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# Translational Biosciences

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**Gillian Bartlett-Esquilant, Co-Director**

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## Contact Information

### Translational Biosciences PhD Program

Mathematical Sciences Building

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## About Translational Biosciences

The Translational Biosciences PhD program represents a new paradigm for graduate training in biomedical research. This program will span the entire breadth of the biomedical research spectrum, from basic science discoveries to improved clinical outcomes and population health. Students in the program will acquire a deep knowledge base of a chosen discipline and the ability to communicate and collaborate across disciplines. Grounded in research programs supported by the NextGen Precision Health Institute and the School of Medicine, the PhD trainees will be actively contributing to the UM System-wide effort to translate ground-breaking biomedical research into life-changing reality for people in Missouri and globally. Completion of this program provides state-of-the-art research training to young biomedical scientists at the beginning of their scientific careers.

## Faculty

**Curators Distinguished Professor** M. Davis\*\*, R. Mohan\*\*, S. Segal\*\*, X. Wan\*\*, G. Weisman\*\*

**Professor** A. Adebowale\*\*, L. Allen\*\*, D. Anderson\*\*, W.D. Arnold, O. Baker, L. Beamer\*\*, B. Beerntsen\*\*, D. Beversdorf\*\*, L. Brandt\*\*, C. Brown\*\*, J. Bryan\*\*, D. Burke\*\*, C. Bysani\*\*, M. Calcutt\*\*, A. Chade, A. Chandrasekhar\*\*, M. Chapman\*, S. Chen\*\*, S. Chen, D. Cornelison\*\*, T. Cui, P. DeFigueiredo\*\*, S. Deutscher\*\*, D. Duan\*\*, W. Durante\*\*, D. Duren\*\*, W. Fay\*\*, W. Folk\*\*, R. Foraker\*\*, B. Froeliger, L. Gangwani\*\*, R. Ganta, K. Gates\*\*, V. Glinskii\*\*, R.D. Hammer\*\*, G. Hildebrandt, M. Hill\*\*, S. Hyder\*\*, J. Jeong, M. Johnson\*\*, J. Kanaley\*\*, M. Katz\*\*, E. Kimchi, G. King\*\*, D. Kline\*\*, L. Layfield, M. Lewis\*\*, Z. Liu\*\*, C. Lorson\*\*, B. Lu, D. Lubahn\*\*, W. Ma\*\*, C. Manrique\*\*, L. Martinez-Lemus\*\*, T. Mawhinney\*\*, K. McDonald\*\*, M. Nassir, E. Parks\*\*, S. Peck\*\*, M. Petris\*\*, C. Phillips\*\*, M. Popescu\*\*, T. Quinn\*\*, A. Sales\*\*, D. Schust, S. Sheinkopf, H. Shirwan\*\*, S. Shukla\*\*, R. Stich\*\*, L. Sumner\*\*, P. Sutovsky\*\*, J. Tanner\*\*, M. Thakkar\*\*, J. Thelen\*\*, S. Van Doren\*\*, D. Xu\*\*, E. Yolcu\*\*, H. Zaghouani\*\*, S. Zhang\*\*, X. Zou\*\*

**Associate Professor** S. Ahmad\*\*, J. Amos-Landgraf\*\*, M. Baldwin\*\*, B. Bostwick\*\*, P. Brown\*\*, J. Cannon\*\*, P. Cornish\*\*, M. Daniels\*\*, T. Domeier\*\*, J. Driver, B. Edwards\*\*, K. Everett\*\*, A. Franz\*\*, D. Gil-Pages\*\*, J. Gomez-Gutierrez, B. Hahn\*\*, A. Heese\*\*, X. Heng\*\*, S. Hou, A. Koo\*\*, M. Krenz\*\*, S. Kumar\*\*, K. Laziuk\*\*, L. Lei, T. Lever\*\*, D. Li, L. Ma\*\*, J. McElroy\*\*, S. McKarns\*\*, F. Nassir, N. Nichols\*\*, R. Nistala\*\*, J. Padilla\*\*, A. Parrish\*\*, R. Pierce, L. Polo-Parada\*\*, S. Rachagani\*\*, P. Rao, S. Rector, A. Schrum\*\*, L. Schulz\*\*, J. Skyberg\*\*, G. Sowa\*\*, V. Subramanian, H. Sun, E. Teixeira-Pernas\*\*, V. Vieira-Potter\*\*, W. Winuthayanon\*\*, I. Zachary\*\*

