PURDUE UNIVERSITY BOARD OF TRUSTEES
EXECUTIVE SUMMARY DEGREE PROPOSAL TEMPLATE

PLEASE NOTE THAT THE FULL PROPOSAL CHECKLIST WILL NEED TO BE COMPLETED FOR THE INDIANA COMMISSION ON HIGHER EDUCATION (see https://in.gov/che/files/checklist_of_criteria_web.pdf)
Both this template and the full checklist document are submitted to the Purdue Board of Trustees.
When this form is complete, please save and return to weiderhaft@purdue.edu with tables as separate attachment.

DATE: September 27, 2019
TO: Board of Trustees
FROM: [Edward J Berbari], Primary Contact, (317) 274-3728; eberbari@iupui.edu
CC: [David J. Russomanno], Secondary Contact, (317) 274-0802; drussoma@iupui.edu
CC: [Paul Salama], Secondary Contact, (317) 278-1682; psalama@iupui.edu
SUBJECT: PhD in Biomedical Engineering

CAMPUS OFFERING DEGREE: Indiana University Purdue University Indianapolis

ANTICIPATED START DATE: August 2020

1. IS THE DEGREE RESIDENTIAL, HYBRID, OR ONLINE?

Residential

2. BRIEF OVERVIEW OF DEGREE/WHY IS THE DEGREE NEEDED?

The Purdue School of Engineering & Technology at Indiana University Purdue University Indianapolis (IUPUI) seeks to transition its current Joint Campus program in the Ph.D. Program of Purdue University for Studies in the School of Biomedical Engineering (BME) to an IUPUI site-approved BME Ph.D. degree program. Since the inception of the joint campus program in 1996, the faculty in the Biomedical Engineering Department have consistently mentored and financially sponsored Ph.D. students successfully, with graduates finding quality positions in academics (e.g. New York University, Harvard Medical School, Texas A&M) and industry (e.g. Stryker, Cook Medical).

A Ph.D. program in Biomedical Engineering on the campus of IUPUI will better align the BME Department with the campus's strategic plan, will continue to build upon the current quality of the program being delivered, and will leverage resources and collaborative ties with the life and health sciences Schools, including the IU School of Medicine, the IU School of Dentistry, the IU School of Nursing, and the Purdue School of Science. Currently, no Ph.D. programs in Biomedical Engineering in the metropolitan Indianapolis area exist. Motivating our best students to undertake this Ph.D. program will engage them in reaching the highest level of academic endeavor. In addition, student-related reasons support seeking site-approved authorization. Students enrolled in a Ph.D. program at IUPUI would be eligible for IUPUI campus-wide fellowships and other sources of graduate support to which they currently do not have access. Still, the proposed program would benefit future students, as it would allow students to access healthcare in Indianapolis, eliminate the requirement of students commuting to PUWL for coursework, and remove co-enrollment registration fees.

Indiana continues to have a large clinical and industrial infrastructure in areas related to the life and health sciences, including a large medical device industry, a major pharmaceutical industry, and a significant presence of entrepreneurial start-up companies. These efforts are exemplified by corporate entities such as Cook Medical, Roche Diagnostics, Zimmer Biomet, Boston Scientific, and Eli Lilly, Co. In industry or academia, Ph.D. graduates create new approaches to understanding and treating disease as well as developing new diagnostic and therapeutic devices, the tools of modern medicine.

3. BRIEF EVIDENCE OF FEDERAL, STATE, AND REGIONAL LABOR MARKET NEED

The U.S. Bureau of Labor Statistics states the job outlook for biomedical engineers is growing annually at 7% (2016-2026) and demonstrates the need for continued workforce development. Because many biomedical engineers work full-time in manufacturing, healthcare, or research facilities, some positions require personnel

with graduate degree credentials. With respect to job opportunities in Indiana, the U.S. Bureau of Labor Statistics ranked Indiana within the top 8 states for overall number of biomedical engineering jobs from 2015 to 2017. These data point to the fact that Indiana has a large clinical and industrial infrastructure in areas related to the life and health sciences. This infrastructure includes a large medical device industry, a major pharmaceutical industry, and a significant presence of entrepreneurial start-up companies. These efforts are exemplified by large corporate entities such as Cook Medical, Roche Diagnostics, Zimmer Biomet, Boston Scientific, and Eli Lilly, Co.

