2021-22

ACADEMIC CATALOG

St. Jude Children's Research Hospital

Graduate School of Biomedical Sciences

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Graduate School of Biomedical Sciences

The St. Jude Children's Research Hospital Graduate School of Biomedical Sciences is authorized by the Tennessee Higher Education Commission. This authorization must be renewed each year and is based on an evaluation of minimum standards concerning quality of education, ethical business practices, and fiscal responsibility.

ST. JUDE CHILDREN'S RESEARCH HOSPITAL
GRADUATE SCHOOL OF BIOMEDICAL SCIENCES
262 Danny Thomas Place, Mailstop 1500
Memphis, TN 38105
Phone (901) 595-1500
Email: sjgradschool@stjude.org
Web: stjude.org/graduate-school

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MESSAGE FROM THE DEAN

Welcome to the St. Jude Children's Research Hospital Graduate School of Biomedical Sciences!

Are you seeking an innovative graduate experience? If so, I strongly encourage you to explore the programs of the St. Jude Graduate School. St. Jude Children's Research Hospital was founded in 1962 to cure life threatening childhood diseases through seamless interactions between clinicians and researchers. This uniquely integrated world-class clinical and cutting-edge scientific environment provides unmatched opportunities for graduate training. The first and only National Cancer Institute-designated Comprehensive Cancer Center devoted solely to children, St. Jude is consistently ranked as one of the top pediatric cancer hospitals in the U.S. Rest assured that your work here will make a real difference to our pediatric patients and to children around the world.

Our worldwide reputation has been achieved by following a simple formula – hire the very best and provide them with matchless resources. The same formula was used to create the Graduate School, and students are taught and mentored by over 150 internationally renowned scientific and clinical investigators. Our highly selective students will develop into elite biomedical scientists and health professionals fully prepared to be leaders in research, education, government, and industry. To foster collaboration, students enjoy a custom-designed space in the Marlo Thomas Center for Global Education and Collaboration. The space encompasses the teaching facility, recreational and discussion areas, and private study carrels.

Our five-year PhD Program in Biomedical Sciences (PhD-BMS) is built on St. Jude excellence in robust foundational basic sciences and our unique translational research environment. Students experience a curriculum that has been designed to meet the needs of modern biomedical research and train with scientific leaders in state-of-the art facilities. St. Jude conducts research in many scientific disciplines, and our program is flexible for students with diverse interests and backgrounds. We are also able to accommodate clinical trainees who wish to obtain a PhD. Students also receive professional development training essential for a successful career and receive clinical mentoring to learn how basic and translational science impacts patient care. The challenging and innovative curriculum is designed for elite, ambitious and interactive graduate students.

Our two-year master's program in Global Child Health (MSc-GCH) is conducted by competency-based distance learning to augment the knowledge and skills of international health care professionals, in leading health care programs and institutions. Working with the global experts at St. Jude and its partnering organizations, the students are uniquely trained to improve health systems and initiatives in their countries and to forge long lasting relationships with the St. Jude Global Program and fellow alumni. This highly successful program will graduate its 1st cohort and welcome its 3rd cohort of students in 2021.

Our new two-year master's program in Clinical Investigations (MSc-CI) will welcome its 1st cohort of students in 2021. This program has been designed to teach health care professionals how to conduct rigorous and impactful clinical research and clinical trials, which are at the very core of what we do at St. Jude.

Memphis offers an outstanding quality of life – attractions include a thriving music and arts scene, professional teams in basketball, baseball and soccer, a rich cultural environment, parks and biking trails, world-class dining, and a vibrant nightlife. St. Jude sponsored housing for our graduate students is available along the beautiful Mississippi River or in the historic midtown area. Our outstanding social and intellectual environment is a major reason why St. Jude is consistently ranked on Fortune magazine's "100 Best Places to Work For." I encourage you to learn more about the St. Jude Children's Research Hospital Graduate School of Biomedical Sciences and look forward to welcoming you to our remarkable institution.

GRADUATE SCHOOL ADMINISTRATION

Stephen W. White, DPhil
President and Dean

TBN
Director, Graduate School Administration

Suzanne Baker, PhD
Associate Dean, PhD-BMS

Tomalei Vess, PhD
Assistant Dean, PhD-BMS

Patricia Flynn, MD
Co-Associate Dean, MSc-CI

Victor Santana, MD
Co-Associate Dean, MSc-CI

Sally Utech, PhD
Assistant Dean, MSc-CI

Shaloo Puri, MBBS, DTCD, MPH, MPA
Associate Dean, MSc-GCH

Julie Laveglia, MA
Assistant Dean, MSc-GCH

Stacey Schultz-Cherry, PhD
Associate Dean, Student Affairs

Tiffany Young-Polk, MA
Registrar

Dayna Baker
Coordinator – Graduate School Operations

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IS

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Legal Counsel

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Giedre Krenciute
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Yutaka Yasui
Benjamin Youngblood
Jiyang Yu
Xinhua Yu
Stanislav Zakharenko
Gerard Zambetti
Jinghui Zhang
Liqin Zhu

HISTORY OF ST. JUDE

More than 50 years ago, Danny Thomas, a struggling young entertainer with $7 in his pocket, got down on his knees in a Detroit church, before a statue of St. Jude Thaddeus, the patron saint of hopeless causes. Danny Thomas asked the saint to "show me my way in life," and pledged to someday build a shrine to the saint. His prayer was answered. Within a few years, Danny Thomas' career prospered. Through films and television, he became a nationally known entertainer, and he remembered his pledge to St. Jude.

When the hospital opened its doors in 1962, a diagnosis of acute lymphoblastic leukemia (ALL) was a death sentence. ALL, the most common form of childhood cancer, had only a 4% survival rate. At that time, the Handbook of Pediatrics stated, "There is no cure for leukemia; treatment is directed at prolonging life and relieving symptoms." Pioneering research at St. Jude resulted in patients with ALL having a 50% cure rate only 8 years after the hospital was established. Building on this early success, St. Jude developed protocols that have raised current survival rates for children with ALL to above 90%. The hospital's research findings are shared with doctors and scientists around the world; thus, tens of thousands of children are alive today as a result of the research and clinical trials conducted at St. Jude.

Despite the greater than 90% cure rate, some forms of ALL continue to evade treatment. Today, researchers at St. Jude are using next-generation sequencing to explore the pathogenesis of leukemia and the effects of treatment, with the goal of identifying unique molecular targets for the development of more effective therapies. Several novel targets have been identified as a result of the St. Jude Children's Research Hospital – Washington University Pediatric Cancer Genome Project, which sequenced the complete genomes of more than 600 matched samples of normal cells and cancer cells from patients with the most challenging and severe forms of childhood cancer. As a result of this work, personalized therapies are now being developed. Pharmacogenomic studies are also providing novel insights into inherited differences in drug response, which can further help to individualize treatment. To date, St. Jude has treated more than 30,000 children from across the United States and from more than 80 countries around the world. All patients are accepted by physician referral for newly diagnosed, untreated, or suspected cancer; HIV infections; or certain hematologic, immunologic, or genetic diseases. Patients are accepted based on their eligibility to enroll in an open St. Jude clinical research protocol. After an initial evaluation, assistance with transportation and local living expenses are also provided.

St. Jude patients and their families are never billed for treatment. ALSAC, the fundraising arm of St. Jude, covers all costs beyond those reimbursed by third-party insurers, and when no insurance coverage is available, ALSAC covers all of the patient's costs. Most patients are seen on a continuing outpatient basis, but the hospital is licensed for 80 beds to accommodate patients who require hospitalization during treatment.

Danny Thomas' "little hospital in Memphis"—which now has daily operating costs exceeding $2.5 million dollars—has dramatically improved health care for children around the world and continues to work on improving treatments for pediatric cancer and other catastrophic childhood diseases. Danny Thomas passed away in 1991, but his children, Marlo, Terre, and Tony, carry on the mission and remain a driving force to ensure that their father's dream endures.

ABOUT ST. JUDE

St. Jude, located in Memphis, Tennessee, is a private nonprofit biomedical research institute where scientists strive to understand the molecular, genetic, and chemical basis of catastrophic childhood diseases. Research is focused on pediatric cancers, acquired and inherited immunodeficiencies, genetic disorders, and infectious diseases, as well as normal cellular processes. The goal of St. Jude is to develop cures for these diseases and promote their prevention.

The St. Jude campus is situated north of downtown Memphis, on the bluffs of the Mississippi River. The campus consists of hospital and research buildings; ALSAC fundraising headquarters; and a Good Manufacturing Practice (GMP) facility, which produces clinical-grade therapeutics. The research staff consists of basic science faculty, clinical faculty, postdoctoral fellows, clinical fellows, and graduate students from around the world.

St. Jude offers opportunities for postdoctoral and graduate training, which is available in a wide variety of research areas in the basic and clinical sciences. The proximity of laboratory and clinical activities provides an ideal setting for collaborative and translational research and facilitates interactions among investigators working in different disciplines.

Current Research

The current basic and clinical research at St. Jude includes work in angiogenesis, apoptosis, cancer biology, cell cycle regulation, chemical biology and therapeutics, computational biology, developmental biology, epidemiology and cancer control, experimental hematology, gene therapy, genomics, immunology, infectious diseases, molecular genetics, molecular therapeutics, neurobiology, pathology, pharmaceutical sciences, proteomics, radiological sciences, signal transduction, stem cell transplantation, structural biology, virology, pediatric AIDS, and psychological effects of catastrophic illnesses. St. Jude also conducts long-term biomedical evaluations of its patients and is the only pediatric research hospital supported by a National Cancer Institute Comprehensive Cancer Center support grant. Research highlights from the previous year can be found in the annual Scientific Report, which is available online at stjude.org/sci-rpt.

Nobel Prize

In 1996, Peter C. Doherty, PhD, who holds the Michael F. Tamer Endowed Chair in Immunology, was awarded the Nobel Prize for Medicine. This award recognized Dr. Doherty for key discoveries on how T cells identify and eliminate infected cells.

Faculty in the National Academy of Sciences

Six members of the St. Jude faculty have been elected to the National Academy of Sciences: Charles J. Sherr, MD, PhD (1995); Peter C. Doherty, PhD (1998); Robert G. Webster, PhD (1998); Brenda A. Schulman, PhD (2014); Martine Roussel, PhD (2019); and Douglas Green, PhD (2020).

Faculty in the National Academy of Sciences Institute of Medicine

Six members of the St. Jude faculty have been elected to the Institute of Medicine (IOM), a prestigious branch of the National Academy of Sciences. The hospital's current IOM members include Peter C. Doherty, PhD, Immunology; President and CEO James R. Downing, MD; William E. Evans, PharmD, Pharmaceutical Sciences; Mary V. Relling, PharmD, Pharmaceutical Sciences; and Charles J. Sherr, MD, PhD, Chair of Tumor Cell Biology.

Howard Hughes Medical Institute

A Howard Hughes Medical Institute (HHMI) award is extremely prestigious and offers not only generous funding but also freedom and flexibility in research. Currently, St. Jude has one HHMI investigator, J. Paul Taylor, MD, PhD, Chair of Cell & Molecular Biology. Past members include; Michael A. Dyer, PhD, Developmental Neurobiology; Brenda A. Schulman, PhD, Structural Biology and Tumor Cell Biology; and Charles J. Sherr, MD, PhD, Chair of Tumor Cell Biology.

Academic Programs Office

The vision of St. Jude emphasizes the importance of educating health care and research professionals. In keeping with this vision, the goal of the Academic Programs Office is to be a world leader in attracting the best basic and translational scientists and to provide superior educational and academic opportunities for them to become national and international leaders in advancing the research, prevention, and treatment of catastrophic diseases in children. To support this vision, Academic Programs assists in recruiting and onboarding postdoctoral fellows at St. Jude, provides a comprehensive Fellows Professional Development Program, and offers the opportunity for mentoring training. All students, including those enrolled in the Graduate School, are also encouraged to participate in the seminars, symposia, social functions, and professional development programs provided by Academic Programs. Many undergraduate and graduate students choose to study at St. Jude each year. Of these students, several are here to pursue their entire doctoral research project and thesis preparation under the affiliation agreements that St. Jude has with many universities – both domestic and international.

Outreach

Since 1991, the institution has maintained a robust international presence, establishing 24 institutional partner sites in 17 countries. In 2016, St. Jude established the Department of Global Pediatric Medicine to advance knowledge in global health research and innovation with the overarching goal to advance care and improve outcomes for children with cancer and catastrophic diseases around the world. It launched St. Jude Global in 2018 with the mission to improve the survival rates of children with cancer and other catastrophic diseases worldwide through the sharing of knowledge, technology and organizational skills. Later that year, the institution formed the St. Jude Global Alliance, a collaboration of more than 125 institutions in 57 countries spread across seven strategic global regions.

HISTORY OF THE ST. JUDE CHILDREN'S RESEARCH HOSPITAL GRADUATE SCHOOL OF BIOMEDICAL SCIENCES

November 2015 marked the official launch of the St. Jude Children's Research Hospital Graduate School of Biomedical Sciences (Graduate School). This institution was designed to provide exemplary graduate education for the next generation of biomedical researchers. The graduate school represents a major milestone in the history of St. Jude Children's Research Hospital (St. Jude).

The training of biomedical scientists has always been a key component of the hospital's mission, with hundreds of postdoctoral fellows, medical students, and clinical fellows annually contributing to ongoing patient care and research. Graduate student training has also been an educational priority, historically occurring through affiliations with other schools and colleges.

St. Jude leadership recognized that the world-class faculty, research, and facilities at St. Jude represent the perfect environment for graduate training, particularly in the area of translational medicine. This idea continued to evolve over the years, and in June 2015, the Hospital's Board of Governors approved the Graduate School's establishment.

The subsequent development of the Graduate School has been rapid. The Tennessee Higher Education Commission (THEC) officially approved the school in November 2015; the Hospital created a Board of Trustees and Advisory Board and recruited a highly experienced staff in 2016. With the infrastructure and curriculum in place, the inaugural class of 12 students arrived on campus in July 2017 to begin their doctoral studies.

In 2018, the Graduate School began working with the St. Jude Department of Global Pediatric Medicine to design a new online Master of Science program in Global Child Health with the goal of creating agents of change by providing health care professionals around the world with skills and knowledge to improve treatment, care and survival rates of children with cancer and other illnesses. The Global Child Health master's program was approved by Graduate School's Board of Trustees in August 2018 and by THEC in January 2019. The first cohort of 10 students representing 10 different countries began their studies in July 2019.

In 2020, the Graduate School began working with St. Jude clinical investigators to design a second master's program: a Master of Science in Clinical Investigations with the goal of training junior health professionals in all aspects of clinical investigations, including designing, conducting, and reporting results from those investigations. Students have the benefit of training in an institution heavily involved in clinical investigations for pediatric catastrophic diseases. The degree program was approved by the Graduate School's Board of Trustees in April 2020 and by THEC in July 2020. The inaugural cohort will begin their studies in July 2021.

Despite the rapid growth of the Graduate School since its inception in 2015, the goal of each academic program is in perfect alignment with the mission and vision of St. Jude – to advance cures, and means for prevention, for pediatric catastrophic diseases through research and treatment and to accelerate this progress globally.

MISSION

To fundamentally advance global health and to find cures for pediatric catastrophic diseases by enhancing education across disciplines and training future leaders and innovators, including researchers probing the molecular basis of disease and therapy, medical practitioners conducting clinical and translational research, and health professionals improving health care systems worldwide.

VALUES

Our Values provide the foundation for our work and actions. They guide our behavior and influence the way we work with each other as students, faculty, staff, and board members—and the way we engage with our external partners.

Excellence: Deliver outstanding and innovative student learning, experience, and career development, leading to academic and professional success.

Integrity: Promote an environment where academic endeavors thrive while adhering to the highest standards of professionalism, ethics, honesty, and personal responsibility.

Respect: Value the unique environment of the Graduate School and the excellence and achievements of its students, faculty, and staff; be polite and kind to St. Jude patients, their families and each other always, and be a good steward of St. Jude's state-of-the-art resources.

Collaboration: Foster an environment of partnership and effective communication among all Graduate School stakeholders.

Diversity & Inclusion: Embrace diversity and create an equitable and inclusive community that provides equal access to educational opportunities.

Freedom of Expression: Support a community of meaningful discussion, debate and dialogue, and an open exchange of ideas, even if unpopular, so that all voices are heard and considered.

VISION

A premier graduate school that promotes scholarship, innovation and discovery, and develops inspired graduates who become global and transformative leaders in basic and translational research, clinical research, or child health and health policy.

