LIFE SCIENCES – COLLEGE OF HUMANITIES AND SCIENCES (CHS)

Requirements for Primary Major, Second Major, and Minor in Life Sciences *(For Cohorts AY2021/22 onwards)*

	Major in Life Sciences	Second Major in Life Sciences	Minor in Life Sciences
Level 1000 Gateway	**LSM1111** Biological Challenges and Opportunities for Humankind	**LSM1111** Biological Challenges and Opportunities for Humankind	**LSM1111** Biological Challenges and Opportunities for Humankind
Level 2000 Essentials	**LSM2105** Molecular Genetics **LSM2106** Fundamental Biochemistry **LSM2107** Evolutionary Biology **LSM2191/A/B** Laboratory Techniques in Life Sciences	**LSM2105** Molecular Genetics **LSM2106** Fundamental Biochemistry **LSM2107** Evolutionary Biology	
Level 2000/ 3000/4000 Electives	**Pass 40 Units LSM22xx/32xx/42xx/4352/3991/4991 (excluding LSM2289/R and LSM3289/R), where:** (i) At most 12 Units of LSM22xx. (ii) At least 12 Units of LSM42xx/4352/4991, including: - One LSM4288 variant and one LSM42xx/4352/4991 elective; OR - Three LSM42xx/4352/4991 electives. (iii) Only 4 Units can be fulfilled with either LSM3991 or LSM4991.	**Pass 24 Units of LSM21xx/22xx/ 32xx/42xx/4352/3991/4991 *(excluding LSM2288/R, LSM2289/R, LSM3289/R and LSM4288 variants)*, as follows:** (i) 4 Units of LSM21xx/22xx. (ii) 16 Units of LSM32xx/42xx/4352/3991/ 4991. (iii) 4 Units of LSM22xx/32xx/42xx/4352. (iv) Only 4 Units can be fulfilled with either LSM3991 or LSM4991.	**Pass 16 Units of LSM21xx/22xx/ 32xx/42xx/4352 *(excluding LSM2288/R, LSM2289/R, LSM3289/R and LSM4288 variants)*, as follows:** (i) 4 Units of LSM21xx/22xx. (ii) 8 Units of LSM32xx/42xx/4352. (iii) 4 Units of LSM22xx/32xx/42xx/4352.
Life Sciences Research Experiential Requirement	**Complete one Life Sciences research experience for the whole degree requirements, which can be:** • LSM4288 variant • LSM UROPS – LSM2288/R or LSM3288/R • ZB UROPS – ZB3288/R (in UE) • LSM UPIP comprising a research topic related to Life Sciences (subject to dept approval, in UE)		
Optional: Specialisation Electives	To fulfil a specialisation, pass **a LSM4288 variant and three more LSM32xx/42xx electives (with 12 Units of UE)**, all listed with the declared specialisation.		
Total Units	**60** (72 if pursuing a specialisation)	**40**	**20**

- **Refer to Page 3 for list of LSM courses, with the specialisation classification of LSM32xx/42xx electives.**
- **All regular LSM courses are 4 Units each except LSM4288 variant (8 Units). The UROPS codes LSM2289/R and LSM3289/R fulfil as UE only.**
- **LSM3991 and LSM4991 are Exchange Enrichment codes to hold credits from approved exchange mapping for Life Sciences topics not covered by NUS LSM courses.**
- **A maximum of 60 Units earned from Level 1000 courses can be counted towards graduation. Please refer to Office of the University Registrar for the exceptions.**

LIFE SCIENCES – COLLEGE OF HUMANITIES AND SCIENCES (CHS)

