



**NANYANG
TECHNOLOGICAL
UNIVERSITY**
SINGAPORE

School of Biological Sciences
College of Science

SCHOOL OF **BIOLOGICAL SCIENCES**

SCHOOL OF THE
COLLEGE OF SCIENCE

UNDERGRADUATE BROCHURE





Welcome to the School of Biological Sciences (SBS)

Since the establishment of SBS in 2002, we have always focused on equipping students with the skills and knowledge essential for today's global environment. The development of technology enabled learning platforms linked to outcome-based learning objectives enabled our courses to provide students with continuous access to the subject content. This not only created a more interactive classroom environment for students, but also provides an avenue for them to develop creative skills in applying their knowledge, essential for future work environment.

Over the years, the School has been constantly taking efforts to ensure our curriculum remains relevant for our students through the establishment of joint programmes in psychology, food science and technology, biomedical structural biology and biobusiness. This year, we are pleased to share that we will be launching the NTU-Duke-NUS Medicine Pathway for students admitted to our double major programmes. Successful students will be provided an avenue to develop their entrepreneurial aspirations in the medical field through a myriad of engagement activities designed to provide insights into the medical school experience and a career in medicine.

Our students will also have the opportunity to understand the unique requirements of being successful in an industrial setting through our compulsory internship programme. They will also have the opportunity to get a first glimpse of cutting edge research through our research attachment and final-year projects, which will equip them with the essential skills in teamwork and problem solving.

Last but not least, the rich mix of culture and nationalities among our professors and students, our varied opportunities for overseas study, and our partnerships with renowned institutes worldwide, will provide a global perspective on science and industry for our students.

So I look forward to having you join our SBS family, as you embark on an exciting learning journey with us. I believe this will be the best decision made as you will be well equipped and prepared with the essential skills and knowledge to face the imminent challenges in the working world without compromising on an exuberant student life.

Prof Lars Nordenskiöld
Chair, School of Biological Sciences

WHY CHOOSE SBS?

Progressive and Relevant Curriculum

Students are well prepared to adapt to the rapidly changing yet competitive life sciences environment and real world challenges in the 5 to 10 years ahead. The availability of a wide range of interdisciplinary modules, partnerships with various schools around the world to offer niche programmes equips students with specialized knowledge in their area of interest.

Studying in SBS also provides a head start for a career in bio-data science as students will be taught essential data science skills, allowing them to be well equipped with the right skills in this digital age.

Global Exposure

Students have the opportunity to go for overseas exchange at various partner universities in countries such as the United States of America, Sweden, United Kingdom, South Korea, Japan and Canada.

Guaranteed Industrial Internship

Implementation of compulsory internship in their third year of study coupled with strong industry partnerships, enables students to intern at organizations such as Tan Tock Seng Hospital, KK Women's & Children Hospital, Singapore General Hospital, Lonza, Merck and Baxter, amongst others, which enables them to obtain first-hand experience in the real world, giving them a competitive edge as they enter the workforce.

Extensive Research Experience

SBS has a community of international professors who not only come from renowned universities such as Cambridge, Oxford, Stanford and Harvard but are also research-active faculty working on problems that impact Singapore and the World. Our students will also be provided a unique opportunity to experience what research encompasses and advance their skill sets in specific areas of biology through innovative courses.

Vibrant Student Life

The Biological Sciences Club is a student-run club that brings the SBS community through a variety of welfare and campus events throughout the year. Alumni-student sharing events are also organized during term time where students get to interact and gain insight into various industries.



School of Biological Sciences

OUR DEGREES AT A GLANCE

B.SC. (HONS) IN BIOLOGICAL SCIENCES

- An established and recognised direct honours Biological Sciences degree programme
- Option for international exchange with over 150 partner universities
- Compulsory Internship
- Option to take up a final year project
- Option to take a minor in any discipline

SECOND MAJOR B.SC. (HONS) IN BIOLOGICAL SCIENCES WITH SECOND MAJOR IN BIOMEDICAL STRUCTURAL BIOLOGY

- Cross-trained in Biology and Structural Biology including Medicinal Chemistry and Biotechnological aspects
- Enhanced working opportunities in areas such as drug discovery, protein engineering and vaccine design

SECOND MAJOR B.SC. (HONS) IN BIOLOGICAL SCIENCES WITH SECOND MAJOR IN FOOD SCIENCE AND TECHNOLOGY

- Interdisciplinary curriculum content that combines Biological Sciences with Food Science, Processing and Engineering

**Conducted in partnership with Wageningen University, the best university in the Netherlands*

DOUBLE MAJOR B.SC. (HONS) IN BIOLOGICAL SCIENCES AND PSYCHOLOGY

- A unique programme that combines Biological Sciences with fields of Psychology such as human memory, motivation and cognitive development
- This is a single degree programme which requires students to satisfy the requirements for both major disciplines

*^Eligible for NTU-Duke-NUS Medicine Pathway *NEW**

SECOND MAJOR B.SC. (HONS) IN BIOLOGICAL SCIENCES WITH SECOND MAJOR IN MEDICINAL CHEMISTRY AND PHARMACOLOGY

- Cross-trained in Biological Sciences and Chemistry
- Selected modules taught by Division of Chemistry and Biological Chemistry, School of Physical and Mathematical Sciences, Nanyang Technological University