ST. JUDE CHILDREN'S RESEARCH HOSPITAL
GRADUATE SCHOOL OF BIOMEDICAL SCIENCES

Fall Term		
Term Begins	July 1, 2021	
Fall Student Registration	July 1, 2021	July 15, 2021
Upper Classmen Report to Labs (BMS)	July 6, 2021	
Housing Move-In Date	July 11, 2021	
GCH course: Intersession 1	July 12, 2021	July 30, 2021
GCH course: Intersession 3	July 12, 2021	July 30, 2021
New Student Orientation (All Programs)	July 19, 2021	July 30, 2021
BMS Course: Research Methods	July 27, 2021	July 30, 2021
BMS Course: Computational Biology (second year)	July 20, 2021	September 2, 2021
Faculty Research Presentations (first year)	July 26, 2021	July 30, 2021
BMS Course: Topics in Clinical & Translational Research I	August 3, 2021	December 9, 2021
BMS Course: Genes to Proteins	August 2, 2021	September 3, 2021
BMS Course: Core Facilities I	August 3, 2021	December 9, 2021
CLI Course: Introduction to Patient Oriented Research	August 9, 2021	December 9, 2021
CLI Course: Biostatistics for the Health Sciences I	August 16, 2021	October 7, 2021
CLI Course: Biostatistics for the Health Sciences I lab	August 18, 2021	October 6, 2021
CLI Course: Introduction to Epidemiology	October 11, 2021	December 6, 2021
GCH Course: Principles of Biostatistics	August 23, 2021	December 12, 2021
GCH Course: Introduction to Epidemiology	August 23, 2021	December 12, 2021
GCH Course: Foundations of Global Health	August 23, 2021	December 12, 2021
GCH Course: Political Economy of Global Child Health (second year)	August 23, 2021	December 12, 2021
GCH Course: Thesis Seminar (second year)	August 23, 2021	December 12, 2021
GCH Course: Organizational Leadership (second year)	August 23, 2021	December 12, 2021
Holiday: Labor Day	September 6, 2021	
BMS Course: Laboratory Rotation I	September 7, 2021	October 18, 2021
BMS Course: Scientific Writing & Communications I (second year)	September 9, 2021	December 16, 2021
BMS Course: Cell Biology	October 20, 2021	November 10, 2021
BMS Course: Biostatistics	October 21, 2021	December 9, 2021
BMS Course: Developmental Biology	November 12, 2021	December 15, 2021
Holiday: Thanksgiving Break	November 23, 2021	November 26, 2021
Classes Resume	November 29, 2021	
Spring Student Registration	December 1, 2021	December 15, 2021
Holiday: Winter Break	December 16, 2021	December 31, 2021
Grades due in Canvas	December 21, 2021	

Spring Term		
Holiday: New Year's Day	January 1, 2022	
Term Begins	January 1, 2022	
GCH course: Intersession 2	TBA	TBA
GCH course: Intersession 4	TBA	TBA
BMS Course: Computational Biology (first year)	January 4, 2022	March 31, 2022
BMS Course: Topics in Clinical & Translational Research II	January 4, 2022	June 9, 2022
BMS Course: Scientific Writing & Communications II (second year)	January 6, 2022	March 10, 2022
BMS Course: Cancer Biology	January 5, 2022	January 28, 2022
BMS Course: Core Facilities II	January 6, 2022	May 3, 2022
Holiday: Martin Luther King Jr. Day	January 17, 2022	
CLI Course: Biostatistics for the Health Sciences II	January 19, 2022	March 14, 2022
CLI Course: Biostatistics for the Health Sciences II lab	January 19, 2022	March 14, 2022
CLI Course: Advanced Clinical and Translational Research Method	January 20, 2022	May 9, 2022
CLI Course: Scientific Writing and Communications II	January 19, 2022	May 9, 2022
GCH Course: Research Methods in Global Health	January 31, 2022	May 22, 2022
GCH Course: Health Economics	January 31, 2022	May 22, 2022
GCH Course: Introduction to Health Systems and Policy	January 31, 2022	May 22, 2022
GCH Course: Strategic Management of Child Health Programs (second year)	January 31, 2022	May 22, 2022
GCH Course: Child Health and Health Systems Innovation (second year)	January 31, 2022	May 22, 2022
GCH Course: Thesis Practicum (second year)	January 31, 2022	May 22, 2022
BMS Course: Laboratory Rotation II	January 31, 2022	March 11, 2022
BMS Course: Immunology	March 14, 2022	March 25, 2022
BMS Course: Infectious Diseases	March 28, 2022	April 8, 2022
Holiday: Spring Break	April 11, 2022	April 15, 2022
BMS Course: Pharmacology & Chemical Biology	April 18, 2022	May 4, 2022
BMS Course: Laboratory Rotation III	May 6, 2022	June 17, 2022
Holiday: Memorial Day	May 30, 2022	
Grades due in Canvas	June 24, 2022	
Holiday: Summer Break	June 18, 2022	June 30, 2022

THE MARLO THOMAS CENTER

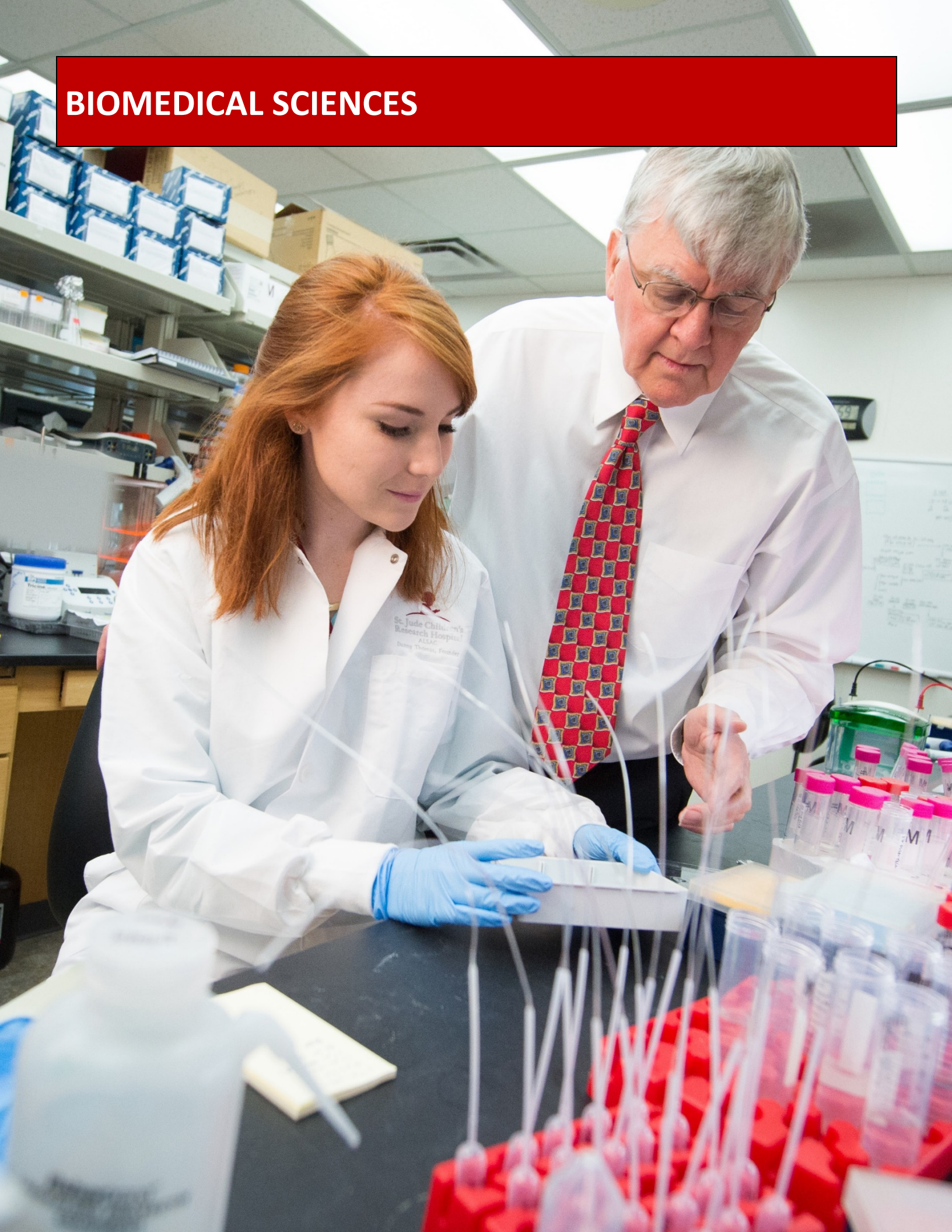
The Graduate School is a custom-designed 4,600 sq ft space located in the Marlo Thomas Center. It contains private study carrels for first-year students, a state-of-the-art teaching facility, and administrative offices. There is also a student lounge equipped with a kitchenette, games, and TV. In addition to the Graduate School, the Marlo Thomas Center also contains an auditorium, a lecture hall, meeting rooms, a large atrium, and the Biomedical Library. The library is conveniently located adjacent to the Graduate School, maintains an extensive journal collection, and provides easy access to electronic journals, e-books, and several databases. In addition, the library maintains a collection of reference books and journals.

State-of-the-art videoconferencing capabilities enable faculty, staff, and students to share ideas, discoveries, and clinical information with experts and colleagues at other institutions. With more than 400 seats, the auditorium features folding desktops and outlets for electronic devices. The lecture hall seats 68 in a semicircle, giving it a stadium feel. The auditorium and lecture hall are powered by technologies that support the hosting of scientific conferences, academic lectures, institutional seminars, meetings, and symposia.

Seating areas are interspersed throughout the Marlo Thomas Center to foster idea-sharing. Inviting colors and comfortable couches encourage small, informal gatherings. Additionally, huddle rooms and meeting rooms, which are distributed throughout the Center, are custom designed to support informal and impromptu brainstorming sessions and discussions. These rooms contain high-definition monitors, cameras, and wall-mounted interface panels that allow users to control the technology settings and interact with remote participants.

The Marlo Thomas Center was opened in October 2014 and was designed to promote institutional interactions and to host national meetings. As St. Jude continues to chart new frontiers of discovery, the Center will support these efforts by encouraging and facilitating collaboration and innovation–two core principles central to the pursuit of contemporary research. With modern technology, attractive interior design, and emphasis on social interactions, students find this space ideal for learning.

BIOMEDICAL SCIENCES



ADMISSIONS

Admissions

The application for the Graduate School is free. Application information can be found at *stjude. org/graduate-school.* Applicants must complete the entire application and attach the required supporting documents (listed below) to be considered. Applicants must have at least an undergraduate degree (i.e., BA, BS, or equivalent). Those with an advanced clinical degree (i.e., MD, DO, PharmD, DVM, or DDS) will also be considered. Degrees should be awarded by a U.S.-accredited institution, but applicants (U.S. citizens or permanent residents) who received their degrees from institutions outside of the U.S. will also be considered. At the present time, the Biomedical Sciences program cannot accept international applications from international students.

There is no minimum grade-point average (GPA) requirement; however, it is expected that the application materials demonstrate that the applicant has broad training in core areas of life sciences and is equipped to succeed in graduate coursework and research.

Undergraduate/Post-baccalaureate Applicants

Undergraduate and post-baccalaureate applicants should hold an undergraduate degree in biology, chemistry, physics, mathematics, or a similar science discipline. Additional advanced training in areas such as biochemistry, microbiology, immunology, organic chemistry, genetics, physiology, pharmacology, computational biology, and cell and developmental biology is strongly encouraged.

Advanced Degree Applicants

Applicants with advanced degrees are encouraged to apply. For the Biomedical Sciences program, undergraduate degree(s), research experience, and career goals are important admissions criteria. Although applicants are required to complete the full number of course credits (90 hours, including the core courses), other elements of training may be adjusted depending on the student's prior experience.

Required Supporting Documents

1. A curriculum vitae that describes in full detail the applicant's academic background, including degrees, research experience, awards, publications, presentations, and other achievements.
2. Unofficial transcripts of academic records (final, official transcripts are due upon matriculation).
3. Letters of reference from three mentors, professors, or program directors. The letters must describe the student's academic successes, background in research, potential for achievement at the graduate level, and capacity for creative, self-directed study.
4. Previous exposure to laboratory research is required. Applicants are required to submit a one-page summary of their prior research experience.
5. A one-page summary that describes the applicant's most important contribution to research. Published work should not be sent. Instead, the applicant should explain in lay terms his/her best research experience, how that effort contributed to the overall project, and how the experience demonstrates the applicant's suitability for graduate studies.
6. A personal statement that outlines the applicant's reasons for pursuing a graduate degree in biomedical sciences, the applicant's career goals, and how the applicant determined that the St. Jude Children's

Research Hospital Graduate School of Biomedical Sciences is the best program through which to attain those goals.

7. There is no direct entry into the MSc in Biomedical Sciences Program. All biomedical sciences applicants must apply to the PhD in Biomedical Sciences Program.

Late Enrollment

Late enrollment is only available at the Dean's sole discretion.

English Language Proficiency

All students must be proficient in English because all instruction will be given in English.

Admissions Procedure

The application and required supporting documents will be accepted through December 1 for admission to the following academic year. The application and seven required supporting documents must be received by 11:59 pm PST on December 1 for consideration. The Dean may waive this deadline only under exceptional circumstances and at his discretion. The Admissions Committee will review all applications, and the top applicants will be invited to visit the St. Jude campus or participate in an online interview. During the visit, the students will interview with the Dean and graduate faculty members, tour the campus and facilities, and experience greater Memphis and its attractions. The projected number of students accepted each year is currently 12.

MSc – BIOMEDICAL SCIENCES

Program Overview

The first year of the program is designed to provide students with the essential background knowledge for their subsequent research, introduce them to clinical research, and familiarize them with the research opportunities at St. Jude. During the first two weeks, students will receive an extensive orientation to the St. Jude campus, resources and policies and be introduced to the faculty and their research. Students will also participate in the Research Methods mini-course which will expand their understanding of fundamental techniques, supporting concepts, and data analysis. For the remainder of the year, students will attend seven core courses, as well as a mini-courses in Biostatistics and Computational Biology. Rather than a formal lecture series, these team-taught courses will emphasize current research, self-directed learning, and group discussions. In addition, the Core Facilities courses will introduce students to the shared resources, and the Topics in Clinical & Translational Research course will expose students to institutional clinical and translational research. Finally, three six-week laboratory rotations are scheduled independently of courses. This will allow students to concentrate solely on coursework when in class and on research projects during the laboratory rotations. A Scholastic Oversight Team (SOT) will oversee the progress of students in their first year. At the end of the first year, students will select permanent laboratories for their dissertation research. If an appropriate laboratory assignment cannot be made after three rotations, one additional rotation may be arranged with the Dean's approval.

In the second year, the students enroll in the Scientific Writing & Communications course, which will provide the requisite skills needed to write and submit a grant proposal. The grant proposal will be the basis of their dissertation research project. With the successful completion of the candidacy qualifying exam, students will be awarded a translational Master of Science degree in Biomedical Sciences. A student who decides to leave the program prior to obtaining their PhD degree or does not successfully pass their Candidacy Exam and is unable to complete his/her PhD studies may apply to the Associate Dean and Dean for a terminal Master of Science degree in Biomedical Sciences. To be considered for a terminal master's degree, the student must:

- Successfully complete the first-year core curriculum;
- Complete at least one year of full-time research; and
- Write and successfully defend their candidacy exam based on their research.

Student Learning Objectives

SLO 1: Apply an understanding of the fundamental concepts of Molecular Biology, Biochemistry, Cell Biology, Developmental Biology, Cancer Biology, Immunology, Infectious Diseases, Pharmacology, Chemical Biology, Biostatistics, and Computational Biology to the research project.

SLO 2: Critically evaluate scientific literature in biomedical sciences, including the choice of methods applied to problems and the interpretation of results.

SLO 3: Design and conduct research using laboratory skills, data acquisition, management and analysis to investigate a selected research problem at a level appropriate for a beginner researcher.

SLO 4: Communicate clearly, accurately, and professionally to disseminate scientific concepts and research results in both oral and written form.

