**Description of Institutional Environment and Commitment to Training**

**Overview:** In its nearly 150-year history, Vanderbilt University Medical Center (VUMC) has built a strong reputation as a leader in medical education, research, and patient care throughout the nation. VUMC originated from the University of Nashville’s incorporation of its School of Medicine with Vanderbilt University in 1875. In the 1920s, Dr. G. Canby Robinson is attributed to modernizing VUMC’s facilities as Dean by relocating the School of Medicine to a new site on campus that also hosted the hospital, outpatient clinics, research facilities, and biomedical library. After several additions to compensate to the school’s growing student population, the structure still hosts a large proportion of VUMC’s research facilities today as Medical Center North.

**Research:** Biomedical research at Vanderbilt has long been recognized for its contributions to the advancement of medicine. The School of Medicine claims two Nobel Laureates, Earl W. Sutherland Jr., in 1971, for his discovery of the metabolic regulating compound cyclic AMP, and Stanley Cohen, in 1986, for his discovery (with a colleague) of epidermal growth factor. The Medical School’s reputation for outstanding research is reflected in the amount of federal and private support it receives. Because of the creativity of the faculty, Vanderbilt University (VU) and VU Medical Center (VUMC) consistently rank among the nation’s top 10 medical schools for NIH funding with NIH funding totaling >$462 in 2021 (VUMC: $344,312,186; VU: $117,806,354). Specifically, VUMC research funding has dramatically increased since the start of the century, having more than doubled since 2001.

**Education:** The Vanderbilt University School of Medicine (VUSOM) attracts the most accomplished and talented students in the country due to the quality of the training, the excellence of the faculty, the collegial atmosphere between faculty and students and the close personal attention that students receive. The diverse 2017 class of physicians, scholars and innovative leaders were selected from a pool of more than 6,400 applicants and represent 31 states, 59 undergraduate schools, and boast a median GPA of 3.9. The Schools of Medicine and Nursing are consistently placed at the top of nationwide rankings, including the annual *U.S. News & World Report* (USNWR) survey, “America’s Best Graduate Schools.” VUMC clinical departments and specialty programs are similarly top ranked in the USNWR annual “America’s Best Hospitals” survey.

**Interdisciplinary Graduate Program (IGP):**

Vanderbilt’s IGP is aimed at fostering diverse, creative, and analytical thinkers, geared to tackle the quickly evolving world of research and technology. As a union between 11 participating programs, the IGP provides a strong foundational point for completing a biomedical dissertation. The IGP first year curriculum has recently undergone re-structuring, placing the emphasis – early on – on teaching the incoming students how to become self-directed learners and develop skills that are essential for a successful research career. During the fall semester, IGP students take a three-block course entitled Bioregulation, which comprises Theme 1, Theme 2 and “the Block”. Themes 1 and 2 teach the concepts of central dogma and cell signaling, aimed to teach the fundamental concepts of cell and molecular biology that is taught by faculty from the 11 participating departments and programs that make up the IGP. As a complement to this didactic course in the fall, students meet in small groups to discuss relevant papers and learn how to critically evaluate the primary literature. Once a week, students meet in small groups to discuss professional development, rigor and reproducibility in a structured course termed “becoming a scientist”. Parallel to these activities, the students take quantitative biology, where they learn the basics of Python and how to leverage computation for analysis of large data sets. Following the completion of Themes 1-2, the students enter their first rotation, which is 4-weeks long. After the completion of the first rotation, the students take “the Block”, which is a mini crash course on developing research grant skills. The students are given a question to solve around a hot topic (the 2021-22 topic was SARS-CoV2) and they are tasked to mine the literature, identify a question, and prepare a two-page report describing the significance, innovation, and approach they propose to answer their small question. Their written reports undergo peer evaluation, using a peer feedback model like that of the NIH and the students take their feedback and use it to prepare a final, revised proposal for submission and evaluation. Finally, students are given 5 minutes/5 slides to present their proposal to the peer group and answer questions from the audience. During the “block” students attend relevant lectures and seminars during the week and meet in small group formats twice weekly to discuss proposal progress, perform peer review, and prepare their presentations. In the spring semester, course specialization begins by enrollment in a variety of elective courses and modules. During the spring semester, students also complete three additional 4-week research rotations in labs of their choosing, allowing exploration of a wide variety of training opportunities in the labs of hundreds of Vanderbilt research faculty. In May, students choose a preceptor and a corresponding graduate program. The 11 different graduate programs that make up IGP include Biochemistry, Biological Sciences, Cancer Biology, Cell and Developmental Biology, Human Genetics, Microbe-Host Interactions, Molecular Pathology & Immunology, Molecular Physiology and Biophysics, Chemical and Physical Biology, Pharmacology, and Neuroscience. The average time to degree is 5.7 years*.*