DOUBLE MAJOR B.SC. (HONS) IN BIOMEDICAL SCIENCES AND BIOBUSINESS

- Cross-trained in biomedical sciences, biotechnology and business management with relevance to the biomedical, healthcare sector in Singapore and Southeast Asia, including biomedical manufacturing operations management and regulatory matters
- This is a single degree programme which requires students to satisfy the requirements for both major disciplines

**Conducted in collaboration with Copenhagen Business School, Denmark and Nanyang Business School, Nanyang Technological University*

*^Eligible for NTU-Duke-NUS Medicine Pathway *NEW**

DOUBLE DEGREE B.SC. (HONS) IN BIOMEDICAL SCIENCES AND B.MED. IN CHINESE MEDICINE

- This innovative 'East meets West' programme trains students in biomedical research and Chinese Medicine
- 3 years in Nanyang Technological University, Singapore and 2 years at the Beijing University of Chinese Medicine

INTERNSHIP

The implementation of compulsory internship in their 3rd year of study (for students joining the School from AY2018 onwards) provides an avenue for students to experience working in an industrial and professional setting as well as hone their career-enhancing skills. Students may select internship placement from the list provided by NTU Career Office (CAO) or self-source their own internship. Having interned at a specific organization also offers students the opportunity to take up available positions directly after graduation.

These are a list of organizations that our students have interned at:

- Abbott Nutrition Research and Development
- AbbVie Operations Singapore Pte Ltd
- Accelerate Technologies (f.k.a Exploit Technologies Pte Ltd)
- Achievers Dream Learning Centre Pte Ltd
- Agency for Integrated Care Pte Ltd
- AGrader Learning Centre (AGrader LC)
- AgriProtein Singapore Pte Ltd
- Archisen Pte Ltd
- Ascend International Training Pte Ltd
- Changi General Hospital Pte Ltd
- Compass Foods Pte Ltd
- Conservation International Singapore
- Corning Singapore Holdings Pte Ltd
- Davos Life Science Pte Ltd
- DoctorxDentist Pte Ltd
- DSM Nutritional Products Asia Pacific
- Ecoponics
- Eurofins Mechem Pte. Ltd.
- Expressions Pte Ltd
- Firmenich Asia Pte Ltd
- Flowcast Pte. Ltd.
- Genecet Biotechnologies Private Limited
- Genome Institute of Singapore
- Grasshopper Pte Ltd
- Health Promotion Board
- Hummingbird Bioscience Pte Ltd
- Iqvia Solutions Asia Pte. Ltd
- KaVo Dental Asia Pacific Pte Ltd
- Khoo Teck Puat Hospital
- Kruger Engineering Pte Ltd
- Learning Smart
- Lonza Biologics Tuas Pte Ltd
- Mandai Park Development Pte Ltd
- Mead Johnson Nutrition (Asia Pacific) Pte Ltd
- Ministry of Home Affairs (HQ)
- My Gym Singapore Pte. Ltd.
- National Cancer Centre Singapore
- National Neuroscience Institute
- National Parks Board
- National University of Singapore, Department of Surgery
- National University Polyclinics
- Nestle R&D Center (Pte) Ltd
- Ngee Ann Polytechnic
- OCBC Bank
- Orchid Medical Pte Ltd
- Pacific Private Limited
- Prestige BioPharma Pte Ltd
- Roquette Asia Pacific Pte Ltd
- Science Centre Singapore
- ScienTec Consulting Pte Ltd
- Sentosa Development Corporation
- Singapore Eye Research Institute
- Singapore General Hospital
- Singapore Health Services Pte Ltd (SingHealth)
- Singapore Institute of Manufacturing Technology, A*STAR
- Smartfuture Pte Ltd
- St. Luke `s Hospital
- Star Array Pte Ltd
- Temasek Lifesciences Accelerator Pte. Ltd.
- Tessa Therapeutics Pte Ltd
- Times Publishing Limited
- TÜV SÜD PSB Pte. Ltd.
- Udders Pte Ltd
- Wildlife Reserves Singapore
- Young Nautilus



INTERNATIONAL EXCHANGE

Seow Wan Xuan

2016 Exchange at Technical University of Denmark, Copenhagen, Denmark

"An exchange in Copenhagen, Denmark opened my eyes to the raw beauty and majesty of Europe or more specifically the Nordic region. This exchange has equipped me with essential skills and the necessary networks, which I feel will allow me to benefit the future Singapore and the future Me."



Kong Ze Qing

2017 Exchange at University of Leeds, United Kingdom

"Fascinating, inspirational, and eye-opening experience filled with spontaneous fun and excitement. I had the opportunity to share Singapore's multi-cultural, racial, religious society to my exchange friends, who were surprised when they heard of the existence of such a dynamic profile in the world."



Shereen Tan Ming Yan
2016 Exchange at University of Western Ontario, Canada

"I really love this slow paced country and their awesome citizens!"