BSC (HONS) DEGREE IN LIFE SCIENCES *(For Cohorts AY2021/22 onwards)*

Requirements	Courses Involved (For Cohort AY2021/22 onwards)		Units
CHS Common Curriculum	Pass **one** course for each of the following plus **two** Interdisciplinary Courses:		52
	- Asian Studies - Humanities - Social Sciences - Scientific Inquiry I - Data Literacy - Design Thinking	- Artificial Intelligence - Communities and Engagement - Writing - Scientific Inquiry II - Digital Literacy - 2x Interdisciplinary Courses	
Life Sciences Major Essentials	**Pass all:** LSM1111 Biological Challenges and Opportunities for Humankind LSM2105 Molecular Genetics LSM2106 Fundamental Biochemistry LSM2107 Evolutionary Biology LSM2191/A/B Laboratory Techniques in Life Sciences		20
Life Sciences Major Electives	**Pass 40 Units LSM22xx/32xx/42xx/4352/3991/4991 (excluding LSM2289/R and LSM3289/R), where:** (i) At most 12 Units of LSM22xx. (ii) At least 12 Units of LSM42xx/4352/4991, including: - One LSM4288 variant and one LSM42xx/4352/4991 elective; OR - Three LSM42xx/4352/4991 electives. (iii) Only 4 Units can be fulfilled with either LSM3991 or LSM4991. **Optional: To fulfil a Specialisation** Pass a LSM4288 variant AND three more LSM32xx/42xx electives (with 12 Units of UE), all listed with the declared specialisation. *(Refer to Page 3.)*		40 (52 if pursuing a specialisation)
Unrestricted Electives	Top up with courses to meet the degree requirements. *[These courses can be those for requirements of Minor, Second Major or other enrichment programmes.]*		48 *[typically 12 courses]* (36 if pursuing a specialisation)
Life Sciences Research Experiential Requirement	**Complete one Life Sciences research experience for the whole degree requirements, which can be:** • LSM4288 variant • LSM UROPS – LSM2288/R or LSM3288/R • ZB UROPS – ZB3288/R (in UE; not in Major) • LSM UPIP comprising a research topic related to Life Sciences (subject to dept approval; in UE, not in Major)		
	Total		**160**

- **Refer to Page 3 for list of LSM courses, with the specialisation classification of LSM32xx/42xx electives.**
- **All regular LSM courses are 4 Units each except LSM4288 variant (8 Units). The UROPS codes LSM2289/R and LSM3289/R fulfil as UE only.**
- **LSM3991 and LSM4991 are Exchange Enrichment codes to hold credits from approved exchange mapping for Life Sciences topics not covered by NUS LSM courses.**
- **A maximum of 60 Units earned from Level 1000 courses can be counted towards graduation. Please refer to Office of the University Registrar for the exceptions.**

List of LSM Courses for Cohort AY2021/22 onwards. All are 4 Units each except otherwise indicated.

	LSM1111/LSM21xx Essentials		**LSM22xx Electives**		**LSM Electives (not for any specialisation)**
LSM1111	Biological Challenges and Opportunities for Humankind	LSM2212	Human Anatomy	LSM2288/R	Basic UROPS in Life Sciences I
		LSM2233	Cell Biology	LSM2289/R	Basic UROPS in Life Sciences II (for UE)
LSM2105	Molecular Genetics	LSM2234	Introduction to Quantitative Biology	LSM3201	Research and Communication in Life Sciences
LSM2106	Fundamental Biochemistry	LSM2251	Ecology and Environment	LSM3288/R	Advanced UROPS in Life Sciences I
LSM2107	Evolutionary Biology	LSM2252	Biodiversity	LSM3289/R	Advanced UROPS in Life Sciences II (for UE)
LSM2191A/B	Laboratory Techniques in Life Sciences	LSM2254	Fundamentals of Plant Biology	LSM4201	Environmental Communication & Coexistence
		LSM2291	Fundamental Techniques in Microbiology	LSM4352	Sustainable Urban Food Production for Food Security

