective #1: To develop in students the scientific knowledge, managerial skills, and professional qualities necessary to excel in employment in their fields, students should be able to:

Outcome	Data	Data Sources	Frequency of Collection
1. Meet employers' needs for scientific knowledge in the specific field (outcomes specific to the field will be developed by program director and appropriate stakeholders)	Depends on outcomes	Depends on outcomes	Depends on outcomes
2. Meet employers' needs for managerial skills by:			
a. applying basic accounting and finance concepts and tools	<ul style="list-style-type: none"> Project evaluations from teaching faculty and student peers Surveys of internship directors 	Program director, teaching faculty, students, internship directors	At the end of projects or term; at the end of internships
b. effectively managing projects and people	As above	As above	As above
c. analyzing markets and displaying knowledge about development and marketing of products	As above	As above	As above
3. Meet employers' needs for professional qualities that lead to success by:			
a. valuing employer goals and working to improve their own performance towards these goals	<ul style="list-style-type: none"> Employment Readiness Survey* Evaluations by program director Project evaluations from teaching faculty and student peers Surveys of internship directors 	Program director, teaching faculty, students, internship directors	At beginning and end of projects or term; at end of internships
b. working productively on teams both as leaders and members	As above	As above	As above
c. applying certain traits toward	As above	As above	As above

achieving employer's goals such as discipline, flexibility, innovative thinking			
d. speaking and writing effectively in employment settings	As above	As above	As above
e. making a constructive contribution to an employer through their interpersonal skills, positive attitude, conflict management abilities, strong ethics, effective mentorship, knowledge of their own personality, ability to make a favorable impression and engender trust, and a sensitivity to and a value of cultural differences	As above	As above	As above
f. explaining and honoring the legalities of knowledge production, including intellectual property, confidentiality, invention disclosure, and field-specific rules and regulations	As above	As above	As above
g. managing their own careers effectively	As above	As above	As above

*A rubric to score the level of employment readiness can be found in Lisbeth Borbye, *Out of the Comfort Zone: New Ways to Teach, Learn, and Assess Essential Professional Skills*, Morgan and Claypool Publishers, 2010.

Objective #2: To strengthen employment-related problem-solving abilities of students, students should be able to:

Outcome	Data	Data Source	Frequency of Collection
Define a problem in way that provides a direction toward its solution, describing the present state or what is given, describing the goal state, and identifying the critical differences between the two	<ul style="list-style-type: none"> • Problem-solving rubric to be applied to the evaluation of projects • Evaluations by internship directors 	Program director; internship directors	For problem-solving experiences (e.g., internships, projects, case studies, externship

			s)
Establish the criteria for an optimal solution to the problem	As above	As above	As above
Produce a variety of possible solutions to the problem	As above	As above	As above
Determine which of the possible solutions is the optimal by evaluating all the possible solutions against the criteria	As above	As above	As above
Make a convincing case for the chosen solution to the problem	As above	As above	As above

Objective #3: To improve the quality and economic impact of the program, it will:

Outcome	Data	Data Source	Frequency of Collection
Develop, expand, and strengthen employer alliances and use those alliances to generate student activities	<ul style="list-style-type: none"> Number and type of active alliances (instructors, mentors, internship and externship providers, advisory board members, sponsors, research collaborators, etc.) Type (internship, case study, externship, research collaboration, etc.) and number of student activities Number of faculty involved in creating alliances Number of alumni serving as new program alliances 	Program director	Annually
Provide economic impact for employers who participate in student projects	Economic impact analyses (student hours, number of projects, dollar value of contributions, including post-project development	Employers	0 - 6 months post-project

	of student solutions, and number of projects and internships leading to job offers)		
Provide economic impact for universities that house program(s)	Economic impact analyses (fellowships, grants, collaborative research projects with employers, access to new technology and knowhow)	Program directors, university faculty	Annually
Increase the number and quality of students in the program and increase the number of students who graduate in a timely manner	<ul style="list-style-type: none"> • Number of applications • Number of enrolled students • Number of graduates • Time-to-degree completion • GPAs 	Program director	Annually
Place graduates in appropriate positions in the field or further education	<ul style="list-style-type: none"> • Number of graduates employed within 0–6 months • Number of graduates employed after 6 months; types of positions (local, regional, national, international); level of employment) • Number of graduates seeking additional graduate education and their fields of study 	Program director	Annually
Meet employers' needs for an improved workforce	<ul style="list-style-type: none"> • Survey of Administrative Board (AB) members • Survey of employers of graduates after one year's employment 	AB members, employers of graduates	Annually

Problem-Solving Rubric

Students should demonstrate their ability to:	poor	fair	excellent
define the problem by describing the present state or what is given, the goal state, and the critical differences between the two			
establish the criteria for an optimal solution to the problem			
produce a variety of possible solutions to the problem			

determine which of the possible solutions is the optimal by evaluating all the possible solutions against the criteria			
make a convincing case for the chosen solution to the problem			

Implementation Year FY 2014 - 2015

Fiscal Summary for the Proposed Academic Program

Institution: University of Kansas - Edwards Campus

Proposed Program: Bachelor of Applied Science in Biotechnology

Part I. Anticipated Enrollment

	Implementation Year		Year 2		Year 3	
	Full-Time	Part-Time	Full-Time	Part-Time	Full-Time	Part-Time
A. Headcount	10	5	22	10	27	15
B. Total SCH taken by all students in the program	170		368		468	

Part II. Program Cost Projection

A. In the implementation year, list all identifiable **General Use** costs to the academic unit(s) and how they will be funded. In subsequent years, please include **only** the additional amount budgeted.

	Implementation Year	Year 2	Year 3
<u>Base Budget</u>			
Salaries	\$229,000	\$229,000	\$229,000
OOE	\$40,000	\$55,000	\$55,000
Renovation to Rm. 21	\$44,212		
Equipment Costs	\$300,000	\$144,267	
Total	\$613,212	\$428,267	\$284,000

Indicate source and amount of funds if **other than** internal reallocation:

JCERT Funding