Lian Yun Yu

2017 Exchange at UMEA University, Sweden

"It was the best 6 months of my life. I got to experience different cultures, people and education system. I learnt to plan trips and take charge of the experiences I wanted to have."



Yang Ming

2016 Exchange at Ludwig Maximilian University of Munich, Germany

"A semester exchange in Munich, Germany gave me a chance to merge into European culture and lifestyles. Life in Munich was calm and peaceful, but at the same time, exciting and adventurous. Dunkelbier and Brezels are two things you just cannot miss out in Munich! (They still appear in my dreams!)"



Ng Aik Seng

2017 Exchange in Uppsala University, Sweden

"The initial daunting thoughts about leaving Singapore turned out to be an unforgettable experience for a university student, both for the learning process and broadening of horizons. Do not be afraid to take advantage of the unique opportunity you have, to learn from the locals or the friends you made during exchange!"





Marco Lizwan
2017 Summer Exchange at Linköping University,
Sweden

"Something I really enjoy about the summer exchange is definitely the chance to travel. But what's more important is the friendship made during the summer exchange. I met people across the world, built bonds with them and hey, I can travel to a few countries around the world having my accommodations settled."



Goh Sho Yee Carissa
2017 Exchange at Lund University,
Sweden

"Perhaps exchange is not only about what the host university teaches you in the curriculum, rather, it is what the world is going to teach you by taking you away from your comfort zone"



Jaelyn Ee Hui Ying
2016 Exchange at Tokyo Institute
of Technology, Japan

"The notion is called wabi-sabi life, like the cherry blossom, it is beautiful because of its impermanence. not in spite of it, more exquisite for the inevitability of loss. - Peggy Orenstein"



Ong Kai Xun
2017 Exchange at National Taiwan
University, Taiwan

"Taiwan is a fantastic country filled with rich Chinese heritage and offers excellent opportunities to experience both urban and rural life. Moreover, National Taiwan University has a beautiful campus, lecturers that are passionate in teaching and friendly classmate. It is a fun and fulfilling experience!"



Chu En Xian
2016 Exchange at Seoul National University,
South Korea

"What I love most about South Korea is its boundless beauty of nature, from its mountainous landscapes to the massive waterfalls: they were truly breathtaking."



Ong Pei Ning Jocelyn
2017 Exchange at Korea University,
South Korea

"Overall, it was a meaningful and memorable experience for me as it was my first time away from Singapore without my family and it was for almost 5 months."



Julianne Lee Siwen
2016 Exchange at Macquarie
University, Sydney, Australia

"No regrets in getting out of my own comfort zone to Australia, for a journey of self discovery, enriched learning and fun!"



CAREER OPTIONS

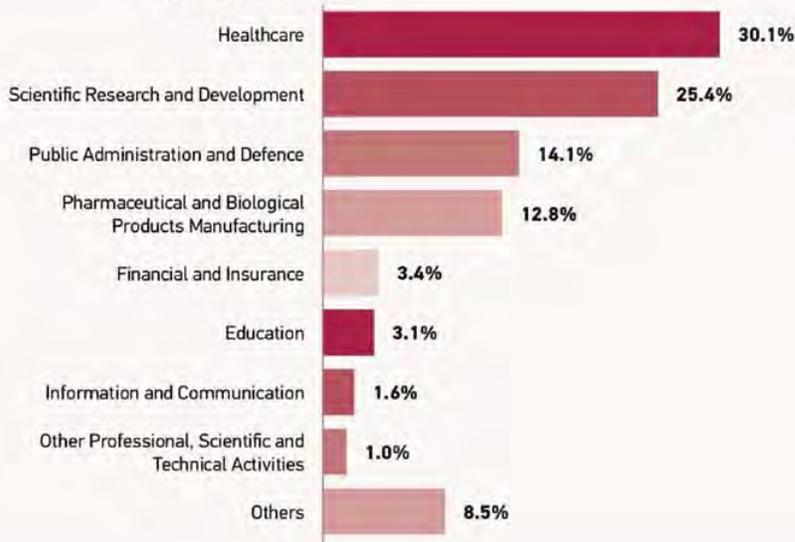


Graduates from SBS will have a good set of career options ahead. A career as a medical doctor or research scientist are popular routes of our graduates, amongst others.

The opportunities for our undergraduates in general, include careers outside of biology where transferable skills taught in the degree programme will be beneficial in management, financial sectors and human resources."

BIOLOGICAL SCIENCES

INDUSTRIES

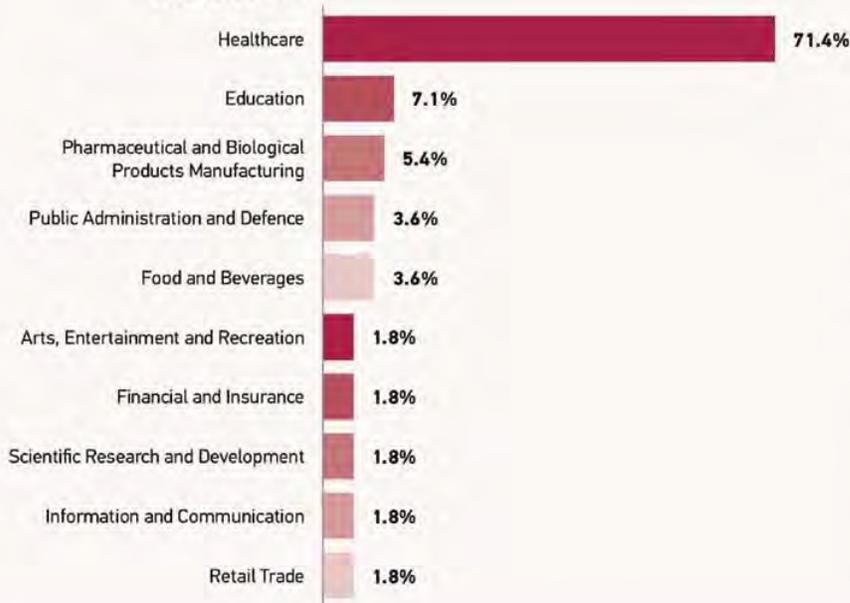


COMMON JOB TITLES

- Research Officer
- Medical and Pathology Laboratory Technician
- Management Executive
- Life Science Professional
- Administration Manager
- Business Development Executive
- Financial/Insurance Services Manager
- Health Services Manager
- Medical Scientist
- Operations Officer
- Quality Control/ Assurance Engineer

BIOMEDICAL SCIENCES

INDUSTRIES



COMMON JOB TITLES

- Physician/TCM Physician
- Clinical Research Coordinator
- Resident Physician
- Research Assistant
- Senior Executive
- Assistant Physician
- Medical Executive
- Management Executive

The data was compiled based on the Graduate Employment Survey from 2016, 2017 and 2018.

CAREER SERVICES

CAREER EXPLORATION WITH ALUMNI

ALUMNI CAREER SHARING SERIES

Through the Alumni Career Sharing Series, our SBS undergraduates stay connected with their seniors who come back to campus as alumni guest speakers to share their career paths.



ALUMNI HAPPY HOUR & SOCIAL NETWORKING EVENTS

Various events such as the Alumni Happy Hour and other Alumni social networking events are organised to provide an avenue for the Alumni, Students and Faculty members to connect and learn from one another.



CAREER & ATTACHMENT OFFICE (CAO)

Working closely with CAO, the School has a dedicated Career Coach to guide students on your career journey through your 4 years here in SBS.

Career coaching offers an opportunity for students to clarify career options and identify their career goal. You can meet your Career Coach in a one-to-one 45-minute session to share your career concerns, challenges, or you may also request for a resume critique and a mock interview session.

You can find out more about CAO here: <http://www.ntu.edu.sg/cao/Pages/index.aspx>

CAO SERVICES

- 1** InterviewASSESSMENT are one of the Career breakout sessions made available as part of the Pre-Internship Career Workshop module, to help students participate in a mock-interview session to better prepare for their internship and full-time employment interview in future.
- 2** Seeking clarity on future career? Attend the Self-Assess WORKOUT to discover your career values, interest, personality skills and more. The 3-hour small classes, are designed to help you gain greater self-awareness and explore career options for a fulfilling and meaningful career.
- 3** Personalized 45 minutes one-to-one Career Coaching with Career Coach to explore your career options/ interests.
- 4** Quick tips on career matters but no appointment? Drop by for the 15 minutes drop in session.
- 5** Our students attend Professional Career Development courses and work closely with our School's Career Coach to chart their future careers.



VIBRANT STUDENT LIFE



SCHOOL OF BIOLOGICAL SCIENCES CLUB (BS CLUB)

The student-run School of Biological Sciences Student's Club (BS Club) is an active unit of the School working with the School Management to address issues concerning students, from academic matters to welfare matters and beyond, as well as enhancing their University's experience through the Club's activities.

The Club organizes various events such as Back to School Day to welcome students back to campus for a new semester; College of Science Day for greater engagement with the other College of Science students; Graduation Dinner & Dance for final year students; and also the Freshmen Orientation Camp to guide new students to campus resources. All students have the opportunity to contribute ideas, time, and energy to the Club and other SBS events, making the NTU experience more than just about academics!



UNDERGRADUATE ADVANCED EXPERIMENTAL BIOLOGY (UAEB) WORKSHOPS

Our UAEB workshops provide an exciting taste of hands-on research. It is a unique opportunity to experience what research encompasses and to advance your skill sets in specific areas of biology. The one-week intensive, small class workshops held during vacation breaks are very much sought after by students.

3 EARN ACADEMIC UNITS (3 AUS)

Small class teaching, greater engagement between professor and students

3 Reasons why students can't wait to sign up for UAEB

- Get first-hand experience on research
- Take existing interests to new depths
- Develop new ideas and skills

13 UAEB across disciplines

- Applied Immunology
- Methods in Histology
- Neurobiology
- Proteomics
- Field Studies in Functional Plant Ecology
- Protein Behavior in Health and Disease - Biophysics Tools
- Effect of Anti-Mitotic Drugs on Cancer Cells
- Science of Aging and Life Extension in *C. elegans*
- Role of Actin Cytoskeleton Regulators in Metastasis
- Genetics of Human Diseases
- Introduction to R programming
- Macromolecular X-ray Crystallography
- Metabolomics and Lipidomics

TEACHING AND LEARNING RESOURCES OUTCOMES-BASED TEACHING AND LEARNING (OBTL)

“Outcomes-based Teaching and Learning (OBTL) is an approach to teaching and learning that focuses on first identifying the intended outcomes or goals of a module or programme and then aligning teaching, learning, and assessment to maximise the likelihood that students achieve those outcomes or goals.”