MSc – BIOMEDICAL SCIENCES
CORE CURRICULUM

Term	Year	Course No.	Course	Credits
Fall	1	ORN8000	Orientation	0
Fall	1	RMD8000	Research Methods	0
Fall	1	BMS8001	Genes to Proteins	4
Fall	1	BMS8101	Cell Biology	3
Fall	1	BMS8201	Developmental Biology	3
Fall	1	BMS8302	Biostatistics	1
Fall	1	BMS8401	Core Facilities Program I	1
Fall	1	BMS8501	Topics in Clinical & Translational Research I	1
Fall	1	BMS8951	Laboratory Rotation I	3
			Fall	16
Spring	1	BMS8702	Cancer Biology	3
Spring	1	BMS8812	Immunology	2
Spring	1	BMS8822	Infectious Diseases	2
Spring	1	BMS8902	Pharmacology & Chemical Biology	2
Spring	1	BMS8402	Core Facilities Program II	1
Spring	1	BMS8502	Topics in Clinical & Translational Research II	1
Spring	1	BMS8952	Laboratory Rotation II	3
Spring	1	BMS8953	Laboratory Rotation III	3
Spring	1	BMS8301	Computational Biology	1
			Spring	18
Credits Earned Year 1				**34**
Fall	2	BMS8971	Scientific Writing & Communications I	1.5
Fall	2	BMS8991	Reading & Research	9
			Fall	10.5
Spring	2	BMS8992	Reading & Research	9
Spring	2	BMS8972	Scientific Writing & Communications II	1.5
			Spring	10.5
Credits Earned Year 2				**21**
Transitional Masters				**55**

Note: With the successful completion of the Candidacy Qualifying Exam, the student will transition into the second portion of the PhD – Biomedical Sciences program.

PhD – BIOMEDICAL SCIENCES

Program Overview

The first year of the program is designed to provide students with the essential background knowledge for their subsequent research, introduce them to clinical research, and familiarize them with the research opportunities at St. Jude. During the first two weeks, students will receive an extensive orientation to the St. Jude campus, resources and policies and be introduced to the faculty and their research. Students will also participate in the Research Methods mini-course which will expand their understanding of fundamental techniques, supporting concepts, and data analysis. For the remainder of the year, students will attend seven core courses, as well as mini-courses in Biostatistics and Computational Biology. Rather than a formal lecture series, these team-taught courses will emphasize current research, self-directed learning, and group discussions. In addition, the Core Facilities courses will introduce students to the shared resources, and the Topics in Clinical & Translational Research course will expose students to institutional clinical and translational research. Finally, three six-week laboratory rotations are scheduled independently of courses. This will allow students to concentrate solely on coursework when in class and on research projects during the laboratory rotations. A Scholastic Oversight Team (SOT) will oversee the progress of students in their first year. At the end of the first year, students will select permanent laboratories for their dissertation research. If an appropriate laboratory assignment cannot be made after three rotations, one additional rotation may be arranged with the Dean's approval.

In the second year, students enroll in the Scientific Writing & Communications course which will provide the requisite skills needed to write and submit a grant proposal. The grant proposal will be the basis of their dissertation research project. With the successful completion of the candidacy qualifying exam, students will be awarded a transitional Master of Science degree in Biomedical Sciences.

To complete the doctoral program, the student must (1) conduct original research in his/her assigned laboratory, (2) analyze and compile the research, (3) pass the candidacy qualifying exam, (4) complete an approved dissertation that reports the results and significance of the work, (5) ideally have at least two publications based on the student's original research, and (6) orally defend the dissertation. Throughout the dissertation phase of the program, students are provided opportunities to attend seminars, lectures, journal clubs, and scientific meetings.

A Dissertation Committee will guide each student through the dissertation process and in their choice of enhanced learning opportunities. The Committee is composed of four faculty members (with the option of a fifth) chosen by the student and approved by the Dean. The Committee is responsible for evaluating and monitoring the progress of their student by providing written feedback during each academic term and to approve the dissertation defense.

Student Learning Objectives

SLO 1: Plan and execute, with considerable independence, original and extensive laboratory research that advances understanding of a significant question in the biomedical sciences.

SLO 2: Effectively communicate original research results in both oral and written form.

SLO 3: Relate in-depth knowledge of the literature to the field related to dissertation research.

PhD – BIOMEDICAL SCIENCES
CORE CURRICULUM

Term	Year	Course No.	Course	Credits
Fall	1	ORN8000	Orientation	0
Fall	1	RMD8000	Research Methods	0
Fall	1	BMS8001	Genes to Proteins	4
Fall	1	BMS8101	Cell Biology	3
Fall	1	BMS8201	Developmental Biology	3
Fall	1	BMS8302	Biostatistics	1
Fall	1	BMS8401	Core Facilities Program I	1
Fall	1	BMS8501	Topics in Clinical & Translational Research I	1
Fall	1	BMS8951	Laboratory Rotation I	3
			Fall	16
Spring	1	BMS8702	Cancer Biology	3
Spring	1	BMS8812	Immunology	2
Spring	1	BMS8822	Infectious Diseases	2
Spring	1	BMS8902	Pharmacology & Chemical Biology	2
Spring	1	BMS8402	Core Facilities Program II	1
Spring	1	BMS8502	Topics in Clinical & Translational Research II	1
Spring	1	BMS8952	Laboratory Rotation II	3
Spring	1	BMS8953	Laboratory Rotation III	3
Spring	1	BMS8301	Computational Biology	1
			Spring	18
Credits Earned Year 1				**34**
Fall	2	BMS8961	Scientific Writing & Communications I	1.5
Fall	2	BMS8991	Reading & Research	9
			Fall	10.5
Spring	2	BMS8992	Reading & Research	9
Spring	2	BMS8961	Scientific Writing & Communications II	1.5
			Spring	10.5
Credits Earned Year 2				**21**
Transitional Masters				**55**
Fall	3	BMS9301	Reading & Research	9
			Fall	9
Spring	3	BMS9302	Reading & Research	9
			Spring	9
Credits Earned Year 3				**18**
Fall	4	BMS9401	Reading & Research	9
			Fall	9
Spring	4	BMS9402	Reading & Research	9
			Spring	9
Credits Earned Year 4				**18**
Fall	5	BMS9501	Reading & Research	9
			Fall	9
Spring	5	BMS9502	Reading & Research	9
			Spring	9
Credits Earned Year 5				**18**
Total Credits Earned				**111**

Note: The Doctoral Degree is awarded at the successful completion of a minimum of 91 credit hours and the student's dissertation.

RESEARCH ENVIRONMENT

St. Jude provides a unique environment for translational research. The campus is compact and highly integrated, with basic scientists and clinicians interacting on a daily basis. Studies are typically coordinated through multidisciplinary teams that strive to understand the causes of diseases at the cellular and molecular level and to translate this knowledge into novel therapeutics. Much of the research is conducted under the umbrella of the St. Jude Comprehensive Cancer Center and its partner organization, the Children's Infection Defense Center, which seeks to eliminate infectious diseases in children. This highly interactive approach defines translational research at St. Jude. The infrastructure drives cutting-edge basic science research, therapeutic drug development, disease modeling and preclinical testing, and the design and implementation of sophisticated pediatric clinical trials. St. Jude recently established a Pediatric Translational Neuroscience initiative that will advance basic research into pathogenic basis of pediatric neurological disease and develop therapeutic approaches for treatment.

St. Jude is a world-renowned institution for pediatric cancer treatment. By remaining at the cutting-edge of research and being able to rapidly exploit emerging technologies and scientific advances, St. Jude is widely regarded as a dynamic and pioneering leader in translational cancer research. Pediatric patients with cancer who are immunocompromised are particularly vulnerable to infectious agents. Thus, in addition to being a leader in pediatric cancer research and treatment, St. Jude was driven to become a global leader in studies of infectious diseases. Nonmalignant pediatric blood diseases represent another prominent area of research at St. Jude. These disorders include sickle cell disease, hemophilia, and bone marrow–failure syndromes.

Faculty members are organized into departments according to their scientific and clinical expertise. Within their departments, faculty members have the necessary office space, administrative support, laboratories, and facilities that are required for their individual research and clinical activities. Each department is equipped with shared cold rooms, tissue culture rooms, conference rooms, and equipment. Individual laboratories are superbly equipped with standard instruments for biochemistry, molecular biology, cell biology, microbiology, and chemistry, according to the needs of each researcher. St. Jude's superb Shared Resources (described below) provide access to many key technologies that support the multidisciplinary research environment.

The world-class faculty and research environment at St. Jude provide unique opportunities for graduate education and training. Graduate students have the opportunity to participate in all of the research programs and to become involved in the full spectrum of studies from basic science, through therapeutic development, and ultimately to clinical trials. Participation in multidisciplinary research teams also extends the mentoring that students receive, beyond that of their dissertation advisors, and exposes students to a wide array of basic science methods. These include, but are not limited to, in vivo imaging; cellular and subcellular imaging using multiphoton, super-resolution microscopy and 3D electron microscopy; structural and dynamic analyses of macromolecules using light and electron microscopy, nuclear magnetic resonance, and X-ray diffraction; screening of small-molecule libraries using biochemical, biophysical, and cell biological approaches; medicinal and synthetic organic chemistry; drug interactions assessed by pharmacokinetics, pharmacodynamics, and pharmacogenetics; neurobiology; developmental biology; genomics and proteomics; computational biology and bioinformatics; genome engineering and editing; and the full spectrum of immunologic approaches. Thus, students graduating from the Graduate School will have acquired an enviable array of cutting-edge scientific and clinical skills and will be fully prepared to pursue an independent career in translational research.

CLINICAL INVESTIGATIONS

ADMISSIONS

Admissions

The application for the Graduate School is free. Application information can be found at stjude.org/ graduate-school. Applicants must complete the entire application and attach the required supporting documents (listed below) to be considered. There is no minimum grade-point average (GPA) however, it is expected that the application materials demonstrate that the applicant has broad training and is equipped to succeed in graduate coursework and research. At the present time, the Clinical Investigations program cannot accept international applications from international students.

Eligibility

To be eligible for the Master of Science program in Clinical Investigations, applicants must be U.S.A. citizens, non-citizen nationals or lawfully admitted permanent residents of the U.S.A. Applicants must have a bachelor's degree (i.e., BA, BS, or equivalent); applicants with an advanced clinical degree (i.e., MD, DDS, DMD, DO, DC, OD, or ND); a doctorally-prepared nurse; or have a PhD with clinical responsibilities are preferred. Applicants must also agree to mentorship and have an advisor in a clinical department.

Required Supporting Documents

1. A curriculum vitae giving full details of the candidate's personal history, education, honors, and previous experience.
2. Official transcripts of academic records. These must be sent directly from the institution's registrar's office to the Graduate School.
3. Letters of reference from three mentors, professors, or program directors. The letters must be submitted directly via the website and should describe the student's academic successes, clinical background, potential for achievement at the graduate level, and capacity for creative, self-directed study. If applicant is a clinical fellow or junior faculty one of the 3 letters must be from the department chair or division chief.
4. A two-page personal statement (in English) that outlines the applicant's reasons for pursuing a graduate degree in clinical research, how they determined that the Graduate School is the best choice, and the applicant's career goals.

Late Enrollment

Late enrollment is only available at the Dean's sole discretion and under advisement of the program Associate Dean(s).

English Language Proficiency

All students must be proficient in English because all instruction and course materials will be given in English language.

Admissions Procedure

The application and required supporting documents will be accepted through December 1 for admission to the following academic year. The application and required supporting documents must be received by 11:59 pm PST on December 1 for consideration. The Dean may waive this deadline only under exceptional circumstances. The Admissions Committee will review all applications, and the top applicants may be invited

to interview with the Dean and graduate faculty members and tour the campus and facilities (on-site or virtual). Accepted candidates will be notified by April 1. Six to eight students may be accepted each year.

MSc – CLINICAL INVESTIGATIONS

Program Overview

The Clinical Investigations MSc program is a 39-credit hour master's degree program with the goal of educating and training future generations of clinician-scientists seeking to understand the basis of human disease and develop novel therapies and interventions based on that understanding. The program seeks to provide transformative education that will create a cadre of health professionals adept at designing, conducting, and reporting clinical investigations that further the human health. The program creates a unique opportunity to understand these concepts contextually in a pediatric and young adult research setting. The three educational pillars of the program are (1) basic and applied knowledge of clinical investigation design and conduct, (2) familiarity with the ethical and legal requirements for conduct of human subjects research, and (3) basic and advanced analytic methods that support clinical investigation. The duration of the program will be two years. In the first year, all students complete required coursework in biostatistics, epidemiology, patient-oriented research, advanced clinical and translational research methods, and scientific writing to develop competencies in foundations of clinical investigation. In the second year, students move to more specialized studies with the selection of an elective course focused on a specific area of clinical investigation, as well as training in ethical and legal issues in conducting clinical investigation. The program culminates with a thesis research project under the guidance of a thesis advisor and thesis committee. Upon completion of the Clinical Investigations MSc program, the graduates will be able to critically appraise existing and new clinical research identifying new interventions and strategies to improve human health. They will also have the necessary skills to develop novel clinical research following scientifically sound and ethical principles.

Student Learning Objectives

SLO 1: Apply an understanding of the fundamental concepts of biostatistics, epidemiology, clinical research, and research methods to the research project.

SLO 2: Critically evaluate scientific literature in clinical research, including the choice of methods applied to problems and the interpretation of results.

SLO 3: Design and conduct clinical research using advanced research skills, data acquisition, management and analysis to investigate a selected research problem.

SLO 4: Communicate clearly, accurately, and professionally to disseminate scientific concepts and research results in both oral and written form.

Thesis Core Curriculum

The goal of the thesis project is to provide the student a culminating experience that applies the principles and methods learned in the coursework to a real-life clinical study. Through this work, the student should demonstrate understanding of the clinical research process from both a theoretical and a practical point of view. Components of the thesis may include preparing an independent study research project based on accumulated data and analysis of those data or develop a draft clinical research protocol, or independently prepare a research manuscript. Students will identify their advisor and thesis committee by the end of the spring semester of the first year and begin to define and formulate a thematic idea about their research proposal while they are completing their coursework. The student will work with their advisor and will be actively involved in the development, execution, and evaluation of a clinical research project.

The research project may have one of two component options:

1. First-author submission of a peer-reviewed manuscript**:** Using data analyzed (but not necessarily collected) during residence in the master's program, students must prepare and submit a first-authored manuscript for publication in a peer-reviewed journal. It is expected that the work represents a substantive contribution to the scholar's research field. Students are also required to submit a first-authored abstract to a nationally or internationally recognized scientific meeting/conference within the student's academic field.

2. Submission of a draft "mock" clinical research protocol: Students must prepare, author and submit an original clinical research project. A clinical research protocol and associated informed consents with all the required elements will fulfill this requirement. In developing such a document, the student will be exposed to clinical research planning, protocol preparation, a discussion with Institutional Review Board staff, regulatory requirements, selection of subjects/patients for the clinical protocol, and plans for study monitoring and data analysis. Students must meet with their advisor at least monthly and with the thesis committee at least quarterly, and the committee is responsible for reviewing and concurring with the proposed project.

MSc – CLINICAL INVESTIGATIONS
CORE CURRICULUM

Term	Year	Course No.	Course	Credits
Fall	1	CLI8101	Biostatistics for the Health Sciences I	3
Fall	1	CLI8201	Biostatistics for the Health Sciences I Lab	1
Fall	1	CLI8301	Introduction to Epidemiology	3
Fall	1	CLI8401	Introduction to Patient-Oriented Research	3
			Fall	10
Spring	1	CLI8102	Biostatistics for the Health Sciences II	3
Spring	1	CLI8202	Biostatistics for the Health Sciences II Lab	1
Spring	1	CLI8302	Advanced Clinical and Translational Research Methods	3
Spring	1	CLI8402	Scientific Writing and Communications	3
			Spring	10
			Credits Earned Year 1	**20**
Fall	2	CLI8501	Ethical and Legal Issues in Clinical Research	3
Fall	2		**Elective (see below)*	3
Fall	2	CLI8701	Critical Assessment of Contemporary Clinical Trials	1
Fall	2	CLI8801	Thesis Research Project I	3
			Fall	10
Spring	2	CLI8802	Thesis Research Project II	9
			Spring	9
			Credits Earned Year 2	**19**
			Total Credits Awarded	**39**
Fall	2	CLI8511	**Behavioral and Social Sciences*	
Fall	2	CLI8521	**Advanced Epidemiology*	
Fall	2	CLI8531	**Clinical Genomic Data Science*	
Fall	2	CLI8541	**Clinical Genomic Data Science Lab*	
Fall	2	CLI8551	**Drug Development – from Bench to Bedside*	
Fall	2	CLI8561	**Translational Neuroscience*	

GLOBAL CHILD HEALTH

ADMISSIONS

Admissions

The application for the Graduate School is free. Application information can be found at stjude.org/ graduate-school. Applicants must complete the entire application and attach the required supporting documents (listed below) to be considered. Applicants must have at least an undergraduate degree (i.e., BA, BS, or equivalent). Those with an advanced clinical degree (i.e., MD, DO, PharmD, DVM,

DDS, etc.) will also be considered. Degrees can be awarded by a U.S.-accredited institution or from accredited institutions outside of the U.S. At the present time, the Global Child Health program can accept international applications from international students. There is no minimum grade-point average (GPA) however, it is expected that the application materials demonstrate that the applicant has broad training and is equipped to succeed in graduate coursework and research.

