

BIOLOGICAL SCIENCES WITH SECOND MAJOR IN BIOMEDICAL MATERIALS

- First in Singapore to offer this interdisciplinary programme, providing a comprehensive background in the biological science and engineering of biomedical materials for regenerative medicine, tissue engineering, drug delivery, among others
- Conducted in partnership with School of Materials Science and Engineering, NTU

ABOUT THE COURSE

Biomaterials science is a rapidly growing field. Biomedical materials have an enormous impact on healthcare throughout the world, and they will continue to be important in advancing patient care and in the medical industry. With the emergence of tissue engineering and regenerative medicine, it also means increasing opportunities for young scientists to work on new clinical treatments for injury and diseases. Students of this interdisciplinary programme will undergo training in biological sciences and biomedical materials areas such as Immunology, Physiology, Advanced Biomaterials and Nanomaterials.

REQUIREMENTS

Singapore-Cambridge GCE 'A' Level	
COLLEGE OF SCIENCE	MINIMUM SUBJECT REQUIREMENTS
Biological Sciences with a Second Major in Biomedical Materials	H1 Level pass in Mathematics ¹
	H2 Level pass in Chemistry/Biology ²
	H2 Level pass in Physics ³

¹ H2 Level pass in Physics is only applicable to applicants who have not read H2 Level Mathematics.

² Physics at Higher Level is only applicable to applicants who have not read Mathematics at Higher Level.

³ Physics at Senior High School Level is only applicable to applicants who have not read Mathematics at Senior High School Level.

WHAT YOU WILL LEARN

On top of the Biological Sciences course requirements, students will be required to learn:

- Materials Chemistry II
- Materials Science
- Thermodynamics of Materials
- Phase Transformation and Kinetics
- Metallic & Ceramic Materials
- Biomaterials
- Nanomaterials: Fundamentals and Application
- Advanced Biomaterials

Select 3 of these electives:

- Materials Physics
- Polymer and Composites
- Mechanical Behaviour of Materials
- Analysis of Materials
- Biomedical Devices
- Drug Delivery and Tissue Engineering

CAREERS

Equipped with the knowledge and skills set in programme, graduates can look forward to a Research and Development career in emerging areas such as regenerative medicine and tissue engineering, as well as in pharmaceutical industries.

CURRICULUM STRUCTURE

B.Sc in Biological Sciences with Second Major in Biomedical Materials

YEAR 1			AU
SEMESTER 1			
Core	BS1001	Introductory Biology	3
	BS1002	Biophysical Chemistry	3
	BS1003	Organic Chemistry	3
	BS1005	Biochemistry I	3
GER-Core	ML0001	Absolute Basics for Career [*]	1
GER-PE**	-	-	3
BSMT-Core	MS1015	Material Science	3
Total AUs			19

^{**}Students will be pre-registered with GER-PE-LA 'HE9091 Principles of Economics' (3AUs) in their first semester. Students may drop the pre-registered GER-PE-LA and register for other available GER-PE.

SEMESTER 2			
Core	BS1006	Principles of Genetics	3
	BS1007	Molecular & Cell Biology I	3
	BS1008	Biostatistics	3
	BS1100	Molecular and Cell Biology Techniques Level 1	3
GER-Core	GC0001	Introduction to Sustainability: Multidisciplinary Approaches and Solutions [*]	1
BSMT-Core	MS1014	Materials Chemistry II	3
GER-PE	-	-	3
Total AUs			19

YEAR 2			AU
SEMESTER 1			
Core	BS2001	Physiology	3
	BS2002	Microbiology	3
	BS2003	Biochemistry II	3
GER-Core	HW0128	Scientific Communication I	2
BSMT-Core	MS1016	Thermodynamics of Materials	3
GER-PE	-	ET0001	3
Total AUs			17

SEMESTER 2			
Core	BS2008	Experimental Molecular & Cell Biology	3
Major PE	-	(See Table A)	9
	HW0228	Scientific Communication II	2
GER-Core	HY0001	Ethics and Moral Reasoning [*]	1
GER-PE	-	-	3
Total AUs			18

YEAR 3			AU
SEMESTER 1			
Major PE	-	(See Table B)	9
GER-Core	BS0001	Biology & Society	3
BSMT-Core	MS2016	Phase Transformation and Kinetics	3
	MS3011	Metallic & Ceramic Materials	3
	MS4013	Biomaterials (MS2013 waived)	3
GER-Core	ML0002	Career Power Up!	1
Total AUs			22

Note: MS2013 which is the pre-requisite of MS4013 Biomaterials can be waived.

