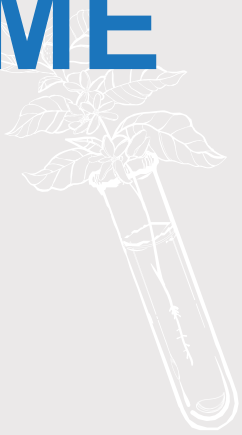
NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

School of Biological Sciences

GRADUATE PROGRAMME

(BY RESEARCH)



www.sbs.ntu.edu.sg

SCHOOL OF
BIOLOGICAL SCIENCES

The School of Biological Sciences (SBS), which belongs to the College of Science, was established in 2001 with the mission to make strong contributions in research and education in biological and biomedical sciences. Since then, many talented individuals including scientific leaders, researchers, postgraduate students from around the world and Singapore have joined the school.

SBS has developed state of the art research facilities and infrastructure. It collaborates with local and international research institutes, universities and hospitals, sharing a common goal to advance basic knowledge and translational application in biological and biomedical sciences.

OUR RESEARCH

The faculty and scientists at SBS are engaged in research in a wide range of topics across different fields. Some major areas are highlighted below.

Biological Data Sciences

We are interested in computational systems biology, starting from molecular dynamics to multi-omics data, to large scale evolution and adaptation in populations. We use integrated data science methods such as artificial intelligence, machine learning, computational modeling, as well as applied and theoretical biostatistics.

Cancer and Cell Biology

The SBS Cancer and Cell Biology research cluster contributes in enriching and advancing current knowledge in cells and their functions. We studied how dysregulated cellular functions lead to diseases, such as cancer. The cluster focuses mostly on signal transduction, gene regulation, cellular transport, cell division, cell migration, stem cell biology, cell physiology, cell metastasis, and cellular stress responses. Our multidisciplinary research team is supported by state-of-the-art facilities including super resolution microscopy, correlation light-electron microscopy, light sheet microscopy, total internal reflection fluorescence microscope, and multi-laser cell sorting.

Gene, Genetics and Genomics

We work on central dogma of life in eukaryotes at different levels ranging from chromatin to transcription to RNA processing to translation, and their (de)regulation that causes human disease.

Microbiology and Immunology

Microbiology and Immunology research at SBS encompasses the study of clinically and veterinary important pathogenic microbes ranging from viruses and bacteria, to eukaryotic parasites. We examine antimicrobial resistance, bacterial biofilms, microbiomes, genomic epidemiology, and host-pathogen interactions. From the host perspective, we study immune cell development and function, innate and adaptive immunity, pathogen recognition and immune evasion, and inflammation. Our research contributes to worldwide efforts to mitigate infectious diseases, focusing on the development of chemotherapies, vaccines, and diagnostics.

Neuroscience

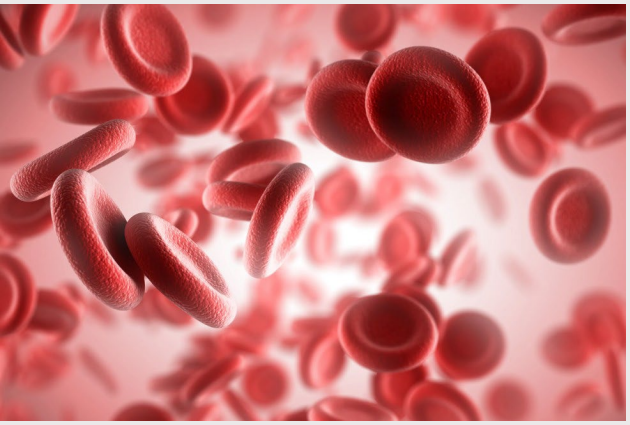
The 21st century is often called the century of the brain. Not surprisingly, research in neurobiology (biology of the brain) flourishes all over the world. Scientists at the NTU neuroscience cluster study the complexity of the brain and behaviour at multi-levels. We work on a wide range of topics including behaviour, learning, memory, neuropsychiatric disease models, brain structure function, proteins & molecules, stem resilience, and dementia.