Eligibility

Applicants must have one of the following combinations of academic credentials and work experience:

- an advanced degree in a health-related field and at least three years of relevant work experience.
- bachelor's degree and at least five years of relevant post-baccalaureate work experience in a relevant health-related field (eg. epidemiology, global health, health and social behavior, health management or health policy).

Required Supporting Documents

1. A curriculum vitae that describes in full detail the applicant's academic background, including degrees, research experience, awards, publications, presentations, and other achievements.
2. Unofficial transcripts of academic records (final, official transcripts are due upon matriculation). These must be submitted via the online application. Transcripts not in English must be accompanied by a certified word-by-word, English translation and uploaded online during the application process.
3. Letters of reference from three mentors, professors, or supervisors. The letters must describe the student's academic successes, background in research, potential for achievement at the graduate level, and capacity for creative, self-directed study.
4. Three-page (single spaced, 11- or 12-point font) personal statement outlining:
    - your personal motivation for pursuing the MSc in Global Child Health, how your past experiences and training have contributed to your interests
    - what differentiates you as an applicant: your strengths, areas to improve, research interests, academic interests, professional interests and leadership potential
    - describe a child health issue that you find most pressing. How do you think this program will complement your professional experience and personal interests in addressing this issue?
    - your professional goals upon completion of the program and why the MSc in Global Child Health, at this point in your career, is the best way to attain those goals

Late Enrollment

Late enrollment is only available at the Dean's sole discretion.

English Language Proficiency

All students must be proficient in English because all instruction will be given in English.

Admissions Procedure

The application and required supporting documents will be accepted through December 1 for admission to the following academic year. The application and required supporting documents must be received by 11:59 pm PST on December 1 for consideration. The Dean may waive this deadline only under exceptional circumstances and at his discretion. The Admissions Committee will review all applications, and the top applicants will be invited to participate in an online interview. During the online interview, the students will meet with the Dean, Program Director, and/or a graduate faculty member. The projected number of students accepted each year is 10.

MSc – GLOBAL CHILD HEALTH

Program Overview

The Master of Science in Global Child Health Program has been designed to provide transformative education to health professionals and future agents of change, committed to enhancing the treatment and care of childhood cancers and catastrophic illnesses. The program will provide students opportunities and competencies that will empower them to apply their education at the local, regional and global level, across multiple settings, and to accomplish identified goals in complex settings.

The duration of the program is two years. The program is designed to integrate traditional academic training and experiential learning that will utilize the exceptional resources of the St. Jude Children's Research Hospital and its faculty, as well as take advantage of the partnerships that St. Jude has formed with collaborators across the globe. It is expected to maximize student potential through guided learning, with mentorship by world-renowned scientists. Instruction will be given through online credit bearing courses and on-campus non-credit bearing training, through a competency-based curriculum.

Students will be trained in three core competency domains: foundational knowledge, translational tools, and implementation skills. Foundational knowledge will include training in the fundamentals of biostatistics and epidemiology, social sciences, and child health issues in the context of global health and health systems. This will be the core of the program that will provide an understanding of concepts and theories in these areas.

Within the domain of translational tools, students will learn the use of quantitative, qualitative and mixed methods, synthesis of evidence-based solutions, and in-depth policy analysis. These tools and analytical frameworks will help graduates to translate foundational knowledge into applied research, evidence- based policies, and programs.

The third domain of competencies will include implementation skills that will guide students towards becoming agents of change by strengthening their communication, leadership, and management abilities. The program will promote an understanding of the mechanisms of implementation, implementation challenges, and innovative thinking and solutions. These competencies are intended to empower the students to apply their education at the local, regional, and global level, across multiple settings, and to accomplish identified goals in complex settings.

In the rapidly changing globalized world, childhood illnesses will not be contained by borders or exclusively by vertical health programs that focus on a single health condition. The program has been specifically designed to bring positive changes in health systems that are required in underserved communities at the state, national, and global levels, with consequent improvement in health care for children.

Mandatory In-Person Intersessions

Students have mandatory non-credit workshops and seminars during their on-campus visits to the Graduate School. Orientation and visits during subsequent winter and summer intersessions focus on:

1. Learning to Learn Online: The workshop will describe components of online learning, analyze different types of learning environments, and help the students plan for a personal learning environment. It will help identify areas of personal adjustment and time management required for success in online learning.
2. Ethics in Global Health: In this presentation by St. Jude experts, the students will learn the ethical principles of scientific research. The students will be exposed to ethical frameworks, theories, and historical references, linking theory to practice in research.

3. Communication Workshops: The workshops will focus on public speaking, persuasive presentations and effective writing.
4. Leadership and Management Workshops: The workshops will address issues related to self-mastery, team building, and conflict management.

Thesis

The thesis will be the culmination of studies and the primary locus for translation of the knowledge and skills students acquired through the program. The students will write a thesis on a project idea, and the best theses will be considered for funding from the Department of Global Pediatric Medicine after the successful completion of the Master of Science degree.

The thesis will consist of a project proposal addressing a global health issue, with the background, justification, process, and measurable results of a project that are expected to make significant contributions to positive change. Impact may be achieved through direct action to improve outcomes in populations and organizations and/or the creation of significant translational action that has potential to influence the change. This includes, but is not limited to, creation, implementation, or evaluation of a global health initiative; managing and enhancing existing initiatives; engagement in developing the strategy of an organization, policy initiative or conducting applied research in select locations.

At the end of their last semester in the program, students will also submit a personal journey statement that is designed to be an opportunity for them to reflect on their personal growth and development in the program.

Student Learning Objectives

SLO 1: Demonstrate competency in basic research methods and their applications- including research design, data analysis and interpretation.

SLO 2: Identify the concepts, determinants, and implementation principles of global child health, health systems and policy.

SLO 3: Demonstrate the ability to evaluate, integrate, and apply appropriate information from various sources to identify problems, evaluate problem-solving strategies, and create evidence-based programs and policies through critical thinking.

SLO 4: Apply leadership and management tools and strategies to effectively and efficiently implement programs and policies.

MSc – GLOBAL CHILD HEALTH
CORE CURRICULUM

Term	Year	Course No.	Course	Credits
Fall	1	GCH8100	New Student Orientation	0
Fall	1	GCH8010	Intersession 1	0
Fall	1	GCH8101	Principles of Biostatistics	3
Fall	1	GCH8111	Introduction to Epidemiology	3
Fall	1	GCH8121	Foundations of Global Health	3
			Fall	9
Spring	1	GCH8020	Intersession 2	0
Spring	1	GCH8132	Research Methods in Global Health	3
Spring	1	GCH8142	Health Economics	3
Spring	1	GCH8152	Introduction to Health Systems and Policy	3
			Spring	9
			Credits Earned Year 1	**18**
Fall	2	GCH8030	Intersession 3	0
Fall	2	GCH8211	Political Economy of Global Child Health	3
Fall	2	GCH8221	Organization Leadership	1.5
Fall	2	GCH8231	Thesis Seminar	1.5
			Fall	6
Spring	2	GCH8040	Intersession 4	0
Spring	2	GCH8242	Strategic Management of Child Health Programs	3
Spring	2	GCH8262	Child Health and Health Systems Innovation	1.5
Spring	2	GCH8282	Thesis Practicum	1.5
			Spring	6
			Credits Earned Year 2	**12**
			Total Credits Awarded	**30**

ACADEMIC REGULATIONS

For access to full academic policies, please see the Graduate School website at www.stjude.org/graduate-school. Policies found on the Graduate School website will be considered the most recent, enforceable policies.

Academic Progress

Satisfactory Academic Progress

Students are required to demonstrate satisfactory academic progress (SAP) toward degree completion. Academic progress is measured at the end of each academic semester. Students must have a minimum GPA of 3.0 to graduate. Milestones required to comply with SAP for each program are described below. Overall performance will be assessed by the Associate Dean of each respective program and if a student fails to comply with SAP, a report of the findings will be discussed with the student and placed in the student's file. The grade scale is as follows: A+ (98-100), A (90-97), A- (85-89), B+ (81-84), B (73-80), B- (70- 72), C+ (67-69), C (62-66), C- (60-61), F (0-59), Pass, Fail, W (Withdrawal), I (Incomplete), X (Missing Grade). A grade will be issued at the conclusion of each course.

Transitional MSc in Biomedical Sciences

- Complete all courses and maintain an overall GPA of 3.0 (on a 4.0 scale) or better;
- Participate in non-credit bearing workshops and seminars;
- Complete three six-week laboratory rotations during the first two semesters. Submit weekly progress reports and make a final presentation at the end of each rotation;
- Select a dissertation advisor and laboratory to begin dissertation research by the end of the second semester;
- Finalize the Dissertation Committee during the early part of the third semester;
- Pass the Candidacy Qualifying Exam by end of June of the fourth semester. The examination includes preparation and oral defense of a grant application based on the proposed dissertation research.

PhD in Biomedical Sciences

- Successfully complete the Transitional MSc in Biomedical Sciences and 'Advance to Candidacy';
- Submit a grant application to an outside funding agency to support the proposed research with assistance from the dissertation advisor no later than the end of the fifth semester;
- Schedule bi-annual meetings with the Dissertation Committee;
- Conduct independent research and submit for publication a minimum of two manuscripts. Ideally, one of the publications will be a first author publication;
- Maintain an overall GPA of 3.0 (on a 4.0 scale) or better;
- Ideally before the end of the fifth year, successfully draft and conduct an oral defense of the dissertation and make all necessary revisions.

MSc in Global Child Health

- Complete all courses and maintain an overall GPA of 3.0 (on a 4.0 scale) or better;
- Participate and satisfactorily complete all assignments and examinations;
- Participate in non-credit bearing workshops and seminars during experiential learning intersessions;
- Select a thesis advisor, topic, and committee during the early part of the third semester;
- Attend scheduled meetings with the Thesis Committee;
- Draft and conduct an oral defense thesis and make all necessary revisions to the thesis by the end of the fourth semester.

MSc in Clinical Investigations

- Complete all courses and maintain an overall GPA of 3.0 (on a 4.0 scale) or better;
- Participate and satisfactorily complete all assignments and examinations;
- Participate in mandatory workshops and seminars;
- Select a thesis advisor, topic, and committee during the early part of the third semester;
- Attend scheduled meetings with the Thesis Committee;
- Draft and conduct an oral defense thesis and make all necessary revisions to the thesis by the end of the fourth semester.

Academic Sanctions

Failure to meet SAP requirements will result in an academic sanction; Academic Warning, Academic Probation or Academic Dismissal.

Academic Warning

The warning sanction alerts the student and the Graduate School of the student's need for academic improvement. Measures of poor performance include, excessive absences, failures to participate in mandatory workshops and seminars, or hold committee meetings. These issues will be reviewed by the Associate Dean of the respective program. The student will receive notification of failure to meet minimum standards of performance and/or engagement and must meet with the Associate or Assistant Dean to discuss and determine next steps. Selection of a dissertation advisor is a key required milestone.

Academic Probation

Students who fall below an average GPA of 3.0 are placed on academic probation for one semester. If the student raises their GPA to the required minimum standard of 3.0 during that semester, then they will be released from probation.

Intervention Measures are initiated as soon as low grades are noted in a single course to prevent probation, and continue during probation to assist students in raising their GPA:

1. Regular check-in meeting with the Associate/ Assistant Dean of their respective program.
2. A plan for corrective action will be devised.
3. The student advisor will maintain status updates on the Corrective Action Plan.

Academic Dismissal

If the student's performance does not raise the GPA to 3.0 by the end of the first semester of probation, the student will be dismissed from the Graduate School. The Dean and Associate Dean of the respective program may decide to allow the continuation of probation for one semester in exceptional circumstances. If at the end

of the second semester of probation the grade point average is still below 3.0, the student will be dismissed from the Graduate School. During the probation period, the student will be given the option to withdraw before facing academic dismissal. The Graduate School will offer coaching to aid in the decision and assist the student in determining next steps.

Curriculum and Instruction

Attendance Policy

Students are required to attend all lectures in each course. A student who cannot attend a lecture for any reason, must notify the Course Leader, Instructor, and the Assistant Dean as soon as possible. All absences will be noted in the Graduate School records. In unusual and exceptional circumstances, students may request an excused absence in advance. Excused absences can be requested from the Assistant or Associate Dean of the respective program.

Lectures are recorded and will remain available for the duration of each course. Lecture recordings are not a substitute for regular attendance but may be used as a substitute if the absence is justified.

Onsite student attendance is defined by the presence of the student. Student attendance in the distance learning component of each course is defined as active participation. These courses will, at a minimum, have weekly mechanisms for student participation, which can be documented by any or all of the following methods:

- Completion of tests or quizzes
- Discussion forums
- Submission/completion of assignments
- Communication with the instructor
- Logging in and watching lectures (or downloading them to watch)
- Other course participation

As a component of attendance, student email, course announcements and discussion forums should be checked frequently (daily is recommended). The student is solely responsible for checking updates related to the course.

Attendance is monitored and excessive absences and/or late arrivals will lead to academic sanctions. Absences will be reviewed by the Associate Dean of the respective program.

Class Cancellation

A class may be cancelled up to two weeks before the start date. If an entire session of classes is cancelled prior to the beginning of the semester, students will be given the opportunity to take the classes to complete the degree. Should an unavoidable event such as an epidemic, natural disaster, civil unrest, or threat of terrorist activity result in partial or complete cancellation, the current situation will be evaluated to determine the appropriate plan in moving forward.

Grade Point Average Calculation

To determine a student's progress toward a degree and scholastic standing, the GPA is calculated at the end of each semester and immediately, prior to graduation. This calculation relies on quality points derived from the grade assigned to each course. Grades are available online at the close of each semester.

Formula:

GPA = Total quality points earned divided by credit hours associated with the quality points awarded

Example:

A student has successfully completed the Genes to Proteins course (4 credits) with a grade of **A -**(3.7 points) and Cell Biology course (3 credits) with a grade of **A** (4.0 points).

Quality Points:

Genes to Proteins = 4.0 x 3.7 = 14.8
Cell Biology = 3.0 x 4.0 = 12.0
Total Quality Points = 14.8 + 12.0 = 26.8
Total Credits = 7
GPA = 26.8/7 = 3.828

Grade Scales

Students will be awarded grades for all coursework. The grades are determined according to the following scale of the combined scores:

A+ (98-100), **A** (90-97), **A-** (85-89), **B+** (81-84), **B** (73-80), **B-** (70- 72), **C+** (67-69), **C** (62-66), **C-** (60-61), **F** (0-59), will be issued at the conclusion the course. Pass, Fail, I, W, X.

For calculating the GPA (see 80.24.006), letter grades are associated with numeric values as follows: **A+** (4.0), **A** (4.0), **A-** (3.7), **B+** (3.3), **B** (3.0), **B-** (2.7), **C+** (2.3), **C** (2.0), **C-** (1.7), **F** (0.0).

Pass/Fail

A student's earned grade in a course designated as Pass/Fail will be a "Pass" if the student has earned a course grade of C (62 or above). A student's earned grade in a course will be "Fail" if the student has earned a course grade F (below 62). A Pass/Fail grade is not used in calculating a student's GPA but a grade of "F" is used in calculating a student's GPA.

When a student earns a "Pass" in a course that is designated as Pass/Fail, the credits from that course count toward the degree requirements, but the credits are not used in calculating the student's GPA.

A student who receives a "Fail" grade in a Pass/Fail course will immediately be placed on academic warning as successful completion of the degree requirements will be at risk. The credits of any failed course will not be counted toward the degree requirements. A student will have the opportunity to earn a "Pass" in a course where the student received a "Fail" with the successful completion of an individualized academic plan designed in consult with the Associate Dean (or designee) and the relevant Graduate Faculty member.

I – Incomplete

A student may initiate an Incomplete when an extenuating circumstance prevents the student from completing course work during the semester. Before an "I" is assigned, the student is responsible for writing an agreement with the course leader(s) that details the requirements that the student must meet to change the "I" to a letter grade. An "I" is not included in the calculation of the GPA. An "I" will convert to a failing grade if the incomplete work is not made up before the end of the next semester which may jeopardize the student's continued enrollment in the graduate program.

W – Student-Initiated Withdrawal

This mark is given to a student who initiates the process to officially withdraw from the Graduate School during the time specified in the academic period. "W" does not satisfy prerequisites and is not included in the calculation of GPA.

X – Missing Grade

This mark is given to a student as a result of a missing course grade from the instructor. This grade does not affect the student's GPA and a replacement grade will be collected by the Registrar, as soon as possible.

Leaving the Graduate School

Leave of Absences

This section covers the policies and procedures related to leave of absences (LOA) for voluntary reasons.