LSM32xx/LSM42xx Electives (Biomedical Science Specialisation – BMS)				**LSM32xx/LSM42xx Electives (Ecology, Evolution and Biodiversity Specialisation – EEB)**	
LSM3210A/B	Metabolism and Regulation	LSM4210	Topics in Biomedical Science: Brain, Metabolism, Ageing	LSM3233	Developmental Biology
LSM3211	Fundamental Pharmacology	LSM4211	Toxicology	LSM3252	Evolution and Comparative Genomics
LSM3212	Human Physiology: Cardiopulmonary System	LSM4213	Systems Neurobiology	LSM3254	Ecology of Aquatic Environments
LSM3214	Human Physiology – Hormones and Health	LSM4214	Cancer Pharmacology	LSM3255	Ecology of Terrestrial Environments
LSM3215	Neuronal Signaling and Memory Mechanisms	LSM4215	Extreme Physiology	LSM3256	Tropical Horticulture
LSM3216	Neuronal Development and Diseases	LSM4216	Molecular Nutrition and Metabolic Biology	LSM3257	Applied Data Analysis in Ecology and Evolution
LSM3217	Human Ageing	LSM4217	Functional Ageing	LSM3258	Comparative Botany
LSM3218	Cardiopulmonary Pharmacology	LSM4218	Biotechnology and Biotherapeutics	LSM3259	Fungal Biology
LSM3219	Neuropharmacology	LSM4220	Molecular Basis of Human Diseases	LSM3260	Plant-Microbe Interactions
LSM3220	Genes, Genomes and Biomedical Implications	LSM4221	Drug Discovery and Clinical Trials	LSM3265	Entomology
LSM3222	Human Neuroanatomy	LSM4222	Advanced Immunology	LSM3266	Avian Biology and Evolution
LSM3223	Immunology	LSM4223	Advances in Antimicrobial Strategies	LSM3267	Behavioural Biology
LSM3225	Molecular Microbiology in Human Diseases	LSM4225	Genetic Medicine in the Post-Genomic Era	LSM3272	Global Change and Wildlife Conservation
LSM3226	Medical Mycology and Drug Discovery	LSM4226	Infection and Immunity	LSM3275	Coral Reef Ecology
LSM3227	General Virology	LSM4227	Stem Cell Biology	LSM4251	Plant Growth and Development
LSM3228	Microbiomes and Biofilms	LSM4228	Experimental Models for Human Disease and Therapy	LSM4254	Principles of Taxonomy and Systematics
LSM3231	Protein Structure and Function	LSM4229	Therapeutic and diagnostic agents from animal toxins	LSM4255	Methods in Mathematical Biology
LSM3232	Microbiology	LSM4231	Structural Biology	LSM4256	Evolution of Development
LSM3233	Developmental Biology	LSM4232	Advanced Cell Biology	LSM4257	Aquatic Vertebrate Diversity
LSM3234	Biological Imaging of Growth and Form	LSM4234	Mechanobiology	LSM4258	Urban Ecology
LSM3235	Biomedical Applications of Human Epigenetics	LSM4236	Human Microscopic Anatomy	LSM4259	Evolutionary Genetics of Reproduction
LSM3236	Pattern Formation and Self-organisation in Biology	LSM4237	Pharmacogenomics & Personalised Medicine	LSM4260	Plankton Ecology
		LSM4241	Functional Genomics	LSM4261	Marine Biology
LSM3241	Genomic Data Analysis	LSM4242	Protein Engineering	LSM4262	Tropical Conservation Biology
LSM3242	Translational Microbiology	LSM4243	Tumour Biology	LSM4263	Field Studies in Biodiversity
LSM3243	Molecular Biophysics	LSM4245	Advanced Epigenetics and Chromatin Biology	LSM4264	Freshwater Biology
LSM3244	Molecular Biotechnology	LSM4252	Reproductive Biology	LSM4267	Light & Vision in Animal Communication
LSM3245	RNA Biology and Technology	LSM4288M	Research Project in Life Sciences BMS (8 Units)	LSM4268	Environmental Bioacoustics
LSM3246	Synthetic Biology			LSM4269	Environmental Microbiomes: From Ecosystems to Hosts
LSM3247	Practical Synthetic Biology			LSM4270	Intertidal Ecology
				LSM4288E	Research Project in Life Sciences EEB (8 Units)