Many sectors hire biomedical engineers including the areas of academia, industry, clinical medicine, and government and policy. Ample opportunities are outlined further in the full program proposal. Still, Engineering By the Numbers, a publication by the American Society for Engineering Education, reports engineering doctoral enrollment and degree production for the U.S. The most recent document details that by discipline, Biomedical Engineering awards 39.1% percent of degrees to women, illustrating the important role that Biomedical Engineering programs have in promoting gender diversity in the doctoral-trained workforce.

4. COSTS

A. Tuition and Fees—In-state and out-of-state

In-state estimation: 9 credit hour/semester

In-state Graduate tuition ($412.00 X 9 hours)	$3,708.00
General Fee	$200.13
Repair and Rehabilitation Fee ($14.40 X 9 hours)	$130.50
Technology Fee	$186.55
TOTAL:	**$4,225.18**

Out-of-state: 9 credit hours/semester

Out-of-state Graduate tuition ($1250.00 X 9 hours)	$11,708
General Fee	$200.13
Repair and Rehabilitation Fee ($14.40 X 9 hours)	$130.50
Technology Fee	$186.55
TOTAL:	**$11,767.18**

B. Financial Projection Table
(Provided below as Appendix A)

C. Program Review and Expenditure Summary
(Provided below)

D. Enrollment Projection
Provided below

5. LIST OF SIMILAR DEGREES IN THE PURDUE SYSTEM AND DISTINCTIVE ELEMENTS FOR THIS DEGREE

Within Indiana, the current Joint Campus Program between Purdue and IUPUI is the only Ph.D. program in Biomedical Engineering.

A unique feature of the proposed BME Ph.D. program will provide Ph.D. students the opportunity to declare an area of concentration noted on their transcript after requirements are completed. Initial areas of concentration will include Musculoskeletal Health, Medical Imaging, and Neuroscience, each represented within the IU School of Medicine by their respective center or institute. Future opportunities may expand these concentrations to fulfill student needs and interests.

6. COMPETITIVE DEGREES – BRIEF SUMMARY

The current Joint Campus program which we share with the Weldon School of Biomedical Engineering may still exist into the future as it is a campus wide program (including the IU School of Medicine). Thus, our students may elect to take a course or two on the West Lafayette campus or via their on-line offerings in BME, much as our current Masters students do now. Research collaborations will also exist as we move forward. Hence we do not envision our site-approved program as a "divorce" but more a "coming of age" separation.

On the IUPUI campus the Department of Electrical and Computer Engineering offers the Ph.D. in Electrical and Computer Engineering and the Department of Mechanical and Energy Engineering offers a Ph.D. in Mechanical Engineering.

Recommended Approval:

5/11/20

Jay T. Akridge Date
Provost and Executive Vice President for
Academic Affairs and Diversity

Approved:

5/21/20

Mitchell E. Daniels, Jr. Date
President

Appendix A

Table 1
Program Financial Projection
Financial Office Table
Indiana University Purdue University Indianapolis (IUPUI)
PhD in Biomedical Engineering