Plant Biology

Our plant research cluster studies how the plant ecosystem senses, utilizes, and produces various biotic and abiotic molecules. Plants sequester a significant amount of the world's carbon dioxide, feed us and comprise a crucial part of terrestrial ecosystems that convert carbon dioxide to valuable commodities such as fatty acids and high-value metabolites. Being sessile, plants need to integrate environmental cues and respond adequately using regulated processes such as plant immunity and mechanobiology. Together, we are trying to address urgent global problems in sustainability, agriculture, food security, and human health. By studying membrane-bound and membrane-less compartmentalization, we are also exploring new avenues in fundamental and applied plant science. To achieve these goals, we integrate diverse approaches such as population and evolutionary biology, integrated omics and computational biology, advanced cell biology, and biochemistry. We are enthusiastic about both model and non-model organisms in plant biology and aim to take advantage of the enormous plant biodiversity in Singapore.

Proteomics and Protein Chemistry

Proteins are essential for virtually every biological process that takes place in living creatures, from the capture of solar energy and environmental sensing, to immune protection against pathogens and even cognitive function of the brain. Reflecting this wide range of functions, proteins display amazing complexity beyond their basic amino acid sequences, featuring highly variable 3D conformations and posttranslational modifications (PTMs) that radically alter both structure and function. Accordingly, disruption of normal protein folding, PTMs profiles, or degradation pathways can generate dysfunctional molecules that impair cellular activity, cause disease and may even become infectious agent. In the proteomics and protein chemistry research framework, we work on several key research questions including how protein complexes concentrate carbon dioxide to improve the efficiency of photosynthesis; how antibacterial peptides protect us against infectious diseases; how protein phosphorylation events regulate cell signaling cascades; and how the formation of brain protein aggregates lead to neurodegenerative disorders. We are also applying discovery-driven proteomic approaches to uncover novel mechanisms of diseases in a range of other human pathologies that conventional methods have so far been unable to unravel.

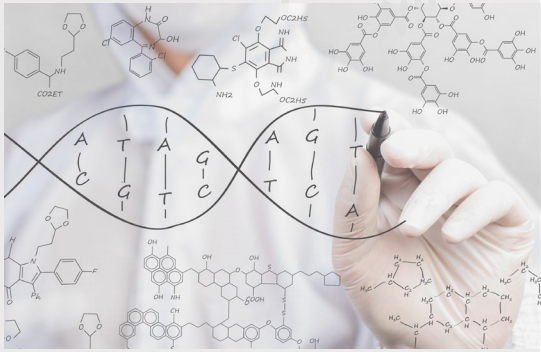


Structural Biology & Drug Discovery

We use a myriad of approaches and technologies in structural biology and biophysics to decipher the relationship between structure and function of biological macromolecules. The technologies include X-ray crystallography, NMR spectroscopy, cryo-electron microscopy as well as biophysical techniques such as circular dichroism, surface plasmon resonance, infrared spectroscopy, calorimetry, fluorescence spectroscopy and analytical ultracentrifugation. The scientists in this cluster work to address fundamental questions in biology and also to discover lead compounds for structure-based drug design.

Traditional Chinese and Tropical Medicine

We use evidence-based approaches to understand the underlying mechanisms of how Chinese and tropical medicine work. Different formulations of medicine are tested and evaluated for efficacy. Projects in drug discovery and genomics of tropical herbs are actively pursued by our research teams. Clinical collaborations are done with the physicians at the NTU Chinese Medicine Clinic associated with our school.



Find out more about our research groups

ALUMNI
TESTIMONIALS

> *The skills and knowledge obtained and the chance to interact with researchers and industry personnel in the field, aided in my path to be an entrepreneur.*

TAN MING JIE

M.Sc. Biological Sciences, 2015

" Never did I expect this exciting chapter of my life would unfold during the pursuit of my Master studies at SBS, where a partnership with several like-minded friends (Dr. Kelvin Chong and Mr. Daniel Tan) led to a start-up company – Denova Sciences. My decision to undertake SBS's part-time Master of Science programme was mainly influenced by NTU's growing international reputation as well as the vibrant, conducive learning and teaching environment at SBS. Flexibility in the programme allowed me to choose my area of interest – skin biology, which played an important factor for my spin-off company in providing rigorous product testing and development using our proprietary in-vitro human skin models. In retrospect, my stint at SBS honed my abilities in problem solving and boosting my confidence exponentially. The skills and knowledge obtained and the chance to interact with researchers and industry personnel in the field, aided in my path to be an entrepreneur. "

> *I was able to seamlessly integrate and begin my new research project thanks to the experience and exposure I obtained throughout my years at SBS.*

ASSOCIATE PROFESSOR WU BIN

Ph.D, Biological Sciences, 2010

" Looking back at my days in SBS, I am very grateful that I made the right decision to continue my Masters and Doctorate at SBS. The world-class faculty members are exciting and energetic combined with the enriching atmosphere of openness gave a unique research synergy within NTU. As a PhD student, I received good guidance from my direct supervisor and many esteemed Professors and mentors in interdisciplinary fields. The accumulation of trainings and opportunities I gained proved to be critical in my success as a researcher. This was apparent when I started my post-doctorate research at Harvard Medical School in Boston. I was able to seamlessly integrate and begin my new research project thanks to the experience and exposure I obtained throughout my years at SBS. I must say, the international community, well-equipped technology and most importantly the company of passionate scientists played an instrumental role in my journey as a researcher. "

GENERAL
ADMISSION REQUIREMENTS

- A good B.Sc. (Hons) degree or equivalent, and the ability to pursue research in the candidate's proposed field of advanced study.
- Good TOEFL or IELTS (for international applicants whose native language is not English).

FULL-TIME CANDIDATURE

PROGRAMMES	MINIMUM	MAXIMUM
Doctor of Philosophy	2 years	5 years
Master of Science	1 year	3 years

PART-TIME CANDIDATURE

PROGRAMMES	MINIMUM	MAXIMUM
Doctor of Philosophy	3 years	5 years
Master of Science	1 year	3 years

INTAKE

Admission is in August and January each year.
Please submit your application before the deadline for each intake.

Deadline for August Intake is 31st January
Deadline for January intake is 31st July.

Apply for admission HERE

" Inspiring dreams, developing skills and confidence, celebrating talents and passions, touching lives and engaging excellence as we together discover science and achieve goals and ambitions – this is the College of Science! "

GRADUATE
COURSEWORK

Graduate coursework forms the basis of the intensive preparation for research work. Students are required to attend classes and pass the examinations in a certain number of graduate courses.

Selection of courses is made after consultation with the research supervisor.

The Academic Unit (AU) requirements for the degrees are as follows:

- M.Sc. - 9 AUs
- Ph.D. - 12 AUs

Exemption of courses may be granted by the Chair of the School if the candidate is deemed to have already done sufficient coursework in relevant areas in a Master's degree program at a recognized university.

THESIS
SUBMISSION

Students are required to submit a thesis in a form ready and acceptable for examination before the expiry of their maximum candidature.

For M.Sc. - Oral defense of the thesis may not be required.
For Ph.D. - An open seminar and oral defense of the thesis are necessary.

TRANSFERABLE *SKILLS PROGRAMME*

At the School of Biological Sciences (SBS) we believe that apart from research and intellectual skills, interpersonal skills, communication skills and other professional skills and attributes are also integral to post-graduate training. The Transferable Skills Programme aims to impart our students with soft skills that are relevant to both research and other career options beyond their stint at NTU.

College of Science's Transferable Skills Programme

1. CoS Research Integrity Workshop (core, half annually in October)
2. CoS Diversity Workshop (optional, half annually in January)

Graduate College's Transferable Skills Series

1. Research Communication Course
2. 3-Minute Thesis (3MT)

FREQUENTLY ASKED *QUESTIONS (FAQ):*

How many courses am I required to take?

You need to fulfil 9 or 12 coursework Academic Units (AUs) for M.Sc. or Ph.D., respectively. As most of the courses offered are 3 AUs, you are required to take 3 courses for the M.Sc. programme or 4 courses for the Ph.D. programme.

Can I go through a lab rotation programme before making a final decision on the lab to conduct my research?

We do not offer lab rotation because the duration of Ph.D. scholarship support is only 4 years. We highly encourage our new graduate students to meet and discuss with SBS faculty members before formalizing the mentorship. Students may formalize their lab of choice within the first month of the graduate programme.

Do I need to identify a laboratory and/or a specific research project before applying to the Ph.D. programme?

No, there is no need to identify a supervisor or project before applying. Applicants are encouraged to look at our website to find out more about the research done at our school. In general, the scholarships are offered to the candidates. They may select their supervisors/labs based on their research interest. The school will consider the availability of positions in the labs and the funding situation of the supervisors before giving the final approval.

Am I required to teach during the graduate programme?

Yes. Participation as teaching assistant is part of the training for our graduate students. Therefore, there is a minimum number of teaching hours that must be fulfiled by all graduate students.

Would I be offered housing on NTU campus?

NTU offers student housing on campus. You can find more information HERE.

SCHOOL OF BIOLOGICAL SCIENCES

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Information in the brochure is correct as of 16 May 2025