LOA for voluntary reasons includes Medical and/or Family Leave, Parenting Leave, Personal Leave, Bereavement Leave or for Military Service. In these cases, the student will contact the Associate Dean of the programs or the Associate Dean for Student Affairs to complete and submit the required LOA forms thirty (30) days in advance of the leave if possible. If approved by the program-specific Associate Dean, the request will be forwarded to the Dean for final approval. The Dean will instruct the registrar to record the leave and file the request in the student's file. The length of time is on a case-by-case basis as approved by the Graduate School.

Students considering a LOA should meet with their advisor, the Associate Dean of their program, the Associate Dean of Student Affairs, the Registrar, and their advisor (as applicable) for guidance and to discuss degree progress requirements, financial and visa impact, as well as other potential LOA impact. Time taken on an approved LOA will not be included in the time-to-degree calculation for degree completion and does not require the student to make degree progress during the period of the leave. Students on a voluntary LOA may retain access to their St. Jude accounts and systems, and to the Graduate School staff for support as needed.

Stipends and other funding during a LOA will be considered on a case-by-case basis depending on length and type of proposed leave.

A PhD student on an approved LOA will be considered a full-time, active and/or in-residency student, only to the extent necessary to allow the student to elect to continue existing health insurance coverage under a Graduate School offered medical, dental or vision insurance policy, if such continued coverage is allowed by the terms of such policy. Students continuing insurance coverage during any LOA will be fully responsible for the costs of such coverage. For more information on health insurance continuation of coverage options and payment requirements, please contact the graduate school office.

A LOA does not affect the student's obligation to comply with other Graduate School policies or the sanctions to which the student may be subject for violation of any such policies. Pending or related student conduct or academic proceedings may continue even when a student is on a LOA.

If a student does not return at the end of the approved leave, the student will be withdrawn from the program and must reapply through the entering students' application process. Exceptions to this policy require the approval of the Dean and Associate Dean.

All information provided to the Graduate School in connection with a LOA will be handled in a confidential manner and disclosed only in accordance with Graduate School policies and in compliance with state and federal law.

Student Withdrawal and Dismissal

A student may voluntarily withdraw from the Graduate School at any time. If a student is uncertain about withdrawing from the entire program or even a semester, alternatives are available with the Dean's approval. A student who has been formally dismissed from the Graduate School for any reason will not be readmitted under any condition. Students receive a full Graduate School tuition scholarship that covers the entire cost of the program and are therefore ineligible for a tuition refund upon withdrawal or dismissal. Doctoral students who receive support from outside agencies including the NIH are subject to their policies relating to withdrawal or dismissal from the Graduate School.

Readmissions

A student who has been dismissed from the Graduate School for any reason will not be readmitted under any condition.

Experiential and Transfer Credit

Experiential Credit

Experiential credit will be considered on a case-by-case basis for students who are admitted into the doctoral program and typically reflects prior experience in research, clinical care and industry. Experiential credit will be reviewed and granted by the Graduate Council. Experiential credit will not be considered for students who are admitted into the Master of Clinical Investigations and Global Child Health programs.

Transfer Credit

Transfer credit may be granted for a student transferring into the Graduate School from another program. The transfer credit request will be evaluated by the Graduate Council, prior to student enrollment. After the conclusion of the evaluation, the Graduate Council will submit a recommendation to the Associate Dean of the respective program. The maximum number of transfer credits will vary across programs.

Transferability of Credit to Other Institutions

The St. Jude Children's Research Hospital Graduate School of Biomedical Sciences is a special purpose institution. The purpose is to fundamentally advance global health and to find cures for pediatric catastrophic diseases by enhancing education across disciplines and training future leaders and innovators, including researchers probing the molecular basis of disease and therapy, medical practitioners conducting clinical and translational research, and health professionals improving health care systems worldwide. Students should be aware that transfer of credit is always the responsibility of the receiving institution. Whether or not credits transfer is solely up to the receiving institutions. Any student interested in transferring credit hours should check with the receiving institution directly to determine to what extent, if any, credit hours can be transferred.

Academic Freedom and Responsibility

Academic Freedom and Responsibility

Academic freedom is the unrestricted search for knowledge and truth and its free expression in the academic community. Academic freedom is vital to the acquisition and dissemination of knowledge for the benefit of the faculty, educational officers, students, administrators, the institution, the academic community, and the public. All members of this community must be able to pursue knowledge, and express and defend their viewpoints in an atmosphere of mutual respect.

Persons engaged in research, dissemination of knowledge, and student advisement and advocacy are entitled to full freedom in research and in the publication of scientifically sound results. All academic and creative activities are subject to the Graduate School policies. Faculty and students are entitled to freedom in the classroom in discussing their subject, maintaining awareness of the relevance of their contribution to the course or to the mission of the Graduate School. Quality education can only thrive in a climate of academic freedom and academic responsibility.

Professional responsibility is the logical correlative of academic freedom. As members of a profession possessing the right of self-government, the academic community has an obligation to define the rights and responsibilities necessary for research and teaching. All members of the academic community are responsible for conducting themselves in ways that will promote the achievement of the purposes for which academic freedom exists. All members of this community shall be free from institutional censorship and retributive

measures in response to exercising academic freedom. Scholars and educational officers shall attempt at all times and in good faith to be accurate, exercise appropriate restraint, show respect for the opinions of others, and clarify that they are not speaking for the institution.

Academic and Personal Conduct

Academic Integrity

Academic integrity is the pursuit of scholarly activity in an open, honest, and responsible manner. All students shall act with personal integrity; respect other students' dignity, rights, and property; and help create and maintain an environment in which all can succeed.

Dishonesty of any kind will not be tolerated. Dishonesty includes, but is not limited to; cheating, plagiarism, and fabricating or falsifying information; facilitating acts of academic dishonesty by others; having unauthorized possession of examinations; submitting work of another person as the student's own or work previously used without informing the instructor; and tampering with the academic work of other students.

Code of Conduct

The Graduate School Code of Conduct applies to students within all programs in the Graduate School. Following this Code ensures that we pursue the Graduate School mission with the highest standards of integrity and that we continually earn and maintain the trust of those who look to us as a world leader in the academic community.

Ethical behavior is essential to the Graduate School mission. We are only as strong as our reputations as individuals and as an institution, which includes a commitment to ensure a culture of excellence, innovation, mutual respect, inclusion, and creativity in research, scholarship, and everything we do. It also includes a commitment to respect ethnic, cultural, religious, and lifestyle differences of patients, their families, colleagues, students, and supporters. Specifically, the Graduate School expects and seeks to foster:

- A drive and sense of urgency to succeed;
- Honesty, integrity, and accountability in actions and decisions;
- A culture of trust and teamwork;
- Respect for employees and students under our supervision;
- A commitment to the continuous development of our employees and students;
- A commitment to diversity and inclusion;
- A commitment to local, state, national, and global social responsibility and institutional citizenship.

Reports of alleged Code violations should be filed with or reported to the Associate Dean of Student Affairs who will initiate any warranted investigation. If the violation is confirmed, sanctions can range from a formal warning to dismissal from the Graduate School. An appeal to the outcome of a hearing must be delivered in writing to the Dean within five (5) business days of the date of the notice of outcome. The Dean will review the appeal and his/her decision is final.

Honor Code

The Honor Code is the foundation of the academic and scientific integrity of the Graduate School and the values that we pledge to in our pursuit of knowledge. The full Honor Code and the Honor Code constitution are available in the Graduate School office. All examinations, problem sets, quizzes, homework assignments, and research are subject to the Honor Code. After a thorough review of the Honor Code, students pledge their honor that they will abide by its terms and pledge a duty to report all suspected violations of the Honor Code to the Honor Code Committee and the Associate Dean for Student Affairs. The Honor Code Committee is a

group of five appointed members of the Graduate Student body who are responsible for upholding the Honor Code.

Research Misconduct

Research Misconduct issues involving the Graduate School will be investigated by St. Jude officials. The Research Integrity Officer (RIO) at St. Jude is responsible for assessing Research Misconduct Allegations, determining when Allegations warrant Inquiries, recommending Investigations or administrative actions based on inquiry conclusions, and overseeing Inquiries and Investigations. At his/her discretion and as dictated by the circumstances, the RIO will inform the Dean and relevant Associate Deans of the investigation, how it is proceeding and if any information is required from the Graduate School. Students who are found guilty of dishonesty will receive academic sanctions up to and including expulsion from the program.

Responsible Conduct of Research Training

Reflection on responsible conduct of research should recur throughout a scientist's career: at the undergraduate, post-baccalaureate, predoctoral, postdoctoral, and faculty levels. According to NIH guidelines, trainees/students/scholars/scientists are required to attend responsible conduct of research training at each stage of their career. On campus, our Academic Programs Office has organized the St. Jude's Responsible Conduct of Research (RCR) Training Program as a series of one-hour monthly trainings from September through June. This training is based on a formal, comprehensive series of didactic lectures and discussion groups led by senior faculty and administrators. Instruction should involve substantive contact hours between the trainees/fellows/ scholars/participants and the participating faculty. Students working towards a PhD degree are required to complete at least eight contact hours over a period of four years. Attendance is documented and recorded. Masters students are strongly recommended to attend any and all trainings of interest.

Complaints and Grievances

Student Complaints and Grievances

The Graduate School will use reasonable methods to respond to all Complaints and Grievances in a timely manner. Retaliation against graduate students for raising Complaints or filing Grievances in good faith shall not be tolerated.

Procedure

Step One**:** A graduate student should speak directly to the source of his/her/their concern. When possible and appropriate, students should attempt to resolve the problem with the other person or persons who are the alleged cause of the Complaint. The parties involved should make every effort to resolve the issue fairly and promptly. If a graduate student is uncomfortable with or unable to speak directly with the source of the concern, they should attempt to resolve the issue in collaboration with the Associate Dean for Student Affairs, Dr. Stacey Schultz-Cherry, E8053 Donald P. Pinkel MD Research Tower, 901-595-6629 or cell 901-216-2627. If a graduate student is not satisfied with the outcome of Step One, he/she/they should proceed to Step Two.

Step Two**:** If a graduate student is not able to reach a satisfactory resolution at Step One, the student should promptly (no more than 30 [thirty] days from the date of the event or incident leading to the Complaint) file a formal written Complaint in the student portal within the student information system at: https://thaddeus.stjude.org/secure/student/loginstu.aspx or through EthicsPoint - St. Jude Children's Research Hospital. The portal is an electronic submission system in which Complaints are stored. The form prepopulates the graduate student's information. The submitted complaint routes to the Student Affairs Committee for review. The Student Affairs Committee consists of the Associate Dean for Student Affairs who will act as chair, the three Assistant Deans, and an additional ad hoc member appointed by the Dean. A representative from the St. Jude Office of Legal Services shall act as legal support to the Student

Affairs Committee. If one or more of the members of the Student Affairs Committee is temporarily unavailable to serve, the Dean may appoint designees for this purpose. If the formal written Complaint is about one of the members of the Student Affairs Committee, that member will be recused and the Dean will appoint a designee in their place.

- Within one month of having received notification, the Student Affairs Committee shall:
    - Meet to discuss the complaint
    - Meet with the Reporter to discuss the complaint
    - Meet with the Respondent(s) to discuss the complaint
    - Determine if a Code of Conduct violation occurred
    - Render a decision and possible sanction and/or corrective actions
    - Issue a decision and recommendation for any sanction and/or corrective actions in writing to the Dean
    - If, under extraordinary circumstances, this deadline cannot be met, the chair of the Student Affairs Committee shall inform the Reporter and Respondent(s) of the delay.
    - The Complaint will be maintained in a confidential file in the Graduate School.

- Once the decision has been made by the Student Affairs Committee, the following notifications will be sent:
    - The Reporter and the Respondent(s) will be notified of the decision and any required follow up actions in writing from the Dean.
    - The Reporter and the Respondent(s) will be notified of the appeal process.

- If follow up corrective actions or sanctions are required, the Associate Dean of Student Affairs will ensure these requirements are met and documented. A copy of the complaint, any investigatory documents, and a statement of the matter's disposition will be kept in the appropriate student file in the graduate school office for a minimum of three years.
    - The range of possible sanctions includes, but is not limited to, those listed at the end of this policy.

- As possible, the confidentiality of all students will be maintained.

- It is prohibited to interfere with or obstruct the Graduate Student Complaint or Grievance Process, by any means and through any medium, including but not limited to the following:
    - Knowingly filing a false report that a violation was committed.
    - Falsification, distortion, or misrepresentation of information relevant to the Graduate School Complaint or Grievance Process.
    - Disruption or interference with the orderly conduct of any meeting as outlined in this policy.
    - Attempting to influence the impartiality of a Student Affairs Committee member prior to, or during, a Graduate Student Complaint or Grievance Process.
    - Harassment or intimidation of a Student Affairs Committee member, and/or participant, prior to, during or after any meeting as outlined in this policy.
    - Influencing or attempting to influence another person to commit an obstruction of the Graduate Student Complaint or Grievance Process.

Step Three. If a graduate student believes that he/she/they has not received appropriate redress through the Complaint procedure, the graduate student may file a Grievance on one or more of the following three grounds:

- Procedural irregularities sufficient to affect the outcome;
- New information that was not reasonably available at an earlier stage of review that could reasonably be expected to affect the outcome; or
- An error of judgment in the conclusion reached by a decision-maker at an earlier stage of review.

A Grievance must be no more than five (5) double-spaced pages with one (1) inch margins and twelve (12) point font and may include attachments, including the original complaint and documentation from each prior step in the process. The Dean will confirm that the student has exhausted the Complaint process (Steps One and Two) and should make every effort to resolve the Grievance promptly (usually within thirty (30) days) through a written decision issued to the student. The Dean will make a decision based on the written record. The decision of the Dean is final.

Any questions about the Student Complaint Process should be directed to the Associate Dean of Student Affairs.

Students are urged to exhaust all possible internal avenues for resolution before filing complaints with external agencies. In the event that an issue cannot be resolved by the Graduate School, the student has the right to contact the state of Tennessee and its appropriate agencies to determine the course of action. Any person claiming damage or loss as a result of any act or practice by this institution that may be a violation of Title 49, Chapter 7, Part 20 or Rule Chapter 1540-01-02 may file a complaint with the Tennessee Higher Education Commission, Division of Postsecondary State Authorization (DPSA). The THEC DPSA is located at 312 Rosa L. Parks Ave., 9th Floor, Nashville, TN 37243. The phone number is (615) 741-5293

Sanctions and Corrective Actions

A sanction is an educational, restorative, corrective, or deterrent measure assigned to a student because he/she/they has been found responsible for a violation. If the respondent is a St Jude faculty or staff member, sanctions fall under the purview of St Jude. Possible sanctions/corrective actions against students, in increasing order of severity include without limitation one or more of the following:

- **Formal Warning:** Respondent is notified that the respondent's actions constituted a violation and that further violations will result in further disciplinary action.
- **Educational Activity:** Respondent is required to complete corrective measures designed to be educational, developmental, or restorative in nature that promote enhanced ethical decision-making.
- **Restitution:** Respondent is required to make restitution for misuse, damage or destruction of or to Graduate School public or private property or services. Examples include without limitation costs of repair, replacement, recovery, cleaning, or otherwise restoring the property or services affected.
- **Denial of Privileges or Associations:** Respondent is notified that, for a specified period, certain privileges or associations within or related to the Graduate School are withdrawn. This sanction may include without limitation the termination of housing contracts and revocation of the privileges of using certain campus facilities.
- **Probation:** Respondent is notified that his/her/their status with the Graduate School, for a specified period, is such that further violations of any applicable Graduate School policies will result in his/her/their being considered for a "higher level" sanction, including deferred suspension, suspension, or dismissal from the Graduate School. If at the end of the specified period no further violations have occurred, the respondent is removed from active probationary status.
- **Deferred Suspension:** In some cases, a sanction may be held in abeyance for a specified period. This means that if the respondent is found responsible for any violation of Graduate School policy during that period, the respondent will be subject to the deferred sanction without further review in addition to the disciplinary action appropriate to the new violation. For serious misconduct, the conferring of an academic degree will be deferred for the duration of the sanction.
- **Suspension:** Respondent is notified that he/she/they is separated from the Graduate School for a specified period. The respondent must leave campus and vacate student housing, if applicable, within the time prescribed and is prohibited from St. Jude property and events. A suspension may be effective

immediately or at a later date under the discretion of the Dean or Dean's designee based on consideration of relevant factors, including without limitation the nature of the misconduct and the health and safety of the respondent and others in the Graduate School community. The respondent's academic transcript will contain a notation of the suspension stating that the respondent was suspended by Graduate School action. The conferring of an academic degree may be deferred for the duration of the suspension. The respondent must receive written permission from the Graduate School Dean prior to re-enrollment.

- **Dismissal:** Dismissal means the permanent removal of the respondent from the Graduate School, which. includes a forfeiture of all rights and degrees not actually conferred at the time of dismissal, notification of dismissal to the Graduate School community (as necessary), permanent notation of the dismissal on the respondent's Graduate School records, and withdrawal from all courses. Any respondent dismissed from the Graduate School is prohibited from St. Jude property and events and will not be readmitted to the Graduate School.

Accommodations

Accommodations

Embedded in the core values of the St Jude Children's Research Hospital Graduate School of Biomedical Sciences ("Graduate School") is a commitment to ensure equal access to a quality higher education experience for a diverse student population. The Graduate School recognizes disability as an aspect of diversity that is integral to society and the Graduate School community. The Graduate School serves as a partner in fostering an inclusive and equitable environment for all Graduate School students.

The Graduate School is committed to providing equal access to educational opportunities for qualified students with disabilities or disabling condition, in accordance with state and federal laws. To ensure equality of access for students with disabilities or disabling condition, reasonable accommodations, including auxiliary aids and services, are provided case-by-case through an interactive process with the Graduate School ADA Coordinator ("ADA Coordinator").

Diversity and Inclusion

Diversity and Inclusion

St. Jude and the Graduate School encourage diversity on campus and do not discriminate on the basis of race, national origin, sex, genetic information, sexual orientation, age, religion, disability, veteran's status, disabled veteran's status, or any other status protected by federal or Tennessee law. The Graduate School is committed to creating an inclusive learning environment that provides cultural and ethnic diversity. Underrepresented minorities are encouraged to apply to the program.

Placement Assistance

Placement Assistance

The "next step" for students who successfully complete a PhD in Biomedical Sciences is intended to be a postdoctoral fellowship, industry position, or teaching. Although there is no formal placement office or programming in the Graduate School, placement assistance for these positions is generally available through faculty advisors and other mentors in the program. Their support in placing graduates into premier fellowships can be invaluable. An extensive network of former St. Jude postdoctoral fellows is another resource to find placements in academia and industry. Students who successfully complete the Master's programs will expect to be considered for advancement in their clinical and healthcare related careers. Faculty and clinical mentors within the Graduate School can also provide placement assistance for these students.

DEGREES AWARDED

Master of Science in Clinical Investigations and Global Child Health – Terminal

To be awarded a master's degree, a student must: successfully complete all coursework and examinations; have satisfactory attendance and participation in the required workshops, seminars, and experiential learning activities; submit a master's thesis with oral defense before the student's thesis committee.

Each student is expected to successfully complete all coursework, assignments, and examinations during the two years of the program.

Master of Science in Biomedical Sciences – Terminal

If a student fails to complete his/her PhD studies, he/she may apply to the Dean for a terminal Master of Science degree in Biomedical Sciences. To be considered for a terminal Master of Science degree, the student must:

- Complete the first and second-year core curriculum and exams, and
- Complete at least one year of full-time research, and
- Accumulate sufficient research data to support a Master's thesis.

Once the Dean, in his sole discretion, approves the request for a terminal Master of Science degree, the student will write and submit a Master's thesis and defend it during an oral exam administered by their committee. The student's Dissertation Committee and the Dean will make final judgment on the amount and quality of the student's work, whether or not it rises to a Master's level of research and academic accomplishment, and a terminal Master of Science degree is awarded.

Master of Science in Biomedical Sciences – Transitional

All students who complete required first- and second-year coursework, laboratory rotations, and successfully pass their Candidacy Qualifying Exam, will be awarded a transitional Master of Science degree in Biomedical Sciences and will advance to candidacy.

Doctor of Philosophy in Biomedical Sciences

The Graduate School will award the doctoral degree upon the successful completion of the following requirements:

- First and second-year courses and accompanying exams
- Laboratory rotations and clinical assignments
- Satisfactory attendance and participation in the required seminars and laboratory meetings
- Candidacy Qualifying Exam (end of the second year)
- Grant application submitted
- Two research papers submitted for publication
- Dissertation research
- Oral defense of dissertation

Students are expected to complete all coursework, three laboratory rotations, and clinical assignments during the first year. Each student will be assigned a SOT at the beginning of the first year to assist with the coursework. The second year is devoted to research and enhanced preparation for the Candidacy Qualifying Exam. At the end of the second year, students must have passed all requirements to take the Candidacy

Qualifying Exam to attain doctoral degree candidacy status. Each student will then, in consultation with the Dean, select a four-member (with the option of a fifth) Dissertation Committee at the beginning of the second year. The Dissertation Committee will include the primary dissertation advisor and will meet with the student at least twice a year, evaluate the Candidacy Qualifying Exam, and generally work with and guide the student toward timely completion of the required research. This Committee will also oversee the preparation and oral defense of the dissertation and recommend pass/fail. Students who fail the Candidacy Qualifying Exam and/or the oral defense of their dissertation will be able to repeat them once. During both exams, a member of the Dissertation Committee, who is not the candidate's primary mentor, will be appointed as Chair.

Intent to Graduate

An Intent to Graduate form must be submitted to the Graduate School at the beginning of the semester in which the student expects to complete a degree.

Degree Completion Time Limit

Students are expected to complete the Master's degree within two years, with three years as the maximum time allowed — including any leaves of absence. Students are expected to complete the doctoral degree in four to five years, with six years as the maximum time allowed. If a student has officially been approved to withdraw from the program and then re-enters, the period of withdrawal will not be included as part of the time to degree. Any exceptions to this policy require the approval of the Dean.

The COMMITMENT-LEADERSHIP Student-Advisor Compact

As a student, I will:

Collaborate with my advisor to develop a research project that will address a key scientific question.
Organize and plan my pathway towards timely completion of my degree.
Maximize my progress and continually seek guidance from my advisor and colleagues.
Manage time constraints to work efficiently and maintain consistent and optimum performance.
Increase my skillsets, knowledge, and independence by seeking the best training opportunities
Thoroughly embrace my role as a student and be respectful of my advisor, mentors and peers.
Maintain accurate and detailed scientific records in compliance with St. Jude policy.
Endeavor to publish my research and data in a timely manner in consultation with my advisor.
Note and comply with ethical standards and regulations, and the Code of Conduct.
Thrive under the tutelage of my advisor as I embark on a career in science.

As an advisor, I will:

Listen to my student and develop an intellectually stimulating research project.
Establish challenging but achievable and clearly defined research goals.
Assess my student's performance regularly and counsel them on realistic career opportunities.
Develop a training plan that enhances my student's scientific knowledge, skills and independence.
Engage with my student: I will listen to them, be approachable and share my knowledge.
Reinforce ethical research standards and report alleged violations without bias.
Sustain a stimulating research environment that promotes curiosity, excitement and creativity.
Help my student to be both an independent thinker and a collaborative researcher.
Inspire my student to complete their studies quickly and to pursue the next stage of their career.
Publish my student's research and appropriately acknowledge their contributions.

TUITION and STUDENT SUPPORT

Below are the official tuition charges, statement of fees, and refund policy for the current academic year.

MSc – Biomedical Sciences	PhD – Biomedical Sciences
Total Cost of tuition for MSc of Biomedical Sciences Program $40,000 Itemized Tuition Cost (Per Year): Fall $10,000 Spring $10,000 Total Per Year $20,000	Total Cost of tuition for PhD of Biomedical Sciences Program $100,000 Itemized Tuition Cost (Per Year): Fall $10,000 Spring $10,000 Total Per Year $20,000
MSc – Clinical Investigations	**MSc - Global Child Health**
Total Cost of tuition for MSc of Clinical Investigations Program $40,000 Itemized Tuition Cost (Per Year): Fall $10,000 Spring $10,000 Total Per Year $20,000	Total Cost of tuition for MSc of Global Child Health Program $40,000 Itemized Tuition Cost (Per Year): Fall $10,000 Spring $10,000 Total Per Year $20,000

St. Jude Graduate School Tuition Scholarship

A full St. Jude Graduate School tuition scholarship is awarded to each student upon enrollment. If additional tuition funding is received, the tuition scholarship will be adjusted.

Fees

Students have no additional fees or financial obligations for books, special equipment, or supplies. The graduate school provides all required items.

Refunds

The term 'external funding', as used in this policy, refers to any non-St. Jude and non-federal funding that a student receives before, during and after enrollment in the St. Jude Graduate School that is used toward graduate school-related expenses. In any case that a refund may be due to the external entity, the St. Jude Graduate School will consider the policies of the external entity and will work directly with them to process the refund. If you are eligible for a refund, a written request must be submitted to the Registrar. A minimum turnaround of three business days should be expected.

Students who receive a full tuition scholarship from institutional funding are not eligible for a refund. Students who receive tuition support from a combination of institutional and external support or full external support are eligible for a tuition refund based upon their official withdrawal date from the Graduate School. A tuition refund for the portion of externally funded tuition support is pro-rated as noted below:

Withdrawal	Refund
Before the start of classes	100%
On the first day of classes	80%
After day 1 but before day 4	60%
After day 3 but before day 6	40%
After day 5 but before day 8	20%
After day 8	0%

In cases in which a student receives external funding from an external entity to apply toward graduate school-related expenses, the student is responsible for any obligation to repay the external entity according to the student's agreement with that entity.

Student Support

The Graduate School offers an array of student support programs, services, and activities that are consistent with its mission and vision. These support systems promote a higher level of academic learning and development and foster personal growth beyond the classroom.

The Graduate School offers the following comprehensive personal and training support packages to students accepted into its graduate programs:

Personal Support Package

- Competitive stipend annually (Doctoral only)
- Medical, dental and vision benefits for students and dependents (Doctoral only)
- Leave of absence with required approval
- Accommodations
- Free health services
- On-campus Fitness and Wellness Center
- Holidays and approved breaks
- Kay Café Dining
- Free on-campus parking
- Opportunities to volunteer in programs supporting St. Jude patients

Training Support Package

- Full tuition scholarship of $20,000 annually
- Allowance to support laboratory research (Doctoral only)
- Laptop computer for the duration of studies at St. Jude
- Electronic access to St. Jude learning, educational and research resources
- Access to the Biomedical Library and electronic services including online access to scientific journals
- Professional development and skills training
- Allowance to fund training related travel - scientific meetings, etc. (Doctoral only)
- Academic success support and services
- Mentoring and tutoring support program
- Internationally recognized guest speaker program
- Career development support

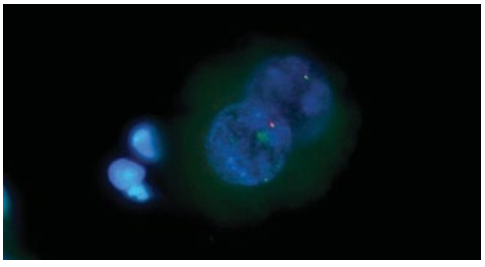
SHARED RESOURCES

St. Jude and its Cancer Center Support Grant provide an impressive array of shared resources and core facilities to support all research programs on campus. More than 40 facilities provide St. Jude investigators with access to cutting-edge technologies. Expert technologists staff these facilities that provide access to sophisticated instrumentation not readily available in each laboratory.

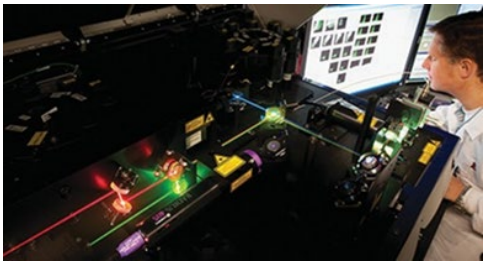
SCIENCE

Cell and Tissue Imaging Center – Electron Microscopy is a highly specialized resource utilizing advanced techniques in electron microscopy imaging.

Cell and Tissue Imaging Center – Light Microscopy assists scientists on design and execution of the imaging experiment; assists with image acquisition, analysis, quantification, presentation, and publication; and educates on the theory and practice of the resident technologies.



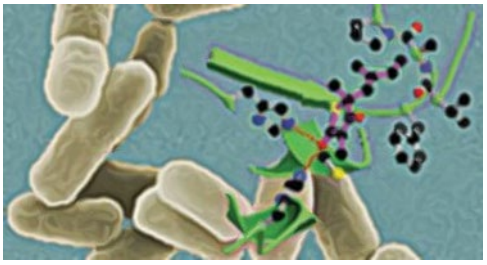
Cytogenetics provides a large diversity of cytogenetics services, including standard G-band karyotyping, spectral karyotyping, FISH analysis, and FISH probe design and development.



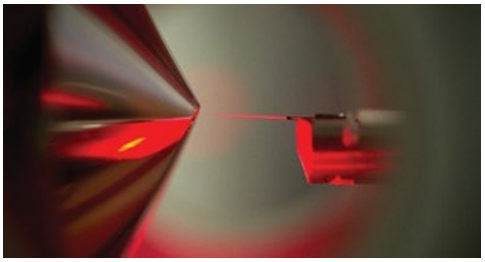
Flow Cytometry and Cell Sorting provides investigators with access to expertise in all aspects of flow cytometry and cell sorting.

Center for In vivo Imaging and Therapeutics facilitates the use of cutting-edge imaging technology to complement investigators' research efforts, including magnetic resonance imaging (MRI), bioluminescence imaging, and high-resolution ultrasound.

Veterinary Pathology Core supports and advances translational research by providing the highest quality laboratory services utilizing state-of-the-art equipment, accurate laboratory methods, and personnel with expertise in comparative pathology.

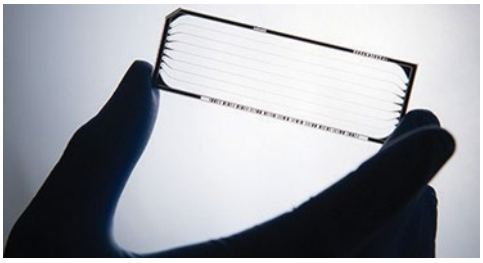


The Protein Production Facility provides a large-scale protein expression and purification service to support the translation of discoveries in molecular and cellular biology to chemical and structural biology.



Center for Proteomics and Metabolomics provides mass spectrometry-based protein analysis services to investigators, including simple protein characterization, posttranslational modification analysis, and comprehensive profiling of the proteome and phosphoproteome.

Transgenic/Gene Knockout Shared Resource incorporates the latest in genome-editing technologies to rapidly produce genetically modified models and provides gene-targeting services, stem cell lines for gene-targeting experiments, selectable marker plasmids for construction of gene-targeting vectors, and training in stem cell culture.



Hartwell Center for Bioinformatics and Biotechnology provides expertise and research support in several high-throughput biotechnologies, including Functional Genomics, Genome Sequencing, Genotyping Analysis, High-Throughput DNA Sequencing, and Macromolecular Synthesis.

INFORMATICS

Bioinformatics & Research Computing provides investigators with access to sophisticated bioinformatics resources that exist in their own departments and also within a shared resource closely aligned with the Comprehensive Cancer Center and the Pediatric Cancer Genome project.

The Center for Applied Bioinformatics (CAB) was established in 2019 with a mission to provide centralized genomic and bioinformatic analytic services for St. Jude investigators. The CAB has research scientists and software engineers of diverse background and expertise, covering the areas of genomics, genetics, transcriptomics and epigenetics.

Biostatistics promotes clinical, translational, and laboratory investigations through the further development and creative application of statistical science, including interfaces with biology, medicine, and information technology.

High-Performance Computing Facility is part of St. Jude Information Sciences and provides principal investigators and their research groups with access to on-campus scientific computing facilities through a variety of computing platforms.

CLINICAL and TRANSLATIONAL

Clinical Pharmacokinetics facilitates and centralizes high-quality, competitively funded, peer-reviewed pharmacokinetic/ pharmacodynamic research in clinical models.

Good Manufacturing Practice Facility/ Therapeutics Production and Quality provides investigators the ability to develop and produce innovative therapeutics that may not find an initial investment by a major pharmaceutical company. The facility also supports the manufacture of products for use in preclinical studies.

Human Applications Laboratory provides expertise in hematopoietic stem cell processing, gene transduction, flow cytometric analysis and sorting, primary human tissue culture, and cellular vaccine preparation.

Preclinical Pharmacokinetics supports pharmacokinetics and pharmacodynamic investigations executed in the preclinical setting by way of bioanalytical methods development and validation, preclinical study design, and pharmacometrics analyses.

OTHER SHARED SOURCES

Biomedical Communications supports the internal and external initiatives of the medical, scientific, and administrative communities by providing comprehensive visual communications solutions, including photography, digital imaging, broadcast video, illustration, graphic design, and print production.

Biomedical Engineering blends traditional engineering and medicine to advance health care through the creation of innovative devices and service procedures.

Biomedical Library is located in the MTC an provides resources 24 hours a day, seven days a week and fully staffed (3 professional staff and 1 support staff) during regular business hours Monday-Friday. The Biomedical Library can be accessed during normal business hours, after hours, or through the Biomedical Library intranet site.

The Biomedical Library staff manages access to approximately 7,600 electronic journals, nearly 19,000 electronic books, and multiple databases that include PubMed, Web of Science, SciFinder, Journal Citation Reports, UpToDate, and CINAHL. All of the library materials are accessible to St. Jude employees and students from their desktop or laptop – including via remote access. Computer workstations in the library provide additional access to full-text electronic journals, the Internet, and databases. Other services provided by the Biomedical Library staff include interlibrary loans, assistance with NIH Public Access Policy compliance, and literature search consultations.

Office of Technology Licensing assists with patenting and licensing inventions and exchanging research materials, facilitates interaction with investigators from other academic institutions and companies, and reviews consulting agreements.

Scientific Editing provides editing, copyediting, and proofreading of scientific documents and also presents workshops on writing, publication strategy, and good grantsmanship.

STUDENT LIFE and HOUSING

LIFE IN MEMPHIS

Situated on a bluff overlooking the Mississippi River, Memphis is the metropolitan hub of a six-state area known as the Mid-South. Residents of Memphis enjoy a relatively low cost of living, the purest water supply in the country, more trees per square mile than any other city, a temperate climate, four distinct seasons, and the hospitable atmosphere and pace of the "City of Good Abode." Memphis provides all the charm and hospitality of a Southern city and the cultural diversity and entertainment opportunities of a large metropolis. A wealth of recreational activities is available for casual and competitive athletes, from scenic trails and river routes to organized races, clubs, and events. With a metropolitan population of more than a million people, Memphis retains much of the allure of a small town, yet features world-class museums, parks, music, dining, and entertainment. Notable destinations include the following:

- Professional sporting events, including the Memphis Grizzlies NBA basketball team; the Memphis Redbirds Triple-A minor league baseball team, which is an affiliate of the St. Louis Cardinals organization; and the Memphis 901 FC soccer team.
- Beale Street, one of the most famous music districts in the world
- Memphis Botanic Garden and Dixon Gallery and Gardens
- Broadway shows at the Orpheum Theatre and multiple local performing arts groups
- Concerts at the FedExForum, Cannon Center for the Performing Arts, and Levitt Shell
- Shelby Farms, one of the nation's largest urban parks
- Kayaking on the Wolf River

HOUSING

A wide variety of affordable housing exists to suit almost any lifestyle. Choices range from high-rise apartments and renovated downtown lofts overlooking the river to a seemingly endless array of single-family homes in the area's numerous metropolitan, suburban, and rural neighborhoods. One of the most popular places to live in Memphis is Mud Island. Located on the Mississippi River and only 1.5 miles from the St. Jude campus, Mud Island provides a central location with a true community feel. A lighted walking/jogging path borders a park along the riverfront. With six apartment complexes and hundreds of single- family homes, a small retail district, and striking views of the river, it is no wonder that many St. Jude postdoctoral fellows, faculty, and staff have chosen to call Mud Island their home. Other popular housing areas include multiple historic neighborhoods in Midtown, the South Main arts district, and South Bluffs. Whether you prefer an older, established family neighborhood or an arts area with proximity to trendy restaurants and nightlife, these diverse neighborhoods have much to offer and are only a short distance from the St. Jude campus.

The Graduate School offers discounted housing for first-year graduate students: Harbor Island Apartments on Mud Island and Parcels at Crosstown Concourse in Midtown. Graduate student housing offers single or roommate-style living with queen bedrooms and individual bathrooms, fully outfitted kitchens, private laundry room, and community amenities. The apartments are fully furnished, and all extra charges for utilities (electric, heat, water, cable, and internet) are included as part of your housing contract. For students relocating to Memphis with significant others, there are a limited number of one-bedroom apartments. The housing contract is ~$850 per month. Free shuttles are available 24/7 at either location, offering a safe and convenient way for students to transfer between the St. Jude campus and student housing throughout the week.

COURSE DESCRIPTIONS

BMS8001 Genes to Proteins 4 credits

This course will cover fundamental topics in biology at the molecular level and provide a molecular foundation for the subsequent core courses. We will build upon the central "genes to proteins" dogma of molecular biology by discussing how genes are organized and packaged in the cell, how genes are regulated, and the determinants of gene transcription, gene silencing, and epigenetics. We will continue by discussing how proteins are generated, modified, and function in the cell. During this section, the Core Facilities Program will showcase the state-of-the-art methods in gene sequencing and protein analysis and will illustrate the power of these approaches to differentiate disease states.

BMS8101 Cell Biology 3 credits

This course will cover fundamental topics in biology at the cell and organelle level and provide a molecular foundation for the subsequent core courses. We will build upon the foundation of Genes to Proteins and focus on how cellular organelles contribute to normal and disease biology in Part 1. Part 2 will focus on how organelle systems collaborate to regulate cellular biological process including energy production, receive and transmit signals with the outside environment, regulate homeostasis, and regulate movement. During this section, the Core Facilities Program will showcase the state-of-the-art methods in cellular imaging from both electron microscopy and light microscopy and illustrate the power of these techniques to assess normal and disease biology.

BMS8201 Developmental Biology 3 credits

This course will cover fundamental topics in developmental biology and will consist of three parts. Part 1 will include a basic introduction to model organisms, including major invertebrate and vertebrate models; major stages of vertebrate embryonic development and their molecular regulation; and an introduction to modern evolutionary concepts and the construction of phylogenies. Part 2 will cover the basic definition of a stem cell, describe biologically important and clinically relevant examples of stem cells, and explain the transcriptional mechanism by which stem cells are maintained and differentiate. Part 3 will discuss fundamental topics in developmental neurobiology and cover the structure, function, development, and dysfunction of the central and peripheral nervous systems. These three parts will be highly complementary; for example, Part 3 will complement Parts 1 and 2, with a focus on neural induction, genesis, migration, and neural crest cells. The Core Facilities Program will highlight state-of-the-art methods in transgenesis, stem cells, gene editing, and veterinary pathology and will illustrate the power of these methods to model diseases, establish platforms for drug studies and genetic analysis, and achieve the long-term goal of directed differentiation of therapeutically useful cell types.

BMS8702 Cancer Biology 3 credits

This course will cover essential concepts in cancer pathogenesis, highlighting fundamental cellular regulatory processes that are subverted in cancer. We will build upon previous discussions of genome organization and apply these to understand the genomic abnormalities that drive cancer development, how they are identified, and new insights into disease classification driven by identification of molecular signatures. We will include historical examples of how oncogenes and tumor-suppressor genes were identified, integrated with discussion and analysis of current literature highlighting different model systems for cutting-edge analysis of the mechanistic consequences of cancer-associated mutations and signaling pathways of central importance in cancer. During this section, the Core Facilities Program will showcase state-of-the-art methods in monitoring

tumor development in the Preclinical Imaging Core. Students will also engage in clinical shadowing during this section.

BMS8812 Immunology 2 credits

This course will cover fundamental topics in immunology. The course will begin by examining the cellular components of the innate and adaptive arms of the immune system, which will include a discussion of how these cellular subsets develop, become activated, and differentiate. It will continue by discussing how the immune response is carefully orchestrated to eliminate foreign pathogens without destroying healthy cells. It will also examine how the immune response can be manipulated to enhance protection against pathogens, prevent autoimmunity, and eliminate tumors.

BMS8822 Infectious Diseases 2 credits

This course will cover the basic methods for infectious diseases and case studies of important disease syndromes and entities. Methods will include stating the signs and symptoms of infectious diseases to which first responders may be exposed; Identifying preventive measures such as standard precautions, immunizations and infectious disease screenings; stating post-exposure procedures; and describing recordkeeping roles and responsibilities. The course will cover topics associated with microbes in health and disease and therapeutic strategies. It will build upon the preceding sections by discussing how microbes affect basic cellular/immunologic processes, how these lead to particular syndromes/diseases, including cancer, how the host can affect microbes, and the concept of "good" microbes. It will also delve into cutting-edge therapies through the use of systems biology, while moving the students toward a "big picture" understanding of the molecular mechanisms of disease, with a focus on the immunocompromised host.

BMS8902 Pharmacology & Chemical Biology 2 credits

This course will introduce fundamental concepts important to the science of drug action and target identification. The course will build upon our understanding of the initial rationale for and ultimately the successful implementation of novel drug therapies at St. Jude. The course will describe and discuss features of the host, the target cell, and the biochemical targets that affect drug action. The course will also discuss modern approaches to screening for new drugs and the identification of drug targets. This course will be complemented by core facility visits.

BMS8501 Topics in Clinical & Translational Research I
BMS8502 Topics in Clinical & Translational Research II 1 credit each

The Topics in Clinical & Translational Research Program is led by a multidisciplinary team comprising a basic scientist, a translational researcher, and a clinical researcher. To participate in this program, students will need to complete mandatory human subjects' protection training by using the online Collaborative Institutional Training Initiative (CITI) platform provided through St. Jude Children's Research Hospital. There will be six modules (one week each) during the first year, and each module will be taught concurrently with the basic science curriculum and other topics. Each module will have an experiential component and a conceptual component. In addition to the six modules, each student will be assigned a patient at the beginning of their first year of graduate school. The clinical and basic research faculty will identify suitable patients to the followed throughout the year.

BMS8301 Computational Biology 1 credit

This course covers the algorithmic and machine learning foundations of computational biology, combining theory with practice. We cover both fundamental topics in computational biology and current research frontiers. We study fundamental techniques, recent advances in the field, and work directly with current large-scale biological datasets.

BMS8302 Biostatistics **1 credit**

Biomedical research is becoming increasingly data-intensive and data-driven, and St. Jude has an outstanding interdisciplinary program with innovative biostatistics tools for accessing, managing, analyzing, and integrating such complex data. This course is designed to provide students with a rigorous statistical education, coupled with exposure to a broad range of biomedical research applications. This course will also prepare students to be part of an interdisciplinary team for conducting biomedical research.

BMS8401 Core Facilities I
BMS8402 Core Facilities II **1 credit each**

The Core Facilities Program is designed and will be scheduled to complement the basic science topics under discussion during the core courses. Students will participate in structured visits to the institutional and departmental research core facilities to observe how the available technologies work and learn about our onsite capabilities.

BMS8951 Laboratory Rotations I
BMS8952 Laboratory Rotations II
BMS8953 Laboratory Rotations III **3 credits each**

An important component of the students' first year training will be three lab rotations in the laboratories of selected graduate faculty. Each rotation will be six weeks, and no other course work will occur during that time. This approach will also ensure that students become fully immersed in the research of their chosen laboratories. Each student will be assigned a small research project during the rotation, and will formally present results to the graduate faculty and other researchers.

BMS8971 Scientific Writing & Communication I
BMS8972 Scientific Writing & Communication II **1.5 credits each**

The Scientific Wright & Grantsmanship course is intended to teach students the basic writing skills needed to successfully publish manuscripts and obtain grant funding. However, other peer-to-peer professional communications will also be included (e.g., professional correspondence, peer review, meeting abstracts).

Reading & Research
BMS8991 BMS8992
BMS9301 BMS9302
BMS9401 BMS9402
BMS9501 BMS9502 **9 credits each**

Research is a requisite part of the curriculum and will be undertaken as three distinct laboratory rotations during the first year or, with previous academic credit earned, as an enrollment in Reading & Research in year one and continuous enrollment in subsequent Reading & Research courses until the student's dissertation defense. This course enables the student to function as a member of a research team in a laboratory setting while also furthering their independent dissertation research. The student's primary advisor will continuously evaluate their progress in accordance with the student's qualifying exam proposal. The student and primary advisor will meet at least once per term with the student's dissertation committee and to submit an evaluation by the end of each term to the Dean. It is expected that the student will author a minimum of two papers related to their independent research for submission to a journal(s) for publication.

CLI8101 Biostatistics for the Health Sciences I **3 credits**
CLI8201 Biostatistics for the Health Sciences I Lab **1 credit**

This course is designed to provide students with a strong foundation in the principles and methods of biostatistics. It will assist students in developing the knowledge, skills, and perspectives necessary to analyze data. Major topics include descriptive statistics, elements of probability, introduction to estimation and hypothesis testing, and nonparametric methods. Through lectures, virtual labs and group discussions, this

course will focus on identifying data sets, refining research questions, univariate and bivariate analyses, and presentation of initial results.

CLI8102 Biostatistics for the Health Sciences II 3 credits
CLI8202 Biostatistics for the Health Sciences II Lab 1 credit

This course is a continuation of Biostatistics for the Health Sciences I and provides students who have already mastered fundamental concepts with an opportunity to develop mastery of more advanced techniques and concepts. Major topics include techniques for categorical data, regression analysis, survival analysis and repeated measures. Through lectures, virtual labs and group discussions, this course will focus on identifying data sets, refining research questions, univariate and bivariate analyses and presentation of initial results.

CLI8301 Introduction to Epidemiology 3 credits

This is an introductory course. Health professionals who provide clinical care, work in public health settings or who educate others, should find the course content particularly relevant. This course will provide a basic understanding of the methods and tools used by epidemiologists to study the health of populations. This course will help the student understand that health is defined very broadly, and the types of questions asked and answered by epidemiologists are infinitely varied. This happens as new health conditions arise (e.g., widespread gastro-intestinal illness), new methods are developed to better elucidate mechanisms by which disease occurs (e.g., enhanced genetic testing mechanisms), previous health conditions take on new importance (e.g., obesity, antibiotic-resistant tuberculosis), or epidemiologic methods are applied to problems in the domain of other disciplines (e.g., violence prevention). This variety makes epidemiology an exciting and useful endeavor.

This course covers all the material and topics typically taken in an introductory course for epidemiology. This course will include basic math: addition, subtraction, multiplication and division skills are necessary. It is important that students understand how to manipulate fractions, exponentiate a number, and take the natural log of a number. Students are advised to review math skills on their own ahead of time.

CLI8302 Advanced Clinical and Translational Research Methods 3 credits

This course introduces students to advanced clinical and translational research methods including clinical trial designs for all phases and complex data analysis methods. Contemporary variations of clinical trial designs will be presented. In addition, students will learn the fundamental principles of good clinical data management practices, and an understanding of database design. Topics discussed include creation of case report forms, types of database systems including relational databases, data validation, standards, missing data, data security and integrity, data entry, and queries and reporting. Students are also presented to resources for clinical trial data management available at St. Jude. This course will also introduce basic concepts from the standpoint of implementing and managing a clinical research project including multi-site studies, financials and budgeting, and contracts/agreements. The class walks through these management components of clinical trial methods and processes in the same sequence that they will use in the workplace. As part of the class, students will apply some of the techniques and tools to real projects.

CLI8401 Introduction to Patient-Oriented Research 3 credits

This introductory course will provide students foundational knowledge, skills and perspectives on design and interpretation of clinical research studies, including retrospective and prospective observational studies, quality improvement projects and clinical trials. Major topics include performing a literature review, developing and evaluating a research question, choosing and understanding a study design and analysis approach, developing study objectives, designing and implementing a clinical study, and interpreting and communicating results. The fundamental principles learned in this course will serve as the basis for more advanced learning in subsequent semesters.

CLI8402 Scientific Writing and Communication 3 credits

Students are expected to enter the course with general knowledge of ongoing research in their thesis lab, as well as an idea of what their individual research project will be. The overarching objective of this course is to equip students with the skills to present their research to a varying degree of detail in oral, poster and written formats. Central to the course is the expectation that students will become immersed in the research literature relevant to their project. Through a series of modules, students will practice synthesizing a body of literature, extracting the key components, and using them to build strong rationales for aims. Incorporated into this learning experience will be instruction on and practice in scientific writing, and journal club and research presentations. Students will practice developing hypotheses and clinical research plans for a clinical protocol. Finally, students will learn how to write basic components for a grant proposal such as a Specific Aims page, develop a solid Experimental Approach, and describe the Significance to frame their research proposal.

The format and sequence of lessons for the course are designed to guide students through the process of framing a scientific main objective with testable specific aims, strong rationales, question-driven experiments, and interpretation of results. Classes will be both didactic and interactive, and students will learn from each other, from thoughtful/methodical study of literature, and from the iterative practice of presenting, writing and peer review.

CLI8501 Ethical and Legal Issues in Clinical Research 3 credits

Although there has long been an emphasis on the conduct of ethical research, advances in genomics, in individualized precision medicine, and the globalization of clinical trials have resulted in an increasingly complex regulatory and legal structures to protect the rights and welfare of research participants. This course is intended to engage the students in consideration of the ethical and legal aspects of designing, conducting and reporting clinical research. They will review regulations, guidance statements and legal court decisions, as well as engage in discussions about how best to conduct research in respect of human subjects.

CLI8511 Behavioral and Social Sciences 3 credits

Behavioral and social research are critical aspects of the clinical research enterprise. The patient participant is at the center of most clinical research, and there is increasing focus on patient-reported outcomes and quality of life in medical clinical trials. Along with this, there are numerous clinical studies – both observational and interventional – that solely have behavioral and social objectives and methodologies. This course will provide an overview of behavioral and social science research, including research design and methodologies (including intervention), psychometrics, participant and employee perspective, and unique populations and research questions.

This course is likely best suited for students interested in careers in behavioral and social science research. However, given the role of the patient participant in all clinical research, it will be of interest and beneficial to students interested in a wide variety of careers.

CLI8521 Advanced Epidemiology 3 credits

This course is designed to provide the student with the critical thinking, methodologic and analytic skills necessary to understand causality in observational and interventional research, to select the most appropriate study design to answer a research question, and to independently quantify and interpret the results. Training in the collection, use and interpretation of data from large epidemiologic and clinical cohorts, and in the use and interpretation of data from public use data sources, including the Surveillance Epidemiology and End Results Program, the National Health Interview Survey and the U.S. Census is included. This course is designed as a practicum in epidemiologic data analysis that integrates learning from previous courses. It includes both lectures and data driven hands-on exercises.

CLI8531 Clinical Genomic Data Science 3 credits
CLI8541 Clinical Genomic Data Science Lab 1 credit

This course provides an overview of the statistical, computational, and laboratory methods used to identify and characterize molecular processes involved in the development and prognosis of a disease. It begins with a review of biological concepts and models, introduces a series of data analysis methods and study design principles, and finally describes how genomic data science is incorporated into clinical trials and clinical practice. This course follows a weekly schedule, with 3 credit hours for lectures and 1 credit hour for laboratory work.

CLI8551 Drug Development – from Bench to Bedside 3 credits

This course will provide students the knowledge, skills and perspectives on pre-clinical and clinical drug development with an emphasis on interventional clinical trials. Major topics include preclinical testing, introduction to pharmacokinetics and modeling, GMP facilities, regulatory aspects of human subjects research, operations and management of clinical research teams, overview of clinical trials management systems and case report forms, endpoints and statistical considerations, protocol and consent documents.

CLI8561 Translational Neuroscience 3 credits

This course will provide students the knowledge, skills and perspectives on pre-clinical and clinical drug/biologics development with an emphasis on interventional clinical trials in Neuroscience. Major topics include understanding basic mechanisms of neurologic diseases, identification of targetable neurologic disorders, generation of informative cell lines and animal models for preclinical testing, pharmacokinetics and pharmacokinetic modeling in the pediatric and adult populations, clinical trial readiness, identification of primary outcomes and endpoints in a rare disease population, clinical trial design, biomarkers, statistical analysis considerations, unique GCP and ethical aspects of drug discovery in neurologic disorders, and regulatory aspects of human subjects research for small molecule and biologic investigational products.

CLI8701 Critical Assessment of Contemporary Clinical Trials 1 credit

This course introduces students to the critical evaluation of clinical trials, cultivating important skills in evaluating trial design and conduct, scientific writing, and peer review. It will familiarize students with the systematic appraisal and critique of study design and methodology, how data are reported, the appropriateness of applied statistical methodology and ethical considerations, and how to incorporate trial results into clinical practice. Topics discussed include the general structure of research papers, essential questions to be answered when reading a clinical trial report and how to critically evaluate publications across different report types. Students will apply principles and use tools to collaboratively evaluate contemporary study reports in a highly interactive format.

CLI8801 Thesis Research Project I 3 credits

This course will assist the students in developing a clinical research study/project that will provide a culminating experience that applies the principles and methods learned in the coursework to a real-life clinical study.

CLI8802 Thesis Research Project II 9 credits

This course will build upon the knowledge that was gained in Thesis Research Project I. Through this work, the student should demonstrate understanding of the clinical research process from both a theoretical and a practical point of view.

GCH8100 New Student Orientation 0 credits

The new student orientation course is designed to assist new students in their academic and social preparation for success in the graduate program. This course will assist in the completion of all materials, the student's adjustment to the St. Jude campus and resources, and the faculty members and their research.

GCH8010 Intersession 1
GCH8020 Intersession 2
GCH8030 Intersession 3
GCH8040 Intersession 4 0 Credits

The Intersession visits during fall and spring focus on:

Learning Online: This includes components of online learning, analysis of different types of learning environments and assisting the students plan for a personal learning environment. It also helps identify areas of personal adjustment and time management required for success in online learning; Leadership and Management: Learn about addressing issues related to self-mastery, team building, organizational and systems-level leadership, and conflict management; Communication: Focus on public speaking, persuasive presentations and effective writing, including basic principles of effective prose and argument in advocacy, opinion pieces and policy writing; and Ethics in Global Health: This includes presentations on ethical principles of scientific research, clinical care and global health. The thesis workshops (Year 2, fall and spring intersessions) support students in producing a thesis of high academic standard, guiding them through structured and collaborative approaches to develop a project idea. Students are introduced to the challenges of writing and presenting a thesis. Resources are provided to support students through the process.

GCH8101 Principles of Biostatistics 3 credits

This course is designed to provide students with a strong foundation in principles and methods of Biostatistics. It will assist students in developing the knowledge, skills and perspectives necessary to analyze data. Major topics include descriptive statistics, elements of probability, introduction to estimation and hypothesis testing, nonparametric methods, techniques for categorical data, regression analysis, analysis of variance, and elements of study design. Through lectures, virtual labs and group discussions, this course will focus on identifying data sets, refining research questions, univariate and bivariate analyses and presentation of initial results.

GCH8111 Introduction to Epidemiology 3 credits

This course will provide a basic understanding of the methods and tools used by epidemiologists to study the health of populations. This course will help the student understand that health is defined broadly, and the types of questions asked and answered by epidemiologists are infinitely varied. This happens as new health conditions arise (e.g., widespread gastro-intestinal illness), new methods are developed to better elucidate mechanisms by which disease occurs (e.g., enhanced genetic testing mechanisms), previous health conditions take on new importance (e.g., obesity, antibiotic resistant tuberculosis), or epidemiologic methods are applied to problems in the domain of other disciplines (e.g., violence prevention). This variety makes epidemiology an exciting and useful endeavor.

GCH8121 Foundations of Global Health 3 credits

This course is designed to equip students with an understanding of the foundational concepts, challenges, and opportunities in global health and how they relate to child health. It will provide a global population health perspective on child health, childhood cancers and other catastrophic illnesses in children worldwide and discuss how complex social, political, economic, and biomedical factors inform our understanding of child health. The imperative for the students is to understand these factors individually and synergistically and leverage this understanding to set priorities, form policies and design interventions. The students will be able

to identify areas of interest and knowledge gaps within the field of global child health that they can focus on through the program.

GCH8132 Research Methods in Global Health 3 credits

This course will provide a foundation in study design, research question development, field implementation, measurement, validity, and reliability. Quantitative, qualitative and mixed methods research approaches will be examined. Students will build critical skills in designing studies and conducting, interpreting, and synthesizing research and scientific literature. It will focus on statistical principles as well as the applied skills necessary to answer questions using data, including data acquisition, data analysis, data interpretation and the presentation of results. The selection of appropriate measurements and survey development will be emphasized.

GCH8142 Health Economics 3 credits

This course will provide an overview of the relevance of microeconomic theories and basic concepts in macroeconomics to global health. It will describe how economists view health and how markets for health and health services differ from other goods. This course will discuss the theoretical and empirical aspects of key health economics issues, including the demand for health and health services, supply side concerns, health insurance, the provision of public goods, and related topics. This course will help understand and apply key economic concepts including efficiency, asymmetric information, agency, moral hazard, and adverse selection to real world problems for child health leaders.

GCH8152 Introduction to Health Systems and Policy 3 credits

This course will introduce how health systems science can be applied to drive evidence-based and sustainable improvements in global health and quality care. Course materials will present core concepts and conceptual frameworks used to describe health systems and systems strengthening, illustrate when and how policy analysis and systems thinking can be incorporated for maximal impact, and introduce principles and applications of health systems and policy research. Students will have the opportunity to consider how health systems science can inform policy and priority-setting. Applying systems thinking, students will articulate a local or regional health systems challenge impacting child health, and design and communicate potential strategies to address this challenge considering key stakeholders and the systems context.

GCH8211 Political Economy of Global Child Health 3 credits

This course presents theoretical and historical approaches, empirical cases, and research issues in political economy of global health, that influence health of children. It will help students examine the role and interaction of different stakeholders and provide tools to perform stakeholder analysis. This course also provides strategic skills and lessons for future leaders to influence the health policy process and how that is shaped by interest groups, media, public opinion, coalition building, policy legacies, institutions, and the politics of information. Students will learn to examine the implications for children with childhood cancers and other catastrophic diseases and how political economy can inform strategies moving forward.

GCH8221 Organizational Leadership 1.5 credits

This course is designed to provide the knowledge, skills, and mindset, applied to create organizational change and systemic transformation with the explicit goal of improving child health. It underscores importance of systems thinking as an effective approach to understand complex adaptive systems and build effective organizations and teams that will drive productive behavior, leading to a more effective realization of the individual and organizational purpose. This course integrates critical thinking and multidisciplinary approaches including evidence- based health communication strategies to inform and influence decisions and actions to improve child health.

This course builds on the leadership and communication training imparted in the non-credit bearing workshops and seminars in the intersessions.

GCH8231 Thesis Seminar 1.5 credits

This Thesis Seminar is offered in the fall semester of the second year of the program. It is designed to assist students in synthesizing competencies, skills and knowledge acquired in the MSc Program and comprehensively apply to real world challenges. This course will equip students with guidelines and administrative processes necessary to develop and execute their thesis. The goal of the Thesis Seminar is for participants to hone the skills and judgments necessary to identify significant and empirically feasible research questions, develop appropriate research/project designs to address those questions, complete independent research to bring evidence to bear on those questions, and write-up the research/project proposal under the supervision of the Thesis Committee selected by each student. The instructors will discuss in detail each master thesis/project idea in order to identify possibilities for improvement and fine-tuning. The seminar will also foster collaboration and mutual support among the students.

GCH8242 Strategic Management of Child Health Programs 3 credits

This course will provide an overview of key concepts and tools in strategic planning and management that students will be able to draw upon throughout their careers. Topics will include competitive analysis, organizational culture, formulation and implementation of strategies, and strategic measurement and management of organizational performance. Students will learn strategies to lead and manage change while scaling up and handling disruptions. This course will include cases that will represent a diverse cross-section of health care organizations, ranging from academic medical centers to government-owned hospitals, as well as ministries of health to non-governmental organizations (NGOs) to private health care corporations, both US and global organizations that provide child health care.

GCH8262 Child Health and Health Systems Innovation 3 credits

This course will discuss the importance of innovation in health systems strengthening and new ways of thinking and organizing people, processes, and resources to make this happen. The focus will not be limited to new medicines, diagnostics, health technologies or product innovation and will extend to new ideas, practices, institutional arrangements health policies, systems and delivery methods that improve efficiency, effectiveness, quality, sustainability, safety and/or affordability within the health systems context. Students will learn how combining technological innovations with other innovations in health systems (such as innovative approaches to governance, financing, service delivery, awareness creation and health seeking behavior changes) enables effective adoption of innovations for enhancement of child health and specifically to treatment and care of childhood cancers and other catastrophic illnesses.

GCH8282 Thesis Practicum 1.5 credits

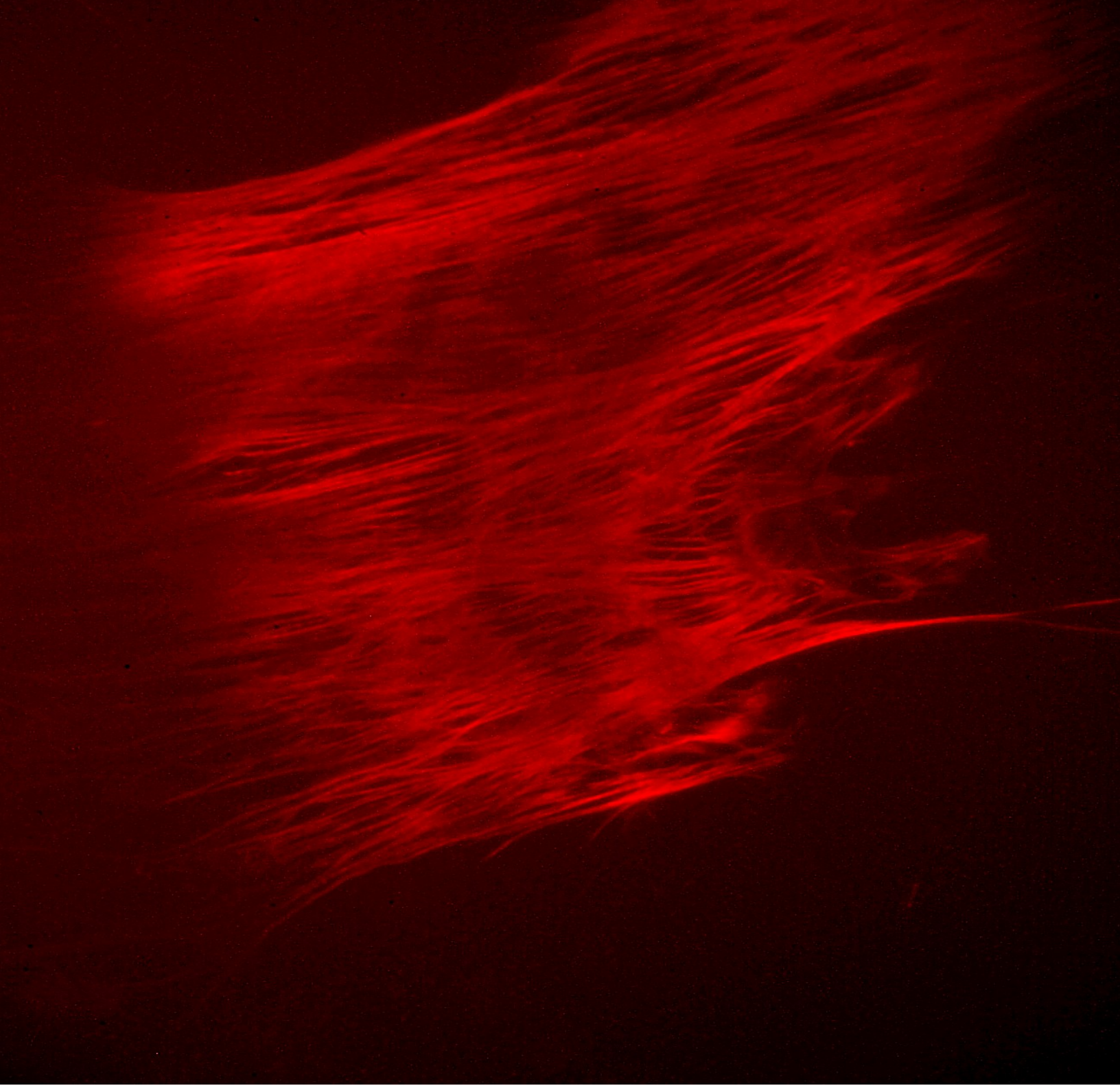
This Thesis Practicum is offered in the Spring Semester of the second year of the program. In the course, the students will apply the theoretical concepts and methods and build on the conceptual framework developed in the Thesis Seminar in the Fall Semester. This course is designed to equip the students with skills and tools for planning and managing their projects around the core idea/topic related to child health that they intend to address. Students will conduct background research and apply analytical thinking to inform their approach, implementation strategy and project plans. They will conduct a thorough stakeholder analysis and complete the project plan necessary to execute their thesis and postgraduate Capstone, under the supervision of individual Thesis Advisory Committees and guidance from instructors. They will continue to advance professional skills and knowledge from others including practicum instructors, experienced practitioners, and other students.

ORN8000 New Student Orientation 0 credits

The new student orientation course is designed to assist new students in their academic and social preparation for success in the graduate program. This course will assist in the completion of all materials, the student's adjustment to the St. Jude campus and resources, and the faculty members and their research.

RMD8000 Research Methods 0 credits

This introductory course covers fundamental techniques, supporting concepts, and data analysis. This course aims to provide students with practical knowledge and experience with some of the most common experiential methods used



262 Danny Thomas Place, MS 1500
Memphis, TN 38105-3678
Phone (901) 595-1500
sjgradschool@stjude.org

www.stjude.org/graduate-school

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