Life Sciences Research Experiential Requirement *(For Cohorts AY2021/22 onwards)*

Life Sciences Major student to complete at least one course on Life Sciences research experience for the whole degree requirements, which can be:

I. LSM4288 variant
II. LSM UROPS – LSM2288/R or LSM3288/R
III. ZB UROPS – ZB3288/R (in Unrestricted Electives)
IV. LSM UPIP comprising a research topic related to Life Sciences (subject to dept approval, in Unrestricted Electives)

For the LSM-prefixed research projects

	Specialisation Project LSM4288 Research Project in Life Sciences *Variants:* - *LSM4288M – For Biomedical Science Specialisation* - *LSM4288E – For Ecology, Evolution and Biodiversity Specialisation* - *LSM4288X – For approved DDP purpose only*	**UROPS Project – Level 3000** LSM3288 Advanced UROPS in Life Sciences I *Variants:* - *LSM3288 – Default* - *LSM3288R – UROPS plus REx Programme*	**UROPS Project – Level 2000** LSM2288 Basic UROPS in Life Sciences I *Variants:* - *LSM2288 – Default* - *LSM2288R – UROPS plus REx Programme*
No. of Units	8 Units	4 Units	4 Units
Requirements Purpose	Fulfils Life Sciences Major Requirements and Specialisation Requirements	Fulfils Life Sciences Major Requirements	Fulfils Life Sciences Major Requirements
Advisory Prerequisite	Student is expected to have completed Levels 1000 and 2000 essential and elective requirements for Life Sciences Major and to conduct the project with certain advanced elective knowledge in life sciences.	Student is expected to have completed Levels 1000 and 2000 essential requirements for Life Sciences Major with understanding in essential life sciences concepts.	Student is expected to have completed at least a semester of undergraduate studies with some coverage of essential life sciences concepts.
Duration	1 year (i.e., 2 consecutive regular semesters)	1 regular semester or 1 whole special term	1 regular semester or 1 whole special term
Earliest juncture possible	First semester of Year 3 *(Can start in Semester 1 or Semester 2, and progresses into following regular semester)*	Second semester of Year 2	Second semester of Year 1.
Deliverables	Project Report – 10,000 words Presentation – Slide/Poster (as determined by project department)	UROPS Report – 3000 words Presentation – Slide format	UROPS Report – 3000 words Presentation – Slide format
Choice of Supervisors	Academic staff (full-time, joint, adjunct) from all 6 Life Sciences teaching departments.		
Other notes	LSM4288 can be done even if no specialisation is intended.	A 4-Unit regular-semester UROPS can be extended to two regular semesters with LSM3289 Advanced UROPS in Life Sciences II (the additional 4 Units go into UE).	A 4-Unit regular-semester UROPS can be extended to two regular semesters with LSM2289 Basic UROPS in Life Sciences II (the additional 4 Units go into UE).

For LSM UPIP comprising a research topic related to Life Sciences (subject to dept approval; not for Major but as Unrestricted Electives only)

Besides meeting the criteria for a UPIP, for the internship to be considered as meeting the research experiential requirement:

A. There should be a project addressing a research question/topic in life sciences adhering to scientific inquiry process, preferably involving testing of hypothesis or comparable methods.
B. This project can be the internship itself, or a self-proposed topic related to the tasks assigned and endorsed by the workplace supervisor.
C. This project goes on a self-directed learning (SDL) basis, with the workplace supervisor giving the relevant guidance. The UPIP academic advisor may contribute to the mentorship but is not obligated to provide supervision to the project.
D. A deliverable is expected in the form of presentation or written report at the end of the UPIP enrolment, as advised by the department upