Permanent Status Self Study Report

Medical Sciences Program
Doctor of Philosophy
Fall 2018

October 1, 2018

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1. General information about the program:

a. Brief introduction and history of the program

The seeds for the origin of the program came from discussions between researchers in the Department of Medical and Molecular Sciences (then called Medical Technology) and the College of Health Sciences dean's office administrators regarding the desirability of adding a graduate program in Medical Sciences to enhance the College's ability to attract and retain research-trained faculty. Because there are researchers in all academic units in the College working within the umbrella designation of Medical Sciences, it made sense for the program to be interdisciplinary from its inception. Whereas the structure of the interdisciplinary program provides for shared governance across the academic units within CHS, the College also welcomes the participation of interested faculty from outside of the College as both mentors to students in the program and committee members. With the Department of Medical and Molecular Sciences being the single unit in the college at that time without a graduate program yet having faculty who secured the first NIH R01 grant in the college, plus experienced faculty in mentoring graduate students, the decision was made to house the administration of this program in this department. Provisional status was approved in March 2012 and the first student began in fall of that year. Our first graduation was in 2017, with another defending in spring 2018, **giving us two alumni**. Enrollment has been steady since 2012, with our fall 2018 enrollment of 4 giving us a total matriculation of 17 as of this report, including two alumni, 2 withdrawals, one fifth year, one fourth year, two third years, five second years and four first years.

b. Explain how the program is compatible with the academic priorities of the University

When the Medical Sciences PhD Program was proposed and approved in 2012, it was consistent with the May 2008 Path to prominence Strategic Plan for the University of Delaware. More specifically, the milestone to become a Premier Research and Graduate University related to increasing the profile and growth of graduate studies and providing full support for graduate students. The students in the program have also helped support faculty research initiatives. The program is also consistent with the "Delaware Will Shine" strategic plan. Specifically, it is consistent with recommendations to increase the number of nationally recognized doctoral programs.

c. Explain how the program helps student meet general education requirements:

Not applicable, graduate program

d. Curricular requirements

The Doctor of Philosophy in Medical Sciences requires a minimum of 43 credits including 9 credits of dissertation. The program is designed to be completed in 4 years. The 43 required credits include:

- MEDT800 Preparing Research Proposals (2)
- KAAP615 Advanced Medical Physiology (4)
- Research (MEDT868) (12)
- Biostatistics (KAAP602 or BISC643) (3)
- Dissertation (MEDT969) (9)
- Seminar (MEDT803/804) (4)

- Science Core electives (9)
  Students who have had substantially similar courses to one or more of those required prior to entering the Medical Sciences Program may substitute other appropriate courses with the approval of the advisor and the Program Committee.
  Only those courses in the 600, 800, 900 levels will apply towards the doctoral degree. Independent study courses will be accepted based on approval of the advisor and the Department Chair. A maximum of 9 independent study credits may be included in the program of study.

  Students must maintain a minimum 3.0 GPA throughout their program. **One student, admitted in the second cohort with a master's degree and who did pass the prelim exam, was unsuccessful, in the second year's required courses, to achieve the 3.0 GPA needed to continue in the program. He remains the only applicant to leave the program because of academics.**

  Applicants must have a bachelor's degree to be considered. **As of September 2018, we have admitted 12 with master's and 5 with bachelor's degrees. Of these, 15 students have either graduated or are in progress to graduate.**

e. Results of assessments or evaluations regarding the quality of the program

Assessment occurs at three time points during the student's time in our program. The first assessment occurs at the time of the preliminary exam followed by the dissertation candidacy proposal and final defense.

Preliminary Examination

The **preliminary examination** is a written and oral exam and content of the exam is based on course work taken during the student's first year of the academic program. The preliminary examination must be completed by the end of the student's first year of enrollment. The results of this examination will be one of the following:

1) Pass. The student may proceed to the next stage of his/her degree training.
2) Conditional pass. If the examination committee feels the student's performance was generally acceptable but with a specific deficiency, condition(s) will be specified that the student must satisfy to achieve a Pass and remain in the Program. These conditions may include a re-examination on one or more question areas in either oral or written form.
3) Re-examination. This result is appropriate for a student whose performance was unsatisfactory but displayed evidence of the potential to complete graduate degree training. Re-examination must be completed within one semester. The possible outcomes of the re-examination are pass or failure. The student may not take the exam a third time.
4) Failure. This outcome would indicate that examination committee considers the student incapable of completing degree training and the student would be recommended for dismissal from the program.

As of September 2018, 11 of 12 students in the Medical Sciences program have passed the preliminary exam, with 3 fulfilling a condition before passing. One second-year international student who needed a sabbatical from studies in summer 2018 has returned and will be taking her prelim exam in late September 2018. The only student not to pass, despite a re-examination, was the very first applicant. This student entered directly from UD's Biological

Sciences master's degree program, and thus was expected to have no problems. It speaks to the rigors of the first year's coursework, which becomes the content of the prelim exam.

Dissertation proposal defense and dissertation defense

Procedures for the dissertation proposal defense and the dissertation defense are the same. The written dissertation proposal and the written dissertation are made available to the Dissertation Committee at least two weeks prior to the oral defense dates. The oral defense meetings include both a defense of the student's proposed or completed dissertation research and an in-depth examination of the student's knowledge of their research specialization. Students are expected to demonstrate competency in both oral and written communication skills. All members of the College of Health Sciences are invited to attend the final oral defense. Following the oral presentation and questions from those in attendance, the Dissertation Committee meets separately and votes on the outcome. The possible outcomes of the oral defense are pass, conditional pass, or failure. The outcome is presented to the student, along with any conditions or requirements for proposal or dissertation revisions. For conditional pass, requirements must be addressed within six months of the original exam date.

Both students who proposed and defended their dissertations in 2017 and 2018 passed these examinations. As expected, both were given edits and suggestions for changes. Three additional students have achieved candidacy status as of this report.

Publications, abstracts accepted for national/international oral/poster presentations and competitive funding

are metrics by which we can evaluate our program. Our students have been consistently presenting their work at scientific meetings, publishing their work in high impact journals, and been successful in competing for funding. A summary of these follow:

Year entered	Year graduated	Name
2013	2017	**Edward Marks (mentor: Arun Kumar, Medical & Molecular Sciences)** Publications • **Marks ED**, Kumar A. "Thymosin β4: Roles in Development, Repair, and Engineering of the Cardiovascular System", in Vitamins and Hormones, Elsevier Publishing, 2016, 102:227-249. • **Marks ED**, Kumar A. Bone Marrow Stem Cell Derived Cardiomyocyte Precursors Differentiated on Nanofiber Scaffolds Attenuate Scar Formation in a Rat Model of Myocardial Infarction. *J Card Fail* 2015, 21:S92. • Kumar A, Young C, Farina J, Witzl A, **Marks ED**. Novel nanocomposite biomaterial to differentiate bone marrow mesenchymal stem cells to the osteogenic lineage for bone restoration. *J Orthopaedic Trans* 2015, 3:105-113. • Kumar A, Patel A, Duvalsaint L, Desai M, **Marks ED**. Thymosin β4 coated nanofiber scaffolds for the repair of damaged cardiac tissue. *J Nanobiotechnology* 2014, 12:10.

		Oral presentations • "Stem Cell-based Nanoscaffold System For Cardiac Repair Following MI"; NJ Tech Council Life Science Research Symposium, December 2016; Philadelphia, PA • "Laparoscope Guided Injection Of Nanofiber Scaffolds Successfully Engraft In An Adjustable Rat Model of Myocardial Infarction"; International Congress on Coronary Artery Disease, November 2015; Firenze Fiera Palazzo dei Congressi, Florence, Italy • "Differentiation of BMSCs on Nanofiber Scaffolds"; International Translational Nanomedicine Conference, July 2014; Northeastern University, Boston, MA Poster Presentations • "BMSC-derived Cardiomyocyte Precursors Differentiated on Nanofiber Scaffolds Successfully Engraft in an Adjustable Rat Model of Myocardial Infarction"; Heart Failure Society of America Annual Meeting, September 2015; National Harbor Washington D.C., MD • "Nanoscaffold Coatings for Modification of Canonical WNT Signaling To Efficiently Differentiate BMSCs to Cardiomyocytes"; Translational Nanomedicine International Meeting, August 2014; University of Angers, Angers, France Internal Funding • Professional Development Award; Office of Graduate and Professional Education, University of Delaware; Aug 2014 ($4,500) and Oct 2015 ($18,000) • Responsibility and Integrity in Science and Engineering (RAISE) Ethics Educator Award; Center for Science, Ethics, and Public Policy, University of Delaware; Sep 2014, $3,000 • Graduate Fellows Award; Office of Graduate and Professional Education, University of Delaware; Sep 2016, $18,000
2014	2018	**Sangjucta Barkataki (mentor: Kenneth van Golen, Biological Sciences)** Publications • **S. Barkataki**, M. Joglekar-Javadekar, P. Bradfield, T Murphy, D. Dickson-Witmer and K. L. van Golen. Inflammatory Breast Cancer: A Panoramic Overview. Journal of Rare Diseases. (In Press, 2018). • Langdon JM, **Barkataki S**, Berger AE, Cheadle C, Xue QL, Sung V, Roy CN. RAP-011, an activin receptor ligand trap, increases hemoglobin concentration in hepcidin transgenic mice. Am J Hematol. 2015 Jan; 90(1): 8-14. • Zhao X, Fan J, Zhi F, Li A, Berger AE, Boorgula MP, **Barkataki S**, Courneya JP, Chen Y, Barnes KC, Cheadle C. Mobilization of epithelial mesenchymal transition genes distinguishes active from inactive lesional tissue in patients with ulcerative colitis. Hum Mol Genet. 2015 Aug 15; 24(16): 4615-24.

		Poster Presentations • **Barkataki S** and van Golen K. The influence of radiation induced TGFβ on the development of inflammatory breast cancer's (IBC) cutaneous metastases. Delaware Breast Cancer Coalition Update conference, Dover, Delaware, April 2017. • **Barkataki S**; Wenting L; Harst E; van Golen K. Effects of local and radiation enhanced TGFβ on the invasive nature of Inflammatory Breast Cancer (IBC) cells. San Antonio Breast Cancer Symposium, San Antonio, Texas, December 2016. • **Barkataki S**; Wenting L; Harst E; van Golen K. Effects of local and radiation enhanced TGFβ on the invasive nature of Inflammatory Breast Cancer (IBC) cells. 5TH International Inflammatory Breast Cancer Conference, Boston, Massachusetts, July 2016. • **Barkataki S**; van Golen KL; Kumar A. Nanoparticles as potential therapeutic treatments for Inflammatory Breast Cancer (IBC) by disassociation of emboli formation. American Association for Cancer Research Frontiers in Basic Cancer Research Conference, Philadelphia, PA, October 2015. External Funding • Delaware IDeA Network of Biomedical Research Excellence (INBRE) Multi Core Access Award ($8,000) by National Institute of Health as Co-PI, January 2017. • Inflammatory Breast Cancer Network Foundation Research Grant ($50,000), January 2017. • Delaware Breast Cancer Coalition Travel Grant ($1,000), November 2016. • Inflammatory Breast Cancer Network Foundation Research Grant ($7,500), February 2016. Internal Funding • Doctoral Fellowship Award ($18,000) 2017-2018. • Professional Development Award ($800), June 2016.
2014		**Debora Kamin Mukaz (mentor: Melissa Melby, Anthropology)** Publication • **Kamin Mukaz D** and Melby MK. What the Global Health Community Can Learn from Africa. *Delaware Public Health Journal*. 2018; 4(4): 20-24. Oral Presentation • **Kamin Mukaz D**, Papas MA, Melby MK, Commodore-Mensah Y, Setiloane K. Diabetes among African Migrants to the United States: Analysis of the National Health Survey 2010-2014; US Conference on Immigrant and Refugee Health (USCAIH). 2017 October 05-08; Washington, DC, USA. Poster Presentations • Setiloane, T.K., **Kamin Mukaz, D**. Household Food Insecurity among African Immigrants of the United States: Evidence from the

		National Health Interview Survey. 2018 Food & Nutrition Conference & Expo (FNCE). 2018, October 20-23; Washington, DC. • **Kamin Mukaz D** and Melissa MK. Acculturation and diabetes among Congolese migrants to the United States. APHA 2017 Annual Meeting; 2017 November 04-08; Atlanta, GA. • **Kamin Mukaz D** and Papas MA. Acculturation and Diabetes among African Migrants of US: Mediating and Moderating Effects of Physical Activity, Obesity and Hypertension. ADVANCE Conference "Women of Color in the Academy: What's Next?" 2016 April; Newark, DE. • **Kamin Mukaz D** and Papas MA. Prevalence of type 2 diabetes mellitus among African immigrants in the USA. International Diabetes Federation World Congress of Diabetes; 2015 November 30-December 04. Vancouver, Canada. • **Kamin Mukaz D** and Papas MA. Prevalence of type 2 diabetes mellitus among African immigrants in the USA. Annual Meeting of the American College of Epidemiology; 2015 September 26-29. Atlanta, GA. External Funding • 2015 (11/30-12/04), International Diabetes Federation, $1500 • 2018 (11/10-11/14), Scholarship, Delaware Public Health Association, $350 Internal Funding • 2015 (6/1-6/30), Graduate Summer Fellowship, $5000 • 2015 (11/30-12/04), Professional Development Award, $250 • 2015 (11/30-12/04), Department of Behavioral Sciences and Nutrition Travel Grant, $250 • 2016 (6/1-8/30), College of Health Sciences Summer Fellowship, $6000 • 2017(1/15-2/6), Graduate Winter Fellowship, $3000 • 2017 (6/1-6/30), Graduate Summer Fellowship, $2500 • 2017 (6/1-6/30), College of Health Sciences, Travel Grant, $1000 • 2017 (6/1-6/30), College of Health Sciences Summer Fellowship, $3500 • 2017 (11/4-11/8), Department of Medical Laboratory Sciences Travel Grant, $570 • 2017 (11/4-11/8), Professional Development Award, $500 • 2018 (11/10-11/14), Department of Medical & Molecular Sciences Travel Grant, $569
2015		**Natalia Rivera-Torres (mentor: Eric Kmiec, Gene Editing Institute, Christiana Care)** Publications • Modarai, SR, Man, D, Bialk, P, **Rivera-Torres**, N, Bloh, K and Kmiec, EB (2017). Efficient delivery and nuclear uptake is not

		sufficient to enable detectable gene editing in CD34+ cells directed by a ribonucleoprotein complex. Mol. Ther - Nucleic Acids. doi:10.1016/j.omtn.2018.01.013. • **Rivera-Torres** N, Kmiec EB. A Standard Methodology to Examine On-site Mutagenicity As a Function of Point Mutation Repair Catalyzed by CRISPR/Cas9 and SsODN in Human Cells. *J Vis Exp* 2017:e56195–e56195. https://doi.org/10.3791/56195. • **Rivera-Torres** N, Banas K, Bialk P, Bloh KM, Kmiec EB. Insertional Mutagenesis by CRISPR/Cas9 Ribonucleoprotein Gene Editing in Cells Targeted for Point Mutation Repair Directed by Short Single-Stranded DNA Oligonucleotides. *PLoS One* 2017;12:e0169350. https://doi.org/10.1371/journal.pone.0169350. • Bialk P, Sansbury B, **Rivera-Torres** N, Bloh K, Man D, Kmiec EB. Analyses of point mutation repair and allelic heterogeneity generated by CRISPR/Cas9 and single-stranded DNA oligonucleotides. *Sci Rep* 2016;6:32681. https://doi.org/10.1038/srep32681. Poster presentations • N. **Rivera-Torres** and E. Kmiec, Modeling Pediatric AML Associated Mutations with CRISPR mediated Gene Editing. American Society of Gene & Cell Therapy Annual Meeting, Chicago, IL. May 2018. • N. **Rivera-Torres** and E. Kmiec Modeling Pediatric AML Associated Mutations with CRISPR mediated Gene Editing. Genetic Toxicology Association Annual Meeting, University of Delaware, Clayton Hall, Newark, DE. May 2018. • T. Woolf, N. **Rivera-Torres**, R. Hogrefe, E. Kmiec Genome Editing with Third Generation Chemically Modified Oligonucleotides without Programmable Nucleases., 12th Annual Meeting of the Oligonucleotide Therapeutics Society, Montreal, Quebec. September 2016.
2016		**Meera Patel (mentor: Esther Biswas-Fiss, Medical & Molecular Sciences)** Publications • **Patel, M. J.**, Yilmaz, G., Bhatia, L., Biswas-Fiss, E. E., & Biswas, S. B. (2018). Site-Specific Fluorescence Double-Labeling of Proteins and Analysis of Structural Changes in Solution by Fluorescence Resonance Energy Transfer (FRET). *MethodsX*. doi: https://doi.org/10.1016/j.mex.2018.03.006 • **Patel, M. J.**, Bhatia, L., Yilmaz, G., Biswas-Fiss, E. E., & Biswas, S. B. (2017). Multiple conformational states of DnaA protein regulate its interaction with DnaA boxes in the initiation of DNA replication. *Biochimica et Biophysica Acta - General Subjects,1861*(9), 2165-2174. doi:10.1016/j.bbagen.2017.06.013

		Poster Presentation • **Patel, M. J.**, Biswas, S., Biswas-Fiss, E. Conformational Dynamics of DnaA Protein Drive the Switch Promoting Initiation of DNA Replication in Bacillus anthracis, Fifth Annual Microbial Systems Symposium, February 11, 2017. Newark, DE. Internal Funding • "Bioethics and Research Integrity Training for Early Career Graduate Students". Curriculum Development Grant Award- Center of Science, Ethics, and Public Policy; School of Arts and Sciences. (June 2018 – August 2018). Award: $3,000. *Investigator*.
2016		**Brett Sansbury (mentor: Eric Kmiec, Gene Editing Institute, Christiana Care)** Publications • **Sansbury** B. M., Wagner A. M., Nitzan E., Tarcic G., and Kmiec E. B., CRISPR-Directed In Vitro Gene Editing of Plasmid DNA Catalyzed by Cpf1 (Cas12a) Nuclease and a Mammalian Cell-Free Extract. CRISPR Journal. 2018, 9(2) 191-202. doi: 10.1089/crispr.2018.0006 • Bialk, P., **Sansbury**, B., Rivera-Torres, N., Bloh, K., Man, D., Kmiec, E., Analyses of point mutation repair and allelic heterogeneity generated by CRISPR/Cas9 and single-stranded DNA oligonucleotides. Scientific Reports. 2016, 6: 32681. doi: 10.1038/srep32681 • Man, D., **Sansbury**, B., Bialk, P., Bloh, K., Kolb, E. A., and Kmiec, E. B., Target Site Mutagenesis during Crispr/ Cas 9/Single-Stranded- Oligonucleotide Directed Gene Editing for Sickle Cell Anemia. Blood. 2016, 128(22), 4706. Poster Presentations • **Sansbury**, B., Wagner, A. and Kmiec, E. *In Vitro* Gene Editing Catalyzed by CRISPR-Cpf1 and a Mammalian Cell-Free Extract. American Society of Gene & Cell Therapy Meeting (May 14th-19th 2018) Chicago, IL. • **Sansbury**, B., Wagner, A. and Kmiec, E. *In Vitro* Gene Editing Catalyzed by CRISPR-Cpf1 and a Mammalian Cell-Free Extract. Genetic Toxicology Association Meeting (May 3rd- 4th 2018) Newark, DE.
2017		**Kelly Banas (mentor: Eric Kmiec, Gene Editing Institute, Christiana Care)** Publication • Bialk P, Wang Y, **Banas K**, and Kmiec EB. Functional Gene Knockout of NRF2 Increases Chemosensitivity of Human Lung Cancer A549 cells in vitro and in a Xenograft Mouse Model. Mol Ther- Oncolytics (2018) (Under Revision) • Rivera-Torres N, **Banas K**, Bialk P, Bloh KM, Kmiec EB (2017) Insertional Mutagenesis by CRISPR/Cas9 Ribonucleoprotein Gene Editing in Cells Targeted for Point Mutation Repair Directed by

		Short Single-Stranded DNA Oligonucleotides. PLoS ONE 12(1): e0169350. doi:10.1371/journal.pone.0169350 Poster Presentation • **Banas K**, Rivera-Torres N, Kmiec EB. Accel Human Gene Editing with Synthetic CRISPR/Cas9. Community Research Exchange 2018: Addressing Health Disparities, Newark, DE, 3/12/2018.
2017		**Joscelyn Korth (mentor: Esther Biswas-Fiss, Medical & Molecular Sciences)** Publication • Biswas-Fiss E.E., Alturkestani, A., Jones, J., **Korth, J.,** Affet, S., Ha, M., & Biswas, S. (2018). ABCA Transporters. In: Choi S. (eds) Encyclopedia of Signaling Molecules. Springer, Cham. doi: https://doi.org/10.1007/978-3-319-67199-4 Poster Presentation • Wangtiraumnuay, N., Van Schelvergem, K., **Korth, J.**, Tsukikawa, M., Capasso, J., Biswas-Fiss, E., & Levin, A. Bioinformatic Analysis of ABCA4 in Ocular Genetic Disease. Poster session presented at: ISGEDR2017. 20th Bi-Annual Meeting of the International Society for Genetic Eye Diseases and Retinoblastoma (ISGEDR); 2017 Sept. 14-16; Leeds, England.
2017		**Ngozi Dom-Chima (mentor: Melissa Melby, Anthropology)** Internal Funding • Graduate and Professional Education: Summer Doctoral Fellowship (06/01/2018-08/31/2018), $4,500.
2017		**Safiyah Mansoori (mentor: Sheau Ching Chai, Behavioral Health & Nutrition)** Oral Presentation • Sheau C. Chai, Stephanie Kramer, Nicole Brown, Jessica McMahon, **Safiyah Mansoori**, Zugui Zhang. Effects of Tart Cherry Juice on Biomarkers of Vascular Function. American Society for Nutrition, 2018. Boston, MA.

f. What are the department's/unit's strategies for student advisement?

During the application process, each student must identify a faculty advisor from among the faculty holding appointments in the program. The faculty member must be willing to serve as advisor and to accept responsibility for oversight of the student's academic progress in the program. Upon admission, students and mentors sign an "Accountable Mentorship Agreement for PhD Students: Research Advisor Selection Form" and "Core Tenets of Graduate Training: Compact Between Graduate Students and their Research Advisors", showing they understand the importance of staying on schedule.

If, during a student's academic program, the advisor is unable or unwilling to continue as advisor, it is the student's responsibility to identify a faculty member willing to be the new advisor. The new advisor must be identified within 6 months for the student to be considered making satisfactory progress toward the degree.

Students may also elect to switch to a different advisor at any time with the approval of the Program Committee and with the consent of the new faculty advisor. Switching advisors does not change the deadlines for completing the requirements for a degree. **This has occurred with two students in the Program, each with satisfactory conclusions (one graduated, one completing prelim exam).**

The student and his/her advisor will identify members of a Dissertation Committee within one semester of successful completion of the preliminary examination. Students must convene their dissertation committees at least once every six months. Upon completion of the meeting, the student's advisor must complete a meeting report and submit it to the graduate coordinator. Students who do not have committee meetings in a timely manner will be considered as failing to progress and will be required to meet with the Program Committee to determine whether a recommendation for dismissal from the program is warranted. **To date, all students have maintained demonstrable progress through these meetings.**

g. Accreditation requirements: Not applicable

h. Changes in the program admission criteria, degree requirements, or subject areas since the program was initiated.

In 2014, KAAP654 Medical Physiology became KAAP615/BISC605 Advanced Mammalian Physiology and MEDT999 was changed to UNIV999.

In 2017, KAAP615 was changed in our program guidelines from 3 to 4 credits. To maintain the total number of required credits at 44, MEDT800 Preparing Research Proposals was changed from 3 to 2 credits. The Program Guidelines were updated with “Leaves of Absence” and “Responsibilities and Evaluation of Students on Assistantships”.

In 2018, we were informed by Biological Sciences that BISC671 Cellular & Molecular Immunology (4 cr) would no longer be available. We added a third required science elective, bringing the total to 9 science elective credits and decreasing the total required program credits from 44 to 43. Additionally, with the retirement of Dr. Mary Ann McLane, the Graduate Program Director was changed to Dr. Esther Biswas-Fiss.

i. Recruiting procedures, including information for underrepresented populations

(1) Our department submitted a request for College of Health Sciences support for a mentored research and teaching fellowship program similar to Rutgers and Penn State’s, to do as a pilot as proof-of concept here at UD to apply for federal funding, but the request was not approved. We are still very much interested in having such a program in our department.

(2) We have reached out to local community colleges (Delaware Technical CC at 2 campuses, Cecil County College, Salem County College, Rowan College in Mt. Laurel and in Sewell NJ, Camden County College, Bucks County College, Mercer County College) to encourage

underrepresented students to pursue graduate education in the health sciences. In addition, we have provided personal visits to the students at Richard Stockton University and Morgan State University. Summer enrichment experiences in Medical Laboratory Science and Biotechnology have been offered to local high school students, and our faculty participates in the credit courses offered to St. Mark's High School and Newark High School. We intend to continue and broaden these efforts.

(3) We are building on our informal association with the faculty at Delaware State University to formalize an agreement to facilitate matriculation of their graduates to our program. **So far we have two students (admitted 2015 and 2016, one = underrepresented) from DSU matriculating in Medical Sciences.**

(4) We initiated a Student Success Initiative within our majors to help those students, including those historically underrepresented students, who are struggling to achieve the bachelor's degree, the opportunity to make sure they achieve that goal and therefore become eligible for graduate education.

(5) We promote the involvement of UD undergraduate students, especially from diverse backgrounds, to participate in year-round research experiences (INBRE, summer scholars, etc), resulting in these students giving poster presentations, for which two received awards.

(6) We have expanded our offering of multiple Open Houses to advertise the opportunities for graduate education within the Medical Sciences PhD.

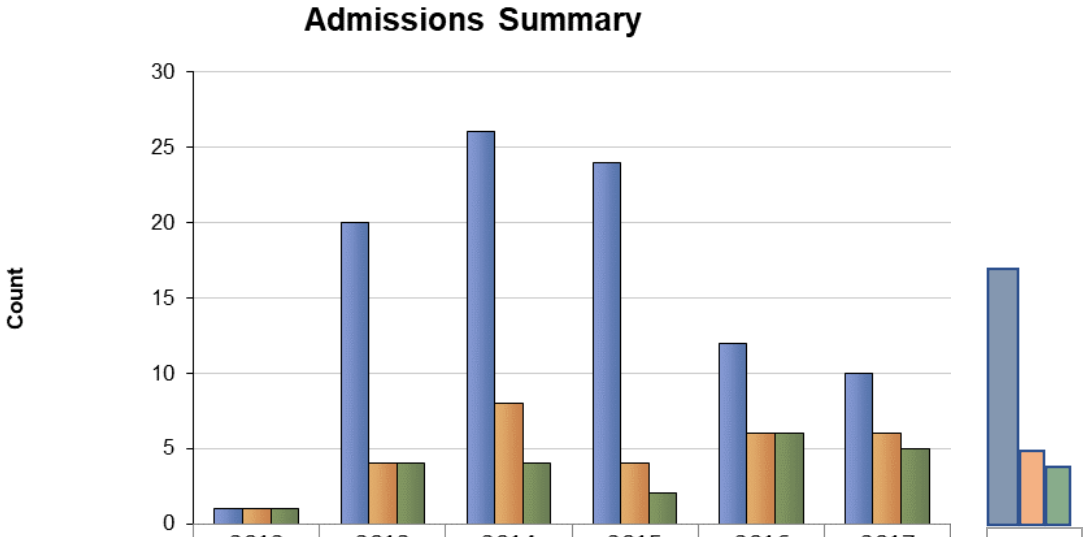
We are learning how to use SLATE to encourage students from historically black colleges and universities to consider our PhD program. Typically, a Medical Laboratory Sciences baccalaureate program is very diverse, like ours at UD. We routinely send information to those programs throughout the country for their students to consider this for their graduate education. Our faculty attends the Clinical Laboratory Educators Conference yearly and take literature with them to distribute to the national educators there.

It is noteworthy that 82% of students admitted have been women, with 59% of those being Asian, African-American, African or Hispanic (Figures 2 and 3).

STUDENT INFORMATION

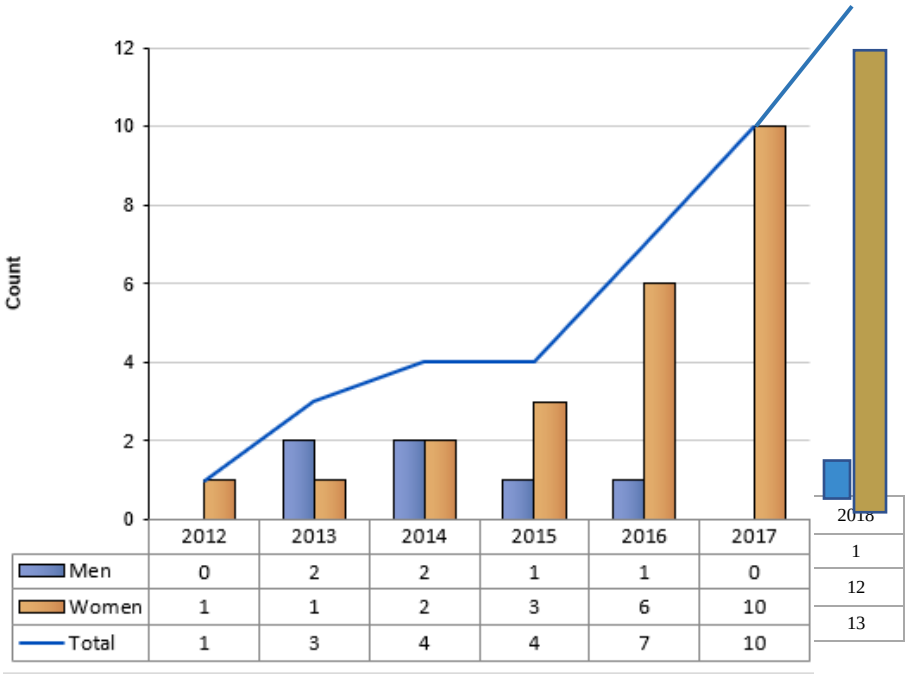
a. All data for Fig 1-4 to 2017 was provided by the Office of Graduate and Professional Education, 9-18-18

Figure 1. Application and enrollment history



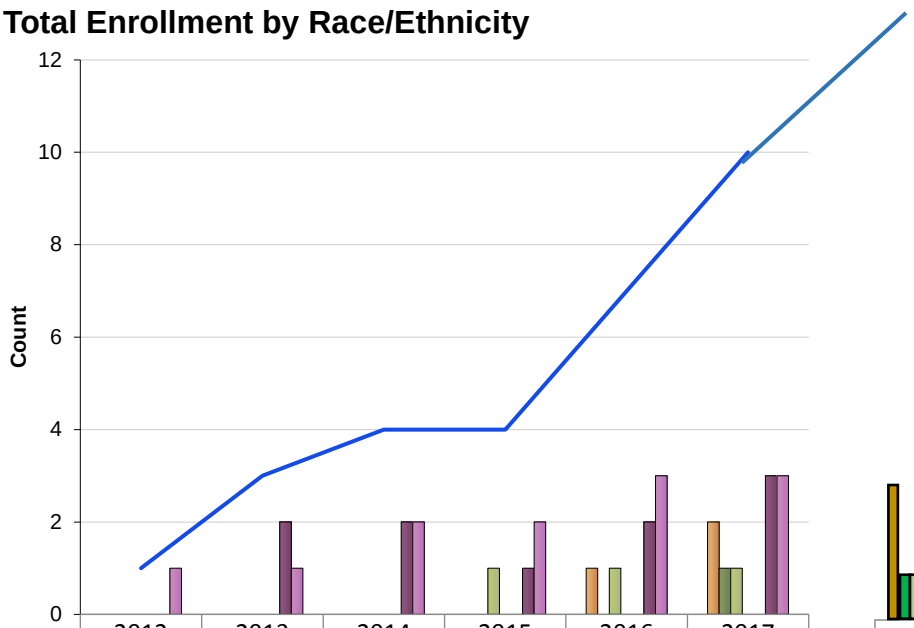
	2012	2013	2014	2015	2016	2017	2018
Applied	1	20	26	24	12	10	17
Admitted	1	4	8	4	6	6	5
Matriculated	1	4	4	2	6	5	4

Figure 2. Total enrollment by gender



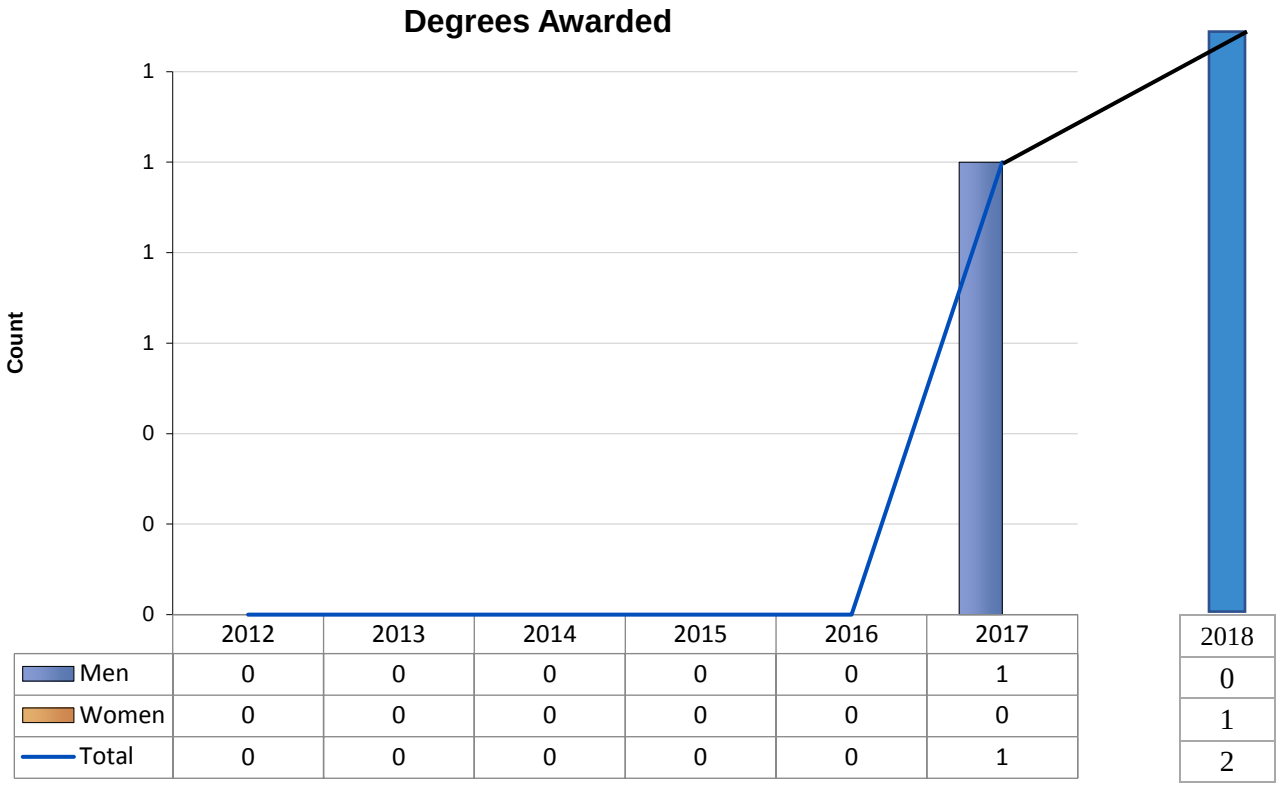
	2012	2013	2014	2015	2016	2017	2018
Men	0	2	2	1	1	0	1
Women	1	1	2	3	6	10	12
Total	1	3	4	4	7	10	13

Figure 3. Total enrollment by race/ethnicity



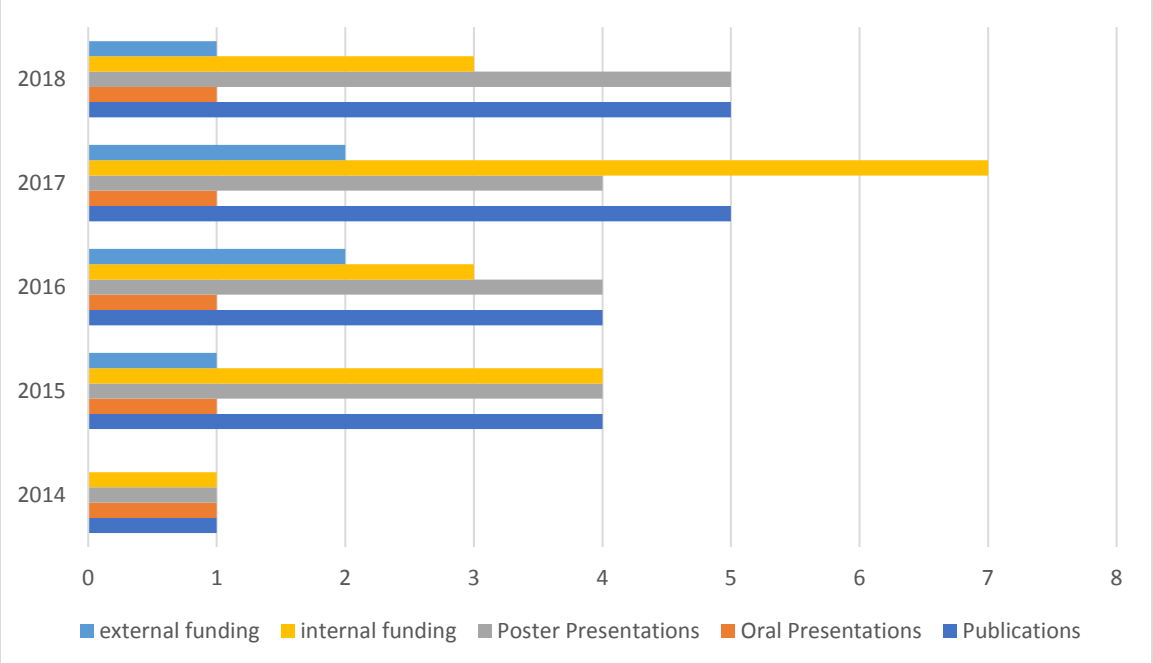
	2012	2013	2014	2015	2016	2017	2018
American Indian or Alaska Native	0	0	0	0	0	0	0
Asian	0	0	0	0	1	2	3
Black or African American	0	0	0	0	0	1	1
Hispanic or Latino	0	0	0	1	1	1	1
Native Hawaiian or Other Pacific Islander	0	0	0	0	0	0	0
Two or more races	0	0	0	0	0	0	0
White	0	2	2	1	2	3	5
Nonresident alien	1	1	2	2	3	3	3
Unknown	0	0	0	0	0	0	0
Total	1	3	4	4	7	10	13

Figure 4. Total degrees awarded



	2012	2013	2014	2015	2016	2017	2018
Men	0	0	0	0	0	1	0
Women	0	0	0	0	0	0	1
Total	0	0	0	0	0	1	2

Figure 5. Publications, presentations, funding



b. Annotated evidence of student placement who have graduated. How does department facilitate placement?

2017 Graduate (male): Associate, Life Sciences Specialist, Deallus Consulting, New York, NY

2018 Graduate (female): Next-Generation Sequencing Scientist, QIAGEN Sciences, Frederick MD

Both graduates already had professional contacts in the health sciences/pharmaceutical industries and had communicated early in their studies that they preferred industry rather than academia. Both graduates had positions promised before they graduated.

During their graduate studies, we encourage and promote student attendance at various professional activities on/off campus.

c. Identify sources and levels of financial support and proportion receiving assistantships.

To date, 100% of student in this Medical Sciences have been financially supported by teaching assistantships, research assistantships, or graduate/dissertation fellowships. As shown in section 1.e above, many students have won internal and external support for supplies, stipends and summer funding.

1. Demand and competitive factors for attracting students

Demand for the Medical Sciences PhD program has been consistent as demonstrated by our increasing enrollment numbers, obtained with minimal advertising. The primary competition for our program is with other doctoral programs in "Medical Sciences" at Penn State and Rutgers. The Master's program in UD's Biological Sciences has been a source of 3 applicants, and our department's two baccalaureate programs in Medical Laboratory Sciences and Medical Diagnostics have yielded two applicants. Our department's new master's degree in Medical Sciences will also become a feeder into this doctoral program, for those nationally certified Medical Laboratory Scientists who wish to complete a research PhD. The availability of the Gene Editing Institute at Christiana Care and expansion of the NIH-funded faculty in our own department places us in a strong position to attract students in our region as well as nationally.

Our department continues to provide this interdisciplinary Biomedical Health Sciences program for students interested in that approach, which is unique to the other graduate programs in our College.

2. Factors making this program unique

From its inception, the Medical Sciences doctoral program was designed to provide the broadest possible opportunities for research-based careers in the health sciences, taking advantage of the range of faculty talent and expertise within our College of Health Sciences. Allowing students and mentors the opportunity to focus on a unique medical challenge, while being exposed to health research topics far afield from their own in seminars and guest speakers, has been appealing to each student coming through the program. It is not unusual for a student focusing on qualitative research for diabetic African migrants to use her statistical skills during seminar to comment and critique a

fellow student reporting on quantitative genetic studies for a leukemia gene. Mentors seeking Medical Sciences students have come from Biological Sciences, Anthropology, Behavioral Health & Nutrition, Medical & Molecular Sciences, and the Gene Editing Institute at Christiana Care.

3. Overview of interdisciplinary relationships

This is covered in #2 above.

4. Adequacy of facilities for this program

Since this is an interdisciplinary program, its facilities are in the research labs of the mentors: Medical & Molecular Sciences (Willard Hall, McDowell Hall, STAR Tower), Biological Sciences (Wolf Hall), Anthropology (Munroe Hall), Behavioral Health & Nutrition (McDowell Hall), Gene Editing Institute (Helen Graham Cancer Center). The Medical Sciences program has in place the faculty, the laboratories, the courses, and the funding needed for the PhD in Medical Sciences to continue to be successful.

5. Budgetary requirements beyond typical unit expenses

There are no budgetary requirements of the program beyond the typical departmental expenses.

APPENDIX 1:

SUPPORT LETTERS FOR PERMANENT STATUS APPLICATION

The Tower at STAR
100 Discovery Blvd. – 7th Floor
Newark, DE 19713
Phone: 302-831-8370

TO: University of Delaware Faculty Senate

From: Kathleen S. Matt, PhD – Dean

DATE: October 25, 2018

Dear Senators,

This letter is written in strong support of permanent status for our interdisciplinary Ph.D. program in Medical Sciences within the College of Health Sciences, and to confirm the College's continued commitment to this program.

This Ph.D. in Medical Sciences has undergone strong, and steady growth since its inception. The high level of interest in the program evident at our student recruitment events and suggests that enrollment in the Ph.D. program will continue to grow as the word gets out about its availability.

This program was designed for those wishing to leverage the opportunities of a multi-disciplinary environment offered by cross collaboration of CHS, UD and its affiliates. The level of rigor is high and graduates of the program have gone onto successful careers as independent scientists. Student productivity is high as measured by graduate student publications, presentations and fellowship awards. As we have growing numbers of graduates from this program, I am confident that tracking data will demonstrate their continued success.

Sincerely,

Kathleen S. Matt, PhD
Dean, College of Health Sciences
Professor, Department of Kinesiology & Applied Physiology
ksmatt@udel.edu

UNIVERSITY OF DELAWARE | Department of Medical & Molecular Sciences

305 Willard Hall Education Building
Newark, DE 19716-3720
Phone: 302-831-2849
Fax: 302-831-4180
Email: mms-dept@udel.edu

October 28, 2018

From: Esther Biswas-Fiss, Ph.D., MB(ASCP) [CM]
Program Director, Ph.D. in Medical Sciences
Professor and Chair, Department of Medical and Molecular Sciences

To: University of Delaware Faculty Senate

RE: Permanent Status for the Ph.D. Program in Medical Sciences

To Whom It May Concern:

Following review of the Permanent Status Program Review (PSPR) self-study report, it is with great enthusiasm that I provide my wholehearted support for the permanent status request for the interdisciplinary PhD program in Medical Sciences offered through the College of Health Sciences.

As the PSPR self-study document demonstrates, the Medical Sciences PhD program provides a unique and strong foundation in the basic and applied health sciences allowing for interdisciplinary advanced graduate study. Graduates of this program are well prepared to succeed as scholars in areas ranging from the bench to the bedside. Novel synergies are created due to the interdisciplinary nature of the program, as students are exposed to a wide variety of research topics. Thus, a student whose thesis research entails the nutritional effects of a particular dietary regime may seek to include RNA biomarkers as a result of exposure to this aspect of science. The knowledge gained in our program will no doubt enable them to excel in "collaborative research initiatives" which are well looked upon by federal funding agencies.

Based on enrollment statistics, the program has been well received, having undergone steady growth since its first offering. Information gathered in recruiting events suggest it is likely that this trend will continue as more students learn of this opportunity. Certainly, in our most recent admission cycle, we have had high caliber applicants and matriculants who were highly competitive for admission to PhD programs nationwide. I am also pleased that we have been able to attract, and continue to attract, a diverse group of students. Students in the program have demonstrated high research productivity in terms of publications, presentations and receipt of fellowships. Graduates of the program have gone on for post-doctoral positions in their desired area of practice. As an individual whose career spans nearly thirty years at several academic institutions, I can say that the thesis defenses and work being conducted by our PhD students is highly competitive.

As a researcher, I feel that this program provides a solid foundation for a rigorous PhD and thesis project. The curriculum provides the needed foundation in biomedical science and research design, yet offers the flexibility for students to gain expertise in areas that specifically relate to their research interests. The existence of a PhD program with a health sciences focus was, and is, an important factor to myself and other active researchers in my department. As the Department of Medical and Molecular Sciences grows, I am confident that additional faculty will seek to become thesis advisors for students in this program. At

the same time, I anticipate the interdisciplinary aspects of this program will continue to attract mentors having primary appointments in departments across campus.

I fully support this program's application for permanent status and will continue to provide leadership and mentorship commitment for its students.

Sincerely,

Esther E. Biswas-Fiss, Ph.D.
Program Director, Ph.D. in Medical Sciences
Professor and Chair
Department of Medical and Molecular Sciences

UNIVERSITY OF DELAWARE
College of Health Sciences
DEPARTMENT OF MEDICAL & MOLECULAR SCIENCES

Vijay Parashar, PhD
Assistant Professor
305G Willard Hall
Email: parashar@udel.edu
Phone: 302-831-4552

TO: University of Delaware Faculty Senate

DATE: October 27, 2018

RE: Permanent approval of the doctoral program in Medical Sciences

I am writing to recommend approval of the Faculty Senate of the proposed permanent doctoral graduate degree in Medical Sciences and confirm my continued commitment to this program.

Participation in this program has availed highly-motivated students to my research group. I have started mentoring Mr. Richard Knappenberger through this program in Fall 2018. Richard is a motivated student who is working hard towards his scientific goals since he joined my laboratory. The program allows the required amount of research time to him while preparing him as a scientist by offering a perfect balance of mandatory and elective courses. While Richard is in his first year of candidacy, this program has already provided him sufficient room to expand his research skills in laboratory while allowing him to take courses that relate to his research project. I am sure that, with the support of this program, Richard will do very well in his PhD tenure in my laboratory.

I am satisfied with the level of rigor of the program and academic quality of the students that are admitted to this program. Being able to personally meet all the candidates before their acceptance into the program, I am amazed by the quality of students this program is attracting. I fully support this program's application for permanent status and will continue to provide a mentorship commitment for its students. This further allows research faculty like me in the college to continue to receive federal funding.

Yours sincerely,

Vijay Parashar, PhD

UNIVERSITY OF DELAWARE | College of Health Sciences
DEPARTMENT OF MEDICAL & MOLECULAR SCIENCES

305 Willard Hall Education Building
Newark, DE 19716-3720
Phone: 302-831-2849
Fax: 302-831-4180
Email: mmsc-dept@udel.edu

Dr. Subhasis (Sam) Biswas Ph.D.
Cell (856) 264-1999

Professor, Molecular Biology
Tel (302) 831-3367

To: University of Delaware Faculty Senate

From: Dr. Sam Biswas, Professor, Department of Medical & Molecular Sciences

Date: October 27, 2018

RE: Permanent approval of the doctoral program in Medical Sciences

I am writing to recommend approval of the Faculty Senate of the proposed permanent doctoral graduate degree in Medical Sciences and confirm my continued support for this program.

After joining University of Delaware in 2017, I was faced with daunting task of finding high-quality graduate students to continue my research. The PhD program in Medical Science recruited a number of excellent graduate students and I was able to attract one of these students to my laboratory. This graduate student came to UDEL with a MS degree in molecular biology from the Catholic University of America. She has one year of research experience that allowed quick assimilation to our research. Thus far, she is doing well in her course work as well as working in the laboratory.

I also had the opportunity to meet many of the more senior students of the program. These students are hard-working and accomplished in completing various milestones towards PhD. This group is racially diverse and helped create a very intellectually and socially stimulating atmosphere for doctoral education.

I pledge to continue to provide mentorship commitment for the students in this program and fully support this application for a permanent status.

Thank you.

Sincerely yours,

Sam Biswas, Ph.D.
Professor
Department of Medical & Molecular Sciences
University of Delaware
Newark, DE 19716

UNIVERSITY OF DELAWARE

DEPARTMENT OF
BIOLOGICAL SCIENCES

University of Delaware
Newark, Delaware 19716-2500
Ph: 302/831-6977
Fax: 302/831-2281

TO: University of Delaware Faculty Senate

From: Kenneth L. van Golen, Ph.D.

DATE: 23 October 2018

RE: Permanent approval of the doctoral program in Medical Sciences

To Whom It May Concern:

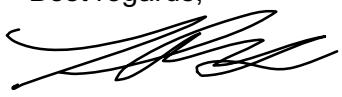
I am writing to recommend approval of the Faculty Senate of the proposed permanent doctoral graduate degree in Medical Sciences and confirm my continued commitment to this program.

At the beginning of 2016 I became the official mentor and faculty advisor of Sangjucta Barkataki, a Ph.D. candidate in the Medical Sciences program. Prior to that I acted as a member of her graduate committee. She had spent the previous summer in my laboratory learning specific techniques. Her mentor at that time left the university and I was asked to take over as her formal Ph.D. advisor. Prior to graduate school, Sangjucta had worked at Johns Hopkins in a microarray core. She came to me with a Masters degree and a good deal of laboratory experience. Her Ph.D. project involved the study of the mechanisms of Inflammatory Breast Cancer (IBC) skin metastases. IBC is a relatively rare but highly aggressive and deadly form of breast cancer. Approximately a quarter of women with IBC develop skin metastases, which rapidly degrades their quality of life and leads to decreased overall survival. For her work, Sangjucta received a travel award from the Delaware Breast Cancer Coalition to attend the biennial IBC International meeting at the Dana Farber Institute. She also received both a University Doctoral Fellowship Award and a $100,000 research grant from the Inflammatory Breast Cancer Research Network. The founder and CEO of the network was so impressed with her work that she attended Sangjucta's doctoral defense in March of 2018.