- Deneen, Brown, Bond, & Shroff, 2013



PROGRAMMES OFFERED



B.SC. (HONS) IN BIOLOGICAL SCIENCES

ABOUT THE COURSE

The study of biology is highly relevant to everyday life. At some point, we discovered that we are fascinated by living systems. As the knowledge base in the biological sciences grows exponentially and technology becomes ever more sophisticated, the ability to think broadly about biology and to apply your knowledge across boundaries of disciplines will inevitably become a very valuable and powerful asset both in the scientific environment and many walks of life.

This programme will prepare you for a variety of careers where you can make a difference in the world. Our mission is to enable you to reach your potential while celebrating the study of life. The curriculum covers specialized and advanced topics in stem cells, cancer biology and therapy, physiology, evolutionary biology, neurosciences, among others. Students are required to do a compulsory internship in the 3rd year of study and given the option to do a research project in their final year,

CURRICULUM FOR BIOLOGICAL SCIENCES

Year 1 Core Courses

- Introductory Biology[^]
- Biophysical Chemistry
- Organic Chemistry
- Biostatistics
- Biochemistry I
- Principles of Genetics
- Molecular and Cell Biology I
- Introduction to Computational Thinking
- Molecular and Cell Biology Techniques Level 1

Year 2 Core Courses

- Physiology
- Microbiology
- Biochemistry II
- Professional Career Development

Year 3 Core Courses

- Professional Internship

GER-Core Courses

- Sustainability: Seeing through the Haze[^]
- Kickstart your Career Success[^]
- Introduction to Data Science
- Scientific Communication I
- Scientific Communication II
- Ethics and Moral Reasoning[^]
- One Health
- Enterprise and Innovation[^]

[^] Online courses

*The above curriculum is based on a 4 year B.Sc. (Hons) in Biological Science programme.

CAREERS

Our students have been successful in a range of careers including healthcare, pharmaceutical and biologics manufacturing, forensic science, research in bioscience sectors, education, media and publishing. Many have gone on to further their studies taking on Masters and PhDs in prestigious universities globally.



Scan here for more

B.SC. (HONS) IN BIOLOGICAL SCIENCES WITH SECOND MAJOR IN BIOMEDICAL STRUCTURAL BIOLOGY

ABOUT THE COURSE

Structural biology has gained importance in the biomedical field, with an increasing impact on healthcare and medicine. Areas of study include structure-based discovery, structure-based vaccine design, structure-based design of biologics, structure-based design of novel biomaterials and structure-based design of protein engineering.

CAREERS

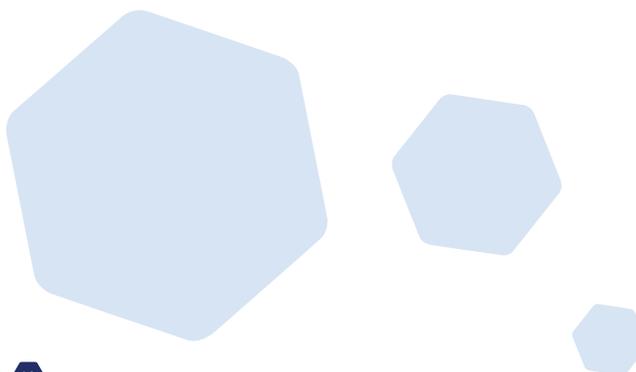
Graduates of this programme have enhanced career opportunities to work in pharmaceutical and biotechnology companies in the research and development of areas such as drug discovery, protein engineering and vaccine design.

Aside from the Biological Sciences course requirements, students will be required to learn:

- Basic Physical Chemistry with Laboratory
- Organic & Bioorganic Chemistry
- Physical and Biophysical Chemistry I
- Mathematics and Physics Topics for Structural Biologists
- NMR in Structural Biology
- Bioimaging Techniques in EM
- RNA Structured & RNA Based Drug Development

Select 3 from the following:

- Natural Product Chemistry
- Drug Design and Synthesis
- Spectroscopic Methods in Biomedical Structural Biology – Undergraduate Advanced Experimental Biology (UAEB) Workshop (Series I) – Macromolecular X-ray Crystallography
- Advanced Bioorganic Chemistry
- Medicinal Chemistry
- Molecular Modeling: Principle and Applications
- Molecular Basis of Diseases
- Computer Biology and Modelling
- Drug Discovery and Development, Biotechnology
- Natural products in Medicinal Chemistry
- Analytical & Manufacturing Techniques in Pharmaceutical Industry





Scan here for more

B.SC. (HONS) IN BIOLOGICAL SCIENCES WITH SECOND MAJOR IN MEDICINAL CHEMISTRY AND PHARMACOLOGY

ABOUT THE COURSE

Combining with the biological sciences programme and in partnership with the Division of Chemistry and Biological Chemistry, School of Physical and Mathematical Sciences at the Nanyang Technological University, enrolled students will be cross-trained in biological sciences and chemistry, building a relevant foundation to embark on research and development in the area of chemical biology.