**Assistant Professor** K. Anguah\*\*, M. Badran, Z. Berndsen, E. Boerman\*\*, M. Boeyer, S. Canfield, Y. Chabu\*\*, D. Chairman, M. Cirstea\*\*, R. Cortese\*\*, J. Dhillon\*\*, C. Durie\*\*, A. Ericsson\*\*, S. Gates\*\*

C. Grunewald\*\*, H. Huang\*\*, G. Jia, E. Johannesen, K. Kabytaev, J. Kaifi\*, X. Kang\*\*, A. Kelleher\*\*, T. Kim, M. Lange\*\*, E. Leary\*\*, M. Lewis, Y. Li\*\*, J. Limberg\*\*, A. Mosa\*\*, V. Nguyen, C. Norton, J. Nuelle\*, S. Palaniyandi, A. Patterson\*\*, D. Rao, K. Rucinski, C. Schenck\*\*, P. Singh, X. Song\*\*, A. Srivastava, J. Stille, R. Thomen\*\*, K. Trout\*\*, A. Upendran\*\*, R. Whiting\*\*, A. Yokom\*\*, S. Zawieja\*\*

\* Graduate Faculty Member - membership is required to teach graduate-level courses, chair master's thesis committees, and serve on doctoral examination and dissertation committees.

\*\* Doctoral Faculty Member - membership is required to chair doctoral examination or dissertation committees. Graduate faculty membership is a prerequisite for Doctoral faculty membership.

## Undergraduate

While MU does not offer undergraduate degrees specifically in this degree program, the University does offer baccalaureate opportunities in a number of related areas in the other Schools and Colleges that make up the University. The catalog provides a complete list of these degree options (<http://catalog.missouri.edu/degreesanddegreeprograms/>).

## Graduate

- PhD in Translational Biosciences (<http://catalog.missouri.edu/schoolofmedicine/translationalbiosciences/phd-translational-biosciences/>)
  - with emphasis in Biochemistry and Biophysics (<http://catalog.missouri.edu/schoolofmedicine/translationalbiosciences/phd-translational-biosciences-emphasis-biochemistry-biophysics/>)
  - with emphasis in Cancer Biology (<http://catalog.missouri.edu/schoolofmedicine/translationalbiosciences/phd-translational-biosciences-emphasis-cancer-biology/>)
  - with emphasis in Infection and Immunity (<http://catalog.missouri.edu/schoolofmedicine/translationalbiosciences/phd-translational-biosciences-emphasis-infection-immunity/>)
  - with emphasis in Integrative Physiology (<http://catalog.missouri.edu/schoolofmedicine/translationalbiosciences/phd-translational-biosciences-emphasis-integrative-physiology/>)
  - with emphasis in Nutrition and Exercise Physiology (<http://catalog.missouri.edu/schoolofmedicine/translationalbiosciences/phd-translational-biosciences-emphasis-nutrition-exercise-physiology/>)
  - with emphasis in Precision Medicine and Health Outcomes (<http://catalog.missouri.edu/schoolofmedicine/translationalbiosciences/phd-translational-biosciences-emphasis-precision-medicine-health-outcomes/>)

### TR\_BIOSC 8001: Topics in Translational Biosciences

Instruction in specific subject matter areas in translational biosciences.

**Credit Hour:** 1-5

**Prerequisites:** instructors consent

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### TR\_BIOSC 8500: Translational Biosciences I

(same as BIOCHM 8240). This course covers foundational principles and recent advances in biochemistry and molecular/cell biology that underpin

current research across a wide range of biomedical sciences, including cancer biology, microbiology, virology and physiology. This is a lecture-based course that will include weekly discussions of primary research articles. Graded on A-F basis only.