	Year #1 FY 2020	Year #2 FY 2021	Year #3 FY 2022	Year #4 FY 2023	Year #5 FY 2024
I. ENROLLMENT					
1. Program Credit Hours Generated (FTE * 30 for BS & FTE * 24 for masters/graduate)					
a. Existing Courses	45	99	168	240	258
b. New Courses	9	9	12	12	12
Total	**54**	**108**	**180**	**252**	**270**
2. Full-Time Equivalents (FTE)					
a. Full-Time FTEs	3	6	10	14	15
b. Part-Time FTEs	0	0	0	0	0
Total Full/Part-Time FTE	**3**	**6**	**10**	**14**	**15**
c. On-Campus Transfer FTEs	0	0	0	0	0
d. New-to-Campus FTEs	3	6	10	14	15
Total On/New-to-Campus FTE	**3**	**6**	**10**	**14**	**15**
3. Program Majors - Headcount					
a. Full-Time Students	3	6	10	14	15
b. Part-Time Students	0	0	0	0	0
Total Full/Part-Time HC	**3**	**6**	**10**	**14**	**15**
c. In-State	3	6	10	14	15
d. Out-of-State	0	0	0	0	0
Total In/Out of State HC	**3**	**6**	**10**	**14**	**15**

	Year #1 FY 2020	Year #2 FY 2021	Year #3 FY 2022	Year #4 FY 2023	Year #5 FY 2024
II. INCREMENTAL REVENUE					
1. Projected # of *New* Students [(1)]	3	3	4	4	4
2. General Tuition & Fees [(2)]					
a. In-state tuition	7416	7,601	7,791	7,986	8,186
b. General Service Fee	200	205	210	215	221
b. Technology Fee	187	192	196	201	206
c. Repair & Rehabilitation Fee	102	105	107	110	113
Total General Service T&F	**$ 7,905**	**$ 8,103**	**$ 8,305**	**$ 8,513**	**$ 8,726**
2. Additional Fees - *if applicable* [(3)]					
a. Differential Fees	-	-	-	-	-
b. Course Fees	-	-	-	-	-
c. Other Fees	-	-	-	-	-
Total Additional Fees	**$ -**	**$ -**	**$ -**	**$ -**	**$ -**
Total Incremental Revenue	**$ 23,715**	**$ 24,308**	**$ 33,221**	**$ 34,051**	**$ 34,903**

Table 1
Program Financial Projection
Financial Office Table
Indiana University Purdue University Indianapolis (IUPUI)
PhD in Biomedical Engineering

	Year #1 FY 2020		Year #2 FY 2021		Year #3 FY 2022		Year #4 FY 2023		Year #5 FY 2024	
III. EXPENDITURES										
1. Salary and Wages	**FTE**	**Cost**	**FTE**	**Cost**	**FTE**	**Cost**	**FTE**	**Cost**	**FTE**	**Cost**
a. Faculty	0.00		0.00		0.00		0.00		0.00	
b. Limited Term Lecturers	0.00		0.00		0.00		0.00		0.00	
c. Graduate Students	1.00	40,000	1.00	40,000	1.00	40,000	1.00	40,000	1.00	40,000
d. Other (Post Doc/Staff)	0.00		0.00		0.00		0.00		0.00	
Total S&W	**1.00**	**$ 40,000**	**1.00**	**$ 40,000**	**1.00**	**$ 40,000**	**1.00**	**$ 40,000**	**1.00**	**$ 40,000**
2. Fringes and Fee Remissions										
a. Fringe Benefits		-		-		-		-		-
b. Fee Remissions		-		-		-		-		-
Total FB & FR		**$ -**		**$ -**		**$ -**		**$ -**		**$ -**
3. Supplies and Expenses										
a. General Supplies & Expenses		-		-		-		-		-
b. Minor Equipment		-		-		-		-		-
c. Recruiting & Marketing		2,000		2,000		2,000		2,000		2,000
d. Travel & Entertainment		-		-		-		-		-
e. Other (Library, subscriptions, IT)		-		-		-		-		-
Total Supplies and Expense		**$ 2,000**		**$ 2,000**		**$ 2,000**		**$ 2,000**		**$ 2,000**
4. Capital										
a. Capitalized Equipment		-		-		-		-		-
b. Repair & Replacement		-		-		-		-		-
Total Equipment		**$ -**		**$ -**		**$ -**		**$ -**		**$ -**
Total Expenditures		**$ 42,000**		**$ 42,000**		**$ 42,000**		**$ 42,000**		**$ 42,000**
Projected Program Surplus/(Deficit)*		**$ (18,285)**		**$ (17,692)**		**$ (8,779)**		**$ (7,949)**		**$ (7,097)**

FOOTNOTES

I. Enrollment Details

1. Program Credit Hours Generated

   Projections were calculated using full-time enrollment status for a PhD student of 9 credits per semester. Our estimate of 3 new students per year was used for the calculated projections. Each new student was projected to enroll in one new 600-level BME course over the given timeframe.