Overall, I have been very pleased with the class work preparation of the students coming from this program. The rigor of the qualifying exams and the insistence of quality of research by the student's dissertation committee comprised of faculty from the program has been outstanding.

I fully support this program's application for permanent status and will continue to provide a mentorship commitment for its students.

Best regards,



Kenneth L. van Golen, Ph.D.
Associate Professor of Biological Sciences
Concentration Coordinator, Molecular Biology & Genetics
Senior Research Scientist, The Helen F. Graham Cancer Center
The Center for Translational Cancer Research

Carpenter Sports Building
Newark, DE 19716-3750
Phone: 302-831-2265
Fax: 302-831-4261

College of Health Sciences
DEPARTMENT OF
BEHAVIORAL HEALTH & NUTRITION

To: University of Delaware Faculty Senate

From: Marie Fanelli Kuczmarski, PhD, RDN, LDN
Professor of Nutrition
Department of Behavioral Health and Nutrition

October 22, 2018

RE: Permanent approval of the doctoral program in Medical Sciences

I am writing to recommend approval of the Faculty Senate of the proposed permanent doctoral graduate degree in Medical Sciences and confirm my continued commitment to this program.

Over the past year, I have served as an academic advisor and mentor of a student enrolled in this program. This doctoral student obtained her Master's degree from the University of Delaware in Nutrition Sciences. She worked at the USDA Human Nutrition Research Center in Beltsville for 6 years prior to returning for her doctoral degree. Her post-baccalaureate academic training and research experiences along with her first year doctoral-level courses have enable her to excel in defining a dissertation topic. As a recipient of a National Institute on Aging, NIH research internship, she will evaluate the nutritional status of a racially and socioeconomically diverse urban population. Currently, she is assisting with the preparation of a manuscript which will be her first co-authored article. She has taken her written preliminary exam and plans to complete the oral component this semester. The Medical Science program is the perfect mechanism to allow her to enhance her research experiences and obtain a doctoral degree.

I have been pleased with the program's academic preparation, especially the required advanced medical physiology courses, and the structure and requirements of the seminar courses. The research and productivity requirements are rigorous. I expect that graduates of this program will be competitive scholars and leaders.

I fully support this program's application for permanent status and will continue to provide a mentorship commitment for its students.

Marie Fanelli Kuczmarski

Carpenter Sports Building
Newark, DE 19716-3750
Phone: 302-831-2265
Fax: 302-831-4261

College of Health Sciences
DEPARTMENT OF
BEHAVIORAL HEALTH & NUTRITION

TO: University of Delaware Faculty Senate

FROM: Sheau Ching Chai, PhD, RD
Department of Behavioral Health and Nutrition

DATE: October 22, 2018

RE: Permanent approval of the doctoral program in Medical Sciences

I am writing to recommend approval of the Faculty Senate of the proposed permanent doctoral graduate degree in Medical Sciences and confirm my continued commitment to this program.

I am currently mentoring a PhD student, Safiyah Mansoori. Safiyah (my first PhD student, female and from an under-represented population) had already obtained her BS degree in Medical Diagnostics. She is interested in nutrition research specifically aiming to elucidate the role of diet in human health. This interdisciplinary Medical Science program is the perfect mechanism to allow her to continue her research in this area and obtain a doctoral degree. She is a second year student and has obtained her candidacy. She is currently working on her research proposal and will start collecting her dissertation data soon while working on two manuscripts using the data from my funded research projects.

This is an excellent program. I have been pleased with their academic preparation, research rigor, and productivity. This program also creates a collaborative opportunity that has allowed me to collaborate with top scientists engaged in highly innovative research.

I fully support this program's application for permanent status and will continue to provide a mentorship commitment for its students.

Sincerely,

Sheau Ching Chai, PhD, RD
Assistant Professor
Department of Behavioral Health and Nutrition
University of Delaware

UNIVERSITY OF DELAWARE
COLLEGE OF ARTS AND SCIENCES
DEPARTMENT OF ANTHROPOLOGY
University of Delaware
Newark, Delaware 19716-2510
Ph: 302/831-2802
Fax: 302/831-4002

TO: University of Delaware Faculty Senate

From: Melissa Melby, Department of Anthropology

DATE: 22 October 2018

RE: Permanent approval of the doctoral program in Medical Sciences

I am writing to recommend approval of the Faculty Senate of the proposed permanent doctoral graduate degree in Medical Sciences and confirm my continued commitment to this program.

I am currently chairing to doctoral dissertation committees for the following students: Debora Kamin Mukaz and Ngozi Dom-Chima. Both students are female from under-represented populations at UD.

Ms. Kamin Mukaz's dissertation is entitled "Acculturation and Diabetes among African Migrants to the United States," and uses qualitative and quantitative methods. She has completed all of her fieldwork and is in the process of writing up her dissertation. Her work as already resulted in several publications and presentations:

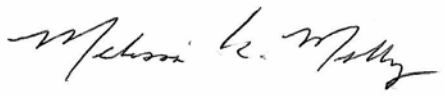
- D Kamin Mukaz, **MK Melby**. (2018) What the Global Health Community Can Learn from Africa. *Delaware Journal of Public Health* 4(4): 20-24.
- DK Mukaz, MA Papas, **MK Melby**,Y Commodore-Mensah, K Setiloane. (2017) "Diabetes among African Migrants to the United States: Analysis of the National Health Survey 2010-2014." United States Conference on African Immigrant Health. 5th Annual Meeting. Washington, DC/Crystal City, VA. 6 Oct.
- D Kamin Mukaz, **M Melby**. (2017) Acculturation and diabetes among Congolese migrants to the United States. American Public Health Association 145th Annual Meeting. Atlanta, GA. 6 Nov.

Ms. Kamin Mukaz has also been assisting me with analyses of a Japanese data set, using Bayesian methodologies. We plan to publish several papers using these methods. Ms. Kamin Mukaz has demonstrated a high degree of professionalism, initiative and preparation for graduate studies.

Ms. Dom-Chima, is my second student from the Medical Sciences program, planning to do research on how financial coaching affects the social determinants of health in a population in Delaware. Shortly after we met, I shared a draft of a grant proposal with her, and she provided feedback on it. Over the summer, she began reading the literature, drafting her research proposal, and contributing to shared google docs on research design and methodology. She is also working on a systematic review with another graduate student, and contacted librarians and participated in a training session on how to do a systematic review. She has made considerable progress on framing her research questions, and conducting a background literature review, all while studying for her qualifying exams. Having recently attended her seminar presentation, I was extremely impressed by the level of engagement and rigor of the questions, demonstrating the program's rigor and the value of the cohort of students as well as participating faculty.

I fully support this program's application for permanent status and will continue to provide a mentorship commitment for its students.

Sincerely yours,



Melissa K. Melby, PhD
Associate Professor
Department of Anthropology
Tel: 302-831-1857
mmelby@udel.edu

TO: University of Delaware Faculty Senate

FROM: Eric B. Kmiec, Director, Gene Editing institute

Christiana Care Health System

DATE: October 22, 2018

RE: Permanent approval of the doctoral program in medical sciences.

I am writing to indicate my strong support and recommended approval to the Faculty Senate for the proposed permanent doctoral graduate degree in the Department of Medical Sciences. I can also confirm my institute's continued commitment to this program.

I have been a faculty member at the University of Delaware since 1999, first, as a tenured full professor in the Department of Biology until 2010, and now as an affiliated faculty in the College of Health Sciences. I founded and now direct the Gene Editing Institute at Christiana Care Health System and, since my arrival I have sought the involvement in the Medical Sciences PhD program as a resource for qualified graduate students. I now have 4 of them and they are all performing beautifully. All have first author publications in high-quality journals and several of them have been recognized nationally and internationally for their contributions to the field of gene editing. Several have gone on to win awards at national meetings and one has a full scholarship from the B plus Foundation in Delaware. I will continue to expect good things from them.

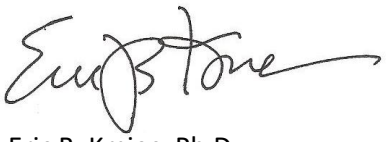
My first student, Natalia Rivera is from an underrepresented population and already obtained her master's degree at Delaware State University. The medical sciences program was a perfect mechanism to allow her to continue her research with me and obtain a doctoral degree. She is currently in candidacy and will be defending her dissertation in summer of 2019. She currently has 5 publications and gives multiple presentations at national and international research meetings. It's safe to say that she will be a highly sought after as a postdoctoral candidate.

The three other graduate students are also progressing very well with two of them having already passed their prelim examinations; the fourth is a first year student. As such I have seen this program in action up close and I therefore can easily support this program's application for permanent status. I will continue to provide mentorship and financial commitments to its students.

Center for Translational Cancer Research, Helen F. Graham Cancer Center & Research Institute
4701 Ogletown-Stanton Road, Suite 4300, Newark, DE 19713

Thank you in advance for your courtesy and, if I can provide any further information, please do not hesitate to contact me.

Sincerely,



Eric B. Kmiec, Ph.D.
Director
Gene Editing Institute
304-840-3375
Eric@GeneEditingInstitute.com

Eric.B.Kmiec@Christianacare.org

UNIVERSITY OF DELAWARE | University of Delaware Library
VICE PROVOST FOR LIBRARIES AND MUSEUMS
AND MAY MORRIS UNIVERSITY LIBRARIAN

181 South College Avenue
Newark, DE 19717-5267
Phone: 302-831-2231
Fax: 302-831-1046

October 16, 2018

Memorandum

To: Esther E. Biswas-Fiss
Professor and Chair
Department of Medical and Molecular Sciences

From: Trevor A. Dawes
Vice Provost for Libraries and Museums
and May Morris University Librarian

I am responding to your request to supply information about the capability of the University of Delaware Library, Museums and Press to support permanent status for the PhD in Medical Sciences.

The existing online and print collections of the University of Delaware Library, Museums and Press, which are strong in the sciences and related interdisciplinary areas, are currently able to support this program. However, no additional funding is available for new resources. Enclosed is a description of collections, resources and services available for this purpose.

I would be pleased to respond to any questions.

/nb
Enclosure

c: University of Delaware Library, Museums and Press
Susan A. Davi, Associate Librarian and Head, Collection Management and Licensed Electronic Content Department
M. Dina Giambi, Associate University Librarian for Technical Services and Resource Management
Sarah E. Katz, Senior Assistant Librarian, Reference and Instructional Services Department, and UDLib/SEARCH Training Coordinator
Sabine Lanteri, Senior Assistant Librarian and Science Liaison Librarian, Reference and Instructional Services Department
Thomas Melvin, Librarian, Reference and Instructional Services Department
Sandra Millard, Deputy University Librarian, Associate University Librarian for Public Services and Outreach, and Program Director, UDLib/SEARCH
Carol Rudisell, Librarian and Head, Reference and Instructional Services Department
William S. Simpson, Associate Librarian and Institutional Repository Librarian, Reference and Instructional Services Department

Faculty Senate
Karren Helsel-Spry, Administrative Assistant IV

University of Delaware Library
VICE PROVOST FOR LIBRARIES AND MUSEUMS
AND MAY MORRIS UNIVERSITY LIBRARIAN

181 South College Avenue
Newark, DE 19717-5267
Phone: 302-831-2231
Fax: 302-831-1046

October 16, 2018

Report on Library Services and Collections in Support of the PhD in Medical Sciences

General Description

The University of Delaware Library, Museums and Press includes the Hugh M. Morris Library, where the main collection is housed; two branch libraries located on the Newark campus, the Chemistry Library and the Physics Library; and a third branch library, the Marine Studies Library, located in Lewes, Delaware. The Library collections parallel the University's academic interests and support all disciplines. The graduate programs in Medical Sciences are directly supported by the Library's strong collections in laboratory sciences, physiology, kinesiology, nutrition, nursing, health sciences, bioinformatics, biological sciences, chemistry, engineering, neuroscience, animal science, and related social sciences.

Databases, full-text electronic journals and electronic books, books, periodicals, microforms, government publications, maps, manuscripts and media provide a major academic resource for the University of Delaware, the surrounding community, the state of Delaware and the nation. Library staff members provide a wide range of services.

The University of Delaware Library, Museums and Press is a U.S. depository library and a U.S. patent depository library and contains the complete file of every patent issued by the U.S. Patent and Trademark Office (USPTO).

The online catalog, DELCAT Discovery, provides access to millions of items by author, title, subject and keyword.

Library collections number over 2,720,000 and are broadly based and comprehensive. In 2016/2017, the Library Web <library.udel.edu/> received over 3,900,000 page views.

Specific Support for the PhD in Medical Sciences

The Library's collections are strong and are able to support this graduate program. For many years, the Library has supported related graduate and undergraduate programs in bioinformatics, biology, engineering, health sciences and medical technology. The collections in these areas are excellent and continue to grow.

An experienced librarian, Sarah E. Katz (sekatz@udel.edu), Senior Assistant Librarian, Reference and Instructional Services Department, serves as the Library liaison to the faculty in the Department of Medical and Molecular Sciences. As Library liaison, Ms. Katz works with the Department to:

- Further develop Library collections, both print and electronic to support the teaching, learning and research needs of the Department
- Provide research support for faculty and students in a consultation setting
- Provide instruction in a classroom setting
- Serve as a resource for the information needs of the Department as they relate to the Library, Scholarly Communication, Open Access and other topics

Three other science librarians have considerable expertise in related subject areas and can provide additional specialized services, as needed. They are:

- Sabine Lanteri (slanteri@udel.edu) – Biological Sciences, Biomedical Engineering, Chemistry & Biochemistry, Chemical & Biomolecular Engineering
- Tom Melvin (tmel@udel.edu) – Civil & Environmental Engineering, Electrical & Computer Engineering, Materials Science & Engineering, Mechanical Engineering
- William Simpson (wsimpson@udel.edu) – Computer & Information Sciences

More than 200 research guides <guides.lib.udel.edu/> in all subject areas have been developed and are maintained by librarian liaisons. These research guides describe library resources and assist students in the research process. These guides introduce students to a wide array of useful resources including databases, eJournals, eBooks, reference materials, visual material and more. The librarians mentioned above are also available to work with faculty to develop research guides for specific courses within this program.

The Library subscribes to more than 400 online databases <library.udel.edu/databases/> which support research in all areas. Among the most important databases for the study and research of medical sciences are: *Cochrane Library*, *PubMed*, *Scopus*, *Web of Science*, *Springer Nature Experiments*, *BIOSIS Citation Index*, *SciFinder Scholar*, *Compendex*, *TOXNET*, and *National Center for Biotechnology Information (NCBI)*.

In addition to its extensive print-based collections, the Library provides access to more than 100,000 electronic journals <library.udel.edu/ejournals/> and more than 670,000 electronic books <library.udel.edu/ebooks/>. Within the Library's eJournal collection, the sciences are particularly strong, including almost all the journals published by Elsevier, Springer, and Wiley as well as smaller publishers such as American Society for Microbiology, American Medical Association, American Society for Clinical Pathology, BioMed Central, PubMed Central, Oxford University Press, Nature, and Annual Reviews.

Within the eBook collection, online access to almost all ebooks published by Springer, now including Palgrave Macmillan, from 2005-present is of particular importance. Other related

eBooks are available from ProQuest Ebook Central, EBSCOhost eBooks, the NCBI Bookshelf, and the Colloquium Digital Library of Life Sciences.

The Library also provides online access to *Bates' Visual Guide to Physical Examination*, the *LWW Health Library* (anatomical sciences and physical therapy sections), *Lippincott Advisor*, and *Primal Pictures*, "the world's most detailed 3D model of human anatomy online." Access to *JoVE Video Journal* and *JoVE Science Education* is also available. These resources may be useful to students in this program

The Library subscribes to *RefWorks*, a web-based citation management tool that can be used with most databases. Access to *EndNote Online* via the Library's *Web of Science* subscription is also available.

The Library has strong collections of film and video <library.udel.edu/filmandvideo/> which support study and teaching in all subject areas.

The Library has a nationally recognized Student Multimedia Design Center <library.udel.edu/multimedia/> which provides access to equipment, software, and training related to the creation of multimedia projects. The Student Multimedia Design Center includes over 80 workstations, six studios, and two classrooms focused on multimedia creation. University of Delaware users also may borrow a wide variety of multimedia equipment. Through its Multimedia Literacy program, the Student Multimedia Design Center provides instructional support for faculty seeking to incorporate multimedia into their assignments.

The Library also maintains an Institutional Repository <udspace.udel.edu/>, which archives research reports, documents, and other resources produced by University of Delaware faculty and students.

Trevor A. Dawes
Vice Provost for Libraries and Museums
and May Morris University Librarian