**Credit Hours:** 3

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#### **TR\_BIOSC 8550: Skills in Translational Biosciences I**

This course is intended to help develop a research protocol relevant to translation biosciences. This will include being able to effectively communicate the research proposal in various formats from written to oral for a range of audiences with varying levels of research experience while gaining the skills necessary to manage a research environment, master the basics of human ethics regulations and basic principles for translational biosciences.

**Credit Hour:** 1

**Recommended:** This course is to be taken concurrent with MPP 8500

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#### **TR\_BIOSC 8555: Professional Skills for Translational Biosciences II**

By the end of this course students should be able to: 1. Understand the different methodological approaches used in basic biomedical science, health research and clinical implementation that inform the translation of discovery into action. 2. Understand real-world unmet clinical needs by fostering the development of a shared language of basic and clinical research. Upon completion of this course, students should be able to develop a research protocol relevant to translation biosciences. This will include being able to effectively communicate the research proposal in various formats from written to oral for a range of audiences with varying levels of research experience. Students will gain the skills necessary to manage their research environment, master the basics of human ethics regulations and basic principles of equity, diversity, and inclusion for translational biosciences. They will use this information to create an individual development plan.

**Credit Hour:** 1

**Prerequisites:** TR\_BIOSCI 8500

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#### **TR\_BIOSC 8560: Data Design and Analysis I**

This course covers the introductory epidemiology and biostatistics concepts essential for biosciences and health research with applied programming skills in R.

**Credit Hours:** 3

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#### **TR\_BIOSC 9001: Topics in Translational Bioscience**

Instruction in specific subject matter areas in translational biosciences. Graded on S/U basis only.

**Credit Hour:** 1-5

**Prerequisites:** instructor consent

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#### **TR\_BIOSC 9085: Rotations in Translational Bioscience**

Students assigned individual problems in translational bioscience for library or lab investigation. Graded on S/U basis only.

**Credit Hour:** 1-99

**Prerequisites:** instructor's consent

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#### **TR\_BIOSC 9087: Translational Bioscience Seminars**

Presentations and discussions by faculty, guest speakers, and graduate students on current topics relevant to translational biosciences. Graded on S/U basis only.

**Credit Hour:** 1

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#### **TR\_BIOSC 9090: Dissertation Research**

Original investigations in translational biosciences in support of dissertation for doctoral candidates. Graded on S/U basis only.

**Credit Hour:** 1-10

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#### **TR\_BIOSC 9422: Journal Club**

The journal club will follow an "inverted" format. Specifically, each class (1) each class session will focus on one specific scientific question or topic rather than a particular article; (2) topics will be selected by the students, with instructor approval, and related to the students' thesis research; (3) instead of everyone reading the same article, nominated students for that session will choose a different article to read for each class session, leading to the presentation of a variety of different papers and viewpoints for each topic; (4) during class, the nominated students (up to 4) will summarize how their chosen article addressed the question and what methodological approach was used. Graded on S/U basis only.

**Credit Hour:** 1

**Prerequisites:** enrolled in Translational Biosciences PhD Program

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#### **TR\_BIOSC 9476: Fellowship and Grant Proposal Writing for Biomedical Scientists**

Topics include experimental design, rigor and reproducibility, writing an effective grant proposal, how to develop a training plan and the peer review process. Methods include lecture, discussion and assignments including the different components of research proposals, of F31 Fellowship proposals, and peer review critiques. In addition to peer review, there will be a faculty-led mock study section that will provide feedback to the students on their proposals.

**Credit Hours:** 3

**Prerequisites:** Enrollment in this course is restricted to graduate students and postdoctoral trainees. Graduate students must be enrolled in a biomedical PhD program and have completed their first year of graduate study. Postdoctoral trainees must have completed a terminal degree degree in biomedical research (PhD) or in medicine (MD)

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**Recommended:** As class space is limited, preference will be given to PhD students who are enrolled in the Translational Biosciences PhD program and postdoctoral fellows who are training with faculty in the School of Medicine

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