II. Incremental Revenue Details

1. Projected # of New Students

   Only students that would be new to the PhD program were counted here.

2. General Tuition & Fees

   A 2.5% rate increase was used in calculating tuition and fees beyond FY 2020. The current tuition graduate rate is $412/credit hour for in-state students. Tuition and fee items are based on IUPUI in-state rates.

III. Expenditure Details

1. Salary and Wages

   Current faculty will be teaching existing and new coursework. Fellowship/RA match support and costs will be partially absorbed by existing support within BME Department base budget. Additional school and campus resources will be used to fund PhD graduate students.

Table 2
Program Revenue and Expenditure Summary
Board of Trustees Table
Indiana University Purdue University Indianapolis (IUPUI)
PhD in Biomedical Engineering

	Year #1 FY 2020	Year #2 FY 2021	Year #3 FY 2022	Year #4 FY 2023	Year #5 FY 2024
Total Incremental Revenue*	$ 23,715	$ 24,308	$ 33,221	$ 34,051	$ 34,903
Total Expenditures	$ 42,000	$ 42,000	$ 42,000	$ 42,000	$ 42,000
Projected Program Surplus/(Deficit)**	**$ (18,285)**	**$ (17,692)**	**$ (8,779)**	**$ (7,949)**	**$ (7,097)**

Table 3
Projected Headcount and FTE Enrollment and Degrees Conferred
Board of Trustees & ICHE Table
Indiana University Purdue University Indianapolis (IUPUI)
PhD in Biomedical Engineering

	Year #1 FY 2020	Year # 2 FY 2021	Year # 3 FY 2022	Year # 4 FY 2023	Year # 5 FY 2024
Enrollment Projections (Headcount)	3	6	10	14	15
Enrollment Projections (FTE)	3	6	10	14	15
Degree Completions Projection	0	0	0	0	3

PURDUE UNIVERSITY®

COLLEGE OF ENGINEERING

Mark Lundstrom, Acting Dean of the College of Engineering,
Don and Carol Scifres Distinguished Professor of Electrical and Computer Engineering

ENDORSEMENT FROM DEAN OF ENGINEERING PWL FOR SITE APPROVAL OF THE PHD IN BIOMEDICAL ENGINEERING AT IUPUI

May 8, 2020

The College of Engineering at Purdue West Lafayette has long appreciated its relationship with IUPUI and the opportunity to help initiate an independent biomedical engineering degree program at that campus. We look forward to continuing our work with the Biomedical Engineering faculty and students at IUPUI.

Kind regards,

Mark

Mark S. Lundstrom
Acting Dean of Engineering
Don and Carol Scifres Distinguished Professor of Electrical and Computer Engineering

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UNIVERSITY

ENDORSEMENT FROM HEAD OF PWL BIOMEDICAL ENGINEERING FOR SITE APPROVAL OF THE PHD IN BIOMEDICAL ENGINEERING AT IUPUI

May 7, 2020

For the past quarter-century, the Weldon School of Biomedical Engineering at Purdue University - West Lafayette has coordinated the Ph.D. Program in Biomedical Engineering with a site specific offering in Indianapolis. Over the years, faculty members from the Department of Biomedical Engineering in the Purdue School of Engineering and Technology in Indianapolis have participated in the Program through student instruction and mentoring. Although their participation in terms of student numbers has been relatively small when compared to the large student cohort afforded by direct Weldon School - Indiana University School of Medicine research and education collaborations, they have met quality standards and serve as the foundation of this request for autonomy.

Kind regards,

George

George R. Wodicka

Dane A. Miller Head and Professor

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