SEMESTER 2			
Major PE	-	(See Table C)	12
BSMT-PE	-	(See Table D)	9
GER-Core	ET0001	Entrepreneurship and Innovation*	1
Total AUs			22

YEAR 4

SEMESTER 1			
Major PE	-	(See Table B)	12
BSMT-Core	MS4014	Nanomaterials: fundamentals and applications	3
BSMT-Core	MS4610	Advanced biomaterials	3
Total AUs			18

SEMESTER 2			
Major PE	BS4020 / BS4222	Final Year Project / Industrial Internship	12
Total AUs			12

*Online courses

TABLE A		AUs
BS2004	Molecular and Cell Biology II	3
BS2007	Immunology	3
BS2009	Advanced Biochemistry	3
BS2010	Bioimaging	3
BS211S	Equations of Life	3
BS2012	Genetics and Genomics	3
BS2014	Microbial Biotechnology	3
BS3332^	Undergraduate Advanced Experimental Biology (JAEB) Workshop (Series I) – Methods in Histology 3	3
BS3335^	Undergraduate Advanced Experimental Biology (JAEB) Workshop (Series I) – Protein behavior in health and disease – Biophysical tools	3

TABLE B		AUs
BS3001	Neurobiology	3
BS3003	Developmental biology	3
BS3004	Cancer biology	3
BS3005	Advanced molecular genetics	3
BS3018	Plant Biology	3
BS3020	Plant Biotechnology	3
BS3021	Bioimaging Techniques in EM	3
BS3023	Regulatory Control of Healthcare Products and Medical Devices	3
BS3024	Human Evolution – from Genes to Health	3
BS3334	UAEB Workshop (Series II) - DNA engineering for Fluorescent In-situ Hybridization (FISH)	3

BS3338	UAEB Workshop (Series II) - Effect of anti-mitotic drugs on cancer cells	3
BS3342	UAEB Workshop (Series II) - Role of Actin cytoskeleton regulators in metastasis	3
BS3343	UAEB Workshop (Series II)-Genetics of Human Diseases	3
BS4001	Current topics in muscle biology & neuromuscular diseases	3
BS4004	Current topics in immunology	3
BS4006	Virology	3
BS4009	Biology of Aging	3
BS4010	Synthetic Biology	3
BS4011	Biology of Social Behavior	3
BS4012	Current Topics in Cancer Drug Discovery	3
BS4013	Physiological Systems: Animal Models for drug development	3
BS4014	Molecular Basis of Diseases	3
BS9001	Research Experience	3
BS2103^	TCM Diagnostics	6

TABLE C		AUs
BS0002	Environmental Microbiology	3
BS3006	Bioentrepreneurship	3
BS3008	Computational Biology & Modelling	3
BS3010	Current topics in stem cell and developmental biology	3
BS3011	Protein folding and biomolecular NMR	3
BS3012	Functional Genomics and Proteomics	3
BS3013	Drug discovery and development, biotechnology	3
BS3014	Biological foundations of behavior	3
BS3015	The RNA World	3
BS3017	Advanced Microbial Pathogenesis	3
BS3019	Neuropsychology of Stress and Resilience	3
BS3022	Protein Trafficking	3
BS3331^	Undergraduate Advanced Experimental Biology (JAEB) Workshop (Series I) – Applied Immunology	3
BS3336^	Undergraduate Advanced Experimental Biology (JAEB) Workshop (Series I) – Proteomics Workshop	3
BS3339^	Undergraduate Advanced Experimental Biology (JAEB) Workshop (Series I) – Neurobiology	3
BS3340^	Undergraduate Advanced Experimental Biology (JAEB) Workshop (Series I) – Science of Aging and Life Extension in C. Elegans	3
BS3341^	Undergraduate Advanced Experimental Biology (JAEB) Workshop (Series I) – Handling Stress and Resilience	3
BS1101^^	Basics of TCM	6

^ Major PE which is conducted during the 1-week term break or during the 2 weeks before the term starts.

^^ BS1101 and BS2103 are considered as ONE Major PE

TABLE D		AUs
MS1012	Materials Physics	3
MS2013	Polymer and composites	3
MS2015	Mechanical Behaviour of Materials	3
MS3014	Analysis of Materials	3
MS4611	Biomedical Device	3
MS4612	Drug Delivery and Tissue Engineering	3

NTU reserves all rights to make changes to the programme structure with prior notice.