CAREERS

Graduates are sought after by pharmaceutical and biotechnology companies due to the added edge of interdisciplinary knowledge.

Aside from the Biological Sciences course requirements, students will be required to learn:

- Basic Inorganic Chemistry with Laboratory
- Basic Physical Chemistry with Laboratory
- Organic & Bioorganic Chemistry
- Physical & Biophysical Chemistry I
- Organic Reaction Mechanisms and Synthesis

Select 5 of these electives:

- Chemistry and Biological Chemistry Laboratory 1 / 2 / 3 / 4
- Chemical Spectroscopy
- Current Topics in Synthetic Organic Chemistry
- Advanced Bioorganic Chemistry
- Medicinal Chemistry
- Food Chemistry & Nutrition
- Physical and Biophysical Chemistry 2
- Molecular Modelling: Principle and Applications
- Analytical and Bioanalytical Chemistry
- Metal Mediated Reactions
- Drug Design and Synthesis
- Heterocyclic Chemistry
- Pharmaceutical Chemistry
- Biomedical Imaging and Sensing
- Artificial Intelligence in Chemistry



Scan here for more

B.SC. (HONS) IN BIOLOGICAL SCIENCES WITH SECOND MAJOR IN FOOD SCIENCE AND TECHNOLOGY

ABOUT THE COURSE

This course is for students with an interest in biology and wish to gain further understanding on food processes through an engineering and industrial point of view.

CAREERS

Graduates have better career opportunities in food related industries and government agencies, such as food processing, food safety and packaging.

Aside from the Biological Sciences course requirements, students will be required to learn:

- Food Microbiology
- Food Chemistry
- Food Physics
- Food Process Engineering
- Quality Systems Operations

Select 5 of these electives:

- Biomedical Nanotechnology
- Bioseparations
- Bioanalytical Techniques
- Pharmacokinetics & Biopharmaceutics
- Food Analysis (with Laboratory)
- Food standards in Food Production and Trade
- Current Topics in Analytical Chemistry
- Plant Biology (with laboratory)
- Functional Genomics and Proteomics
- Food Industry Seminar Series
- Principles of Nutrition
- Plant Biotechnology



B.SC. (HONS) IN BIOLOGICAL SCIENCES AND PSYCHOLOGY

ABOUT THE COURSE

In collaboration with the School of Social Sciences, this highly interdisciplinary degree offers students the opportunity to specialize in two major academic disciplines from the two Schools. The programme equips students with the transferrable skills of a combined education for successful careers in the rapidly changing environment of the 21st century. In Singapore with its population encountering higher levels of stress, there is a growing emphasis on awareness of mental health and a demand for professionals with interdisciplinary training in Psychology.

As this programme offers more consistent depth in both disciplines, students who have a curiosity in areas such as human emotions, behaviours and thoughts can now adopt a more integrated approach towards its understanding.

Note: Students admitted to this course are eligible for the NTU-Duke-NUS Medicine Pathway.

CAREERS

Students can enter the field of research, teaching, healthcare management, human resource management, criminal rehabilitation. Research careers are even more wide-ranging, including contributing to government policy development (in areas such as healthy eating and exercise) or issues of importance for industry (improving work productivity, for example). Graduates from this programme can also explore further education leading to professions such as clinical psychologist and neuropsychologist.

Aside from the Biological Sciences major requirements, students will be required to learn:

- Introduction to Psychology
- Fundamentals of Social Science Research
- Research Design and Data Analysis in Psychology
- Biological Psychology
- Cognitive Psychology
- Abnormal Psychology

Select 12 Psychology Electives, for example:

- Developmental Psychology
- Social Psychology
- Personality and Individual Differences
- Learning and Behavioral Analysis
- Positive Psychology
- Engineering Psychology
- Applied Statistical Methods for Psychological Research
- Evolutionary Psychology
- Alcohol, Drugs and Behavior
- Qualitative Methods in Psychology
- Applied Multivariate Methods for Psychological Research
- Clinical Psychology



B.SC. (HONS) IN BIOMEDICAL SCIENCES AND BIOBUSINESS

ABOUT THE COURSE

In collaboration with the Copenhagen Business School (CBS) and Nanyang Business School, students will be provided a unique opportunity to be cross-trained in biomedical sciences/biotechnology and business management with relevance to the biomedical and healthcare sector in Singapore and Southeast Asia. This includes biomedical manufacturing operations management and regulatory matters relating to biomedical and healthcare industry.

Immersion components are further included as an integral structure of this programme where the foundational knowledge and skills will be strengthened through professional internship in various business departments at multinational pharmaceutical, biotechnology and medical technology companies and local healthcare institutions. Students will spend their Year 4 Semester 1 in CBS for their biobusiness coursework, which will require them to bring their observations during the immersion experience into their coursework discussion. Students will then close the learning loop through a final year project in the final semester where they can fully explore and synthesize the theoretical knowledge and internship experience in a biobusiness-related project, or participate in laboratory based biomedical science research prior to understanding the relevance of research and development for bio-products in the industry.

Note: Students admitted to this course are eligible for the NTU-Duke-NUS Medicine Pathway.

CAREERS

Graduates from this programme are expected to have good employment prospects in the growing biomedical

and healthcare sector in executive, management and entrepreneurial roles.

Biomedical Sciences major requirements

- Biophysical Chemistry
- Biochemistry I
- Principles of Genetics
- Molecular and Cell Biology I
- Molecular and Cell Biology Techniques Level 1
- Computational Thinking
- Biochemistry II
- Molecular and Cell Biology Techniques Level 2
- Fundamentals of Immunology (TBC)
- Genetics and Genomics
- Drug Discovery and Development, Biotechnology
- RNA Structure and RNA-based Drug Development

Biobusiness major requirements

- Understanding Singapore Healthcare System
- Regulatory Control of Healthcare Products and Medical Devices
- Good Manufacturing Practice and Sterilisation for Medical Devices
- Bioentrepreneurship
- Intellectual Property Rights (Online)
- Introduction to Biobusiness
- Innovation, Entrepreneurship and Strategy in BioBusiness
- Bio Markets and Contracts
- Finance and Accounting in BioBusiness
- BioBusiness Immersion (10 weeks)
- BBIP Entrepreneurship Project

Select 2 of these electives:

- Digital Healthcare
- Biomaterial and Applications
- Pharmaceutical Engineering
- Process Monitoring, Automation and Control



NTU-DUKE-NUS MEDICINE PATHWAY*NEW*

The NTU-Duke-NUS Medicine Pathway provides motivated individuals the opportunity to develop their entrepreneurial aspirations in the medical field through a myriad of engagement activities. Through the stimulating and challenging curriculum devised by the School of Biological Sciences, graduates will be well-trained to meet the demands of the biomedical and healthcare industries, ensuring that they maintain relevance in the industry.

Successful applicants will receive a conditional admission offer for the Doctor of Medicine (MD) programme at Duke-NUS Medical School.

PROGRAMME HIGHLIGHTS

As part of the core requirement, both double major programmes will be required to complete a Final Year Project related to their key discipline: Neuroscience & Psychology (for BSPY) and Business of Biomedical sector (for BSB). The former is often done in partnership with (but not limited to) the Institute of Mental Health and the latter with organisations in the Biomedical Sector.

Students can also expect to stay engaged with Duke-NUS through periodic meetings with Duke-NUS faculty on campus and invitations to activities designed to provide insights into the medical school experience and a career in medicine.

Coursework Requirements

- Final Year Project related to their respective programmes in Neuroscience & Psychology or Business in the Biomedical sector
- Duke-NUS Pre-medical Module (GMS1000)

Mentorship and Enrichment Activities

- Advising Sessions with Duke-NUS Medical School Faculty
- Duke-NUS Prehealth Experiential Programme
- Duke-NUS Medical Specialties Workshops
- Duke-NUS Alumni Clinical Observership
- Community Projects

ELIGIBLE UNDERGRADUATE COURSES

- B.Sc. (Hons) in Biological Sciences and Psychology
- B.Sc. (Hons) in Biomedical Sciences and BioBusiness

REQUIREMENTS FOR NTU-DUKE-NUS MEDICINE PATHWAY

Admission to the NTU-Duke-NUS Medicine Pathway is competitive and only Singapore Citizens or Singapore Permanent Residents (PR) may apply. The following will be considered in the selection process:

- Academic excellence and motivation to study in the indicated fields
- Records of experiences and activities
- Performance at interviews

Note: The admission process for the undergraduate programmes offered by NTU and the NTU-Duke-NUS Medicine Pathway are independent of each other. NTU SBS will be responsible for the selection process of their undergraduate students and also for the entire period that the students are in their course of study at NTU SBS. Duke-NUS will be responsible for the selection process of the conditional admissions and will continue to have engagement with the students prior to their graduation from NTU SBS, and also for the final admissions into the MD programme.



DOUBLE DEGREE IN BIOMEDICAL SCIENCES AND CHINESE MEDICINE

ABOUT THE COURSE

This unique five-year double degree programme is an amalgamation of the western approach to Biomedical Sciences with Traditional Chinese Medicine (TCM). The Bachelor of Science (Honours) in Biomedical Sciences is conferred by Nanyang Technological University (NTU), Singapore and the Bachelor of Medicine (Chinese Medicine) is conferred by the Beijing University of Chinese Medicine (BUCM). Year 1 to 3 of the double degree programme are taught at NTU, while year 4 and 5 are taught at BUCM in Beijing. This is a bilingual course with English and Mandarin as the medium of instruction.

**The Beijing University of Chinese Medicine is a prestigious university in China with traditional Chinese medicine (TCM) and Chinese materia medica as its leading subjects.*

YEAR 1 TO 3 AT NTU, SINGAPORE

YEAR 1

- Introductory Biology
- Organic Chemistry
- TCM in Ancient Chinese
- Anatomy
- Biochemistry I
- Principles of Genetics
- Molecular & Cell Biology I
- Molecular & Cell Biology Techniques Level 1
- Biostatistics
- Basics of TCM
- Biology and Society
- Introduction to Computational Thinking
- Sustainability: Seeing through the Haze ^

YEAR 2

- Physiology
- Microbiology
- Chinese Materia Medica
- TCM Diagnostics
- Emperor's Canon of Internal Medicine
- TCM Formulary
- Pathology
- TCM Internship I

- Ethics & Moral Reasoning
 - Scientific Communication I
 - Kickstart your Career Success
 - Introduction to Data Science
 - One Health
- (Optional) Overseas TCM Enrichment Programmes*

YEAR 3

- Plant Biology
- Treatise on Exogenous Febrile Diseases
- Acupuncture & Moxibustion
- Fundamentals of Immunology (TBC)
- Biomedical Pharmacology
- Synopsis of the Golden Chamber
- Seasonal Febrile Diseases
- TCM Internship II & III
- Enterprise and Innovation
- One Major PE
- Inter-semester – Final Year Project

YEAR 4 AND 5 AT BUCM, BEIJING

- Basics of Diagnostics
- Internal Medicine of TCM
- Orthopaedics, Traumatology of TCM
- Ophthalmology of TCM
- Otolaryngology of TCM
- Selected Literature in TCM

- Modern Internal Medicine
- Gynaecology of TCM
- External Medicine of TCM
- Paediatrics of TCM
- Dermatology of TCM
- TCM Tui-Na
- TCM Clinical Internship
- Oncology of TCM

CAREERS

Graduates of this double degree programme are well positioned to consider a wide range of career options, which includes:

- TCM (Employment as Chinese Medicine physician is subject to passing the Traditional Chinese Medicine Practitioner's Board Exam)
- Healthcare and Pharmaceutical Industries
- Bio-Botanical Products and Nutraceutical Industries
- Education and Public Sectors
- Bilateral Diplomats (Between China & Singapore)
- Further Education and/or Research

ADMISSION CRITERIA

Programmes	Minimum Subject Requirements	
Biological Sciences Biological Sciences with Second Major in Biomedical Structural Biology Biological Sciences with Second Major in Medicinal Chemistry and Pharmacology ¹ Biological Sciences with Minor in Business Double Major in Biomedical Sciences and BioBusiness	'A' Level and Polytechnic Applicants	At least H1/SL or equivalent pass in Mathematics and a good H2/HL/A Level or equivalent pass in Physics, Chemistry or Biology ¹ H2 Level pass in Chemistry
	International Baccalaureate Diploma Applicants	Mathematics at Standard Level and Physics/Chemistry/Biology at Higher Level ¹ Mathematics at Standard Level and Chemistry at Higher Level
	'A' Level and Polytechnic Applicants	At least H2 or equivalent pass in Mathematics and a H2 Level or equivalent pass in Physics, Chemistry or Biology OR At Least H1 or equivalent pass in Mathematics and two H2 Level or equivalent pass in Physics, Chemistry or Biology
	International Baccalaureate Diploma Applicants	Mathematics at Higher Level and Physics/Chemistry/Biology at Higher Level; OR Mathematics at Standard Level and any two Physics/Chemistry/Biology at Higher Level
Double Major in Biological Sciences and Psychology	'A' Level and Polytechnic Applicants	Good H1/SL or equivalent pass in Mathematics, good H2/HL/A Level or equivalent pass in Physics, Chemistry or Biology, and a good grade in General Paper or Knowledge & Inquiry
	International Baccalaureate Diploma Applicants	A good grade in Mathematics at Standard Level and, Physics/Chemistry/Biology at Higher Level AND a good grade in English at Standard Level
Biomedical Sciences/Chinese Medicine	'A' Level and Polytechnic Applicants	At least H1/SL or equivalent pass in Mathematics and a good H2/HL/A Level or equivalent pass in Physics, Chemistry or Biology PLUS at least an O Level/SL or equivalent pass in Chinese Language
	International Baccalaureate Diploma Applicants	Mathematics at Standard Level and Physics/Chemistry/Biology at Higher Level and Chinese at Standard Level



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EXEMPTIONS

A Level Subject	Exemptions	Criteria
H2 Biology	BS1001 Introductory Biology	Grade A
H2 Chemistry	BS1003 Organic Chemistry	Grade A
H3 Molecular Biology	BS1007 Molecular & Cell Biology I	Distinction or Merit
H3 Proteomics	BS1005 Biochemistry I	Distinction or Merit
Other H3 Subjects	Exemption will be granted on a case-by-case basis	Distinction or Merit

Exemptions for other qualifications, please refer to <http://sbs.ntu.edu.sg/prospective/undergraduate/BS/Pages/Exemptions.aspx>

SCHOLARSHIP

NTU offers a wide range of scholarship to students pursuing full-time undergraduate studies. Awarded based on academic merit and exceptional co-curricular records.

Some of the scholarships include:

- Nanyang Scholarship
- College Scholarship

Find out more at www.ntu.edu.sg/admissions

*Note:

For scholars taking the Double Degree Programme in Biomedical Sciences @ Chinese Medicine, the scholarship will only cover the first three years of study in NTU

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