**IDP for PhD graduate students:**Following NIH guidelines, the BRET office of career development developed IDPs for graduate students compatible with program-specific evaluation forms already in place. The student IDPs, like the postdoc IDP, are required annually of all School of Medicine PhD students and administered centrally through the BRET office; compliance with the completion of an annual IDP is also monitored by the BRET office. The student IDPs begin with a self-review of general expectations and responsibilities for each stage (year) of training, a self- assessment of progress toward career goals, and a self-assessment of current skills in seven core competency areas: (1) scientific knowledge; (2) research skills; (3) communication; (4) professionalism; (5) leadership and management skills; (6) responsible conduct of research; (7) career advancement. Students then set specific goals for professional development within the coming year and finally discuss the form with the advisor. Advisors identify additional expectations (if any), review the IDP, and provide feedback to the student. The student and the research advisor jointly sign and then file the IDP signature page with the BRET office. The IDPs were launched in May 2014 and are executed in May of each year*. (The above text was provided by and edited from the Vanderbilt BRET Office).*

**Microbe Host Interactions Program:** The Microbe-Host Interactions (MHI) Ph.D. program was conceived in 2016, with its inaugural class joining in 2017. MHI was born out of the former Microbiology and Immunology Ph.D. program, which operated since its founding in the early 1990s. The goal of the MHI program is to train aspiring scientists with interests in bacterial or viral pathogenesis, microbial signaling, metabolism, microbiome in health and disease. The program also trains students whose research interests include immune control of infection. MHI students spend their initial summer and fall terms learning in the classroom while working toward developing an original research project in the laboratory. In the subsequent Spring semester, students choose from a variety of modules tailored toward their own research areas while learning how to write a research proposal on a subject of their choosing. Following completion of the oral Qualifying Exam and approval of the written thesis proposal, students pursue full time research toward the degree with biannual committee meetings to assess their progress. While the primary goal of the MHI program is to provide an environment that equips and encourages students to become independent researchers, the faculty understand that our graduates choose to pursue a wide variety of fulfilling careers outside of research. For this reason, we encourage our students to explore all career options available to Ph.D. scientists.

**Qualifying Examination:** The purpose of the Qualifying Examination (QE) is to determine whether a student is sufficiently prepared for full-time dissertation research leading to the Ph.D. degree. The examination is conducted by the student’s Ph.D. committee. The exam requires the student to submit a written dissertation proposal, followed by an oral defense of the proposed thesis. One purpose of the examination is to ensure that the student, advisor, and thesis committee have well-defined concepts of what the dissertation project involves and how it will be conducted. The major criteria employed by members of the Dissertation Committee while conducting the examination include the ability of the student to pose a scientific question, formulate hypotheses, develop reasonable strategies to test a hypothesis, anticipate experimental outcomes, and accurately interpret these potential outcomes. Acquisition of such skills is a crucial prerequisite for success in any scientific environment and must be developed and evaluated.

**Biannual Thesis Committee Meetings**: Within six months following passing of the Qualifying Exam, students must have their first Thesis Committee meeting. A minimum of four committee members should be available for the Thesis Committee meeting. In preparation for the meetings, students should prepare a written Progress Report and distribute this to each Committee Member. During the committee meeting, the student should describe his/her accomplishments since the previous meeting and outline plans for the next six months of work. Following the meeting, the student will be informed of the Committee’s opinion of their progress by the Committee Chair in writing, including any suggestions for improvement. The Research grade will also be determined by the Thesis Committee, in collaboration with the Research Advisor. Students are required to schedule committee meetings before the end of the Fall (Nov to mid-Dec) and Spring (April to early May) semesters so the Research grades for those terms can be determined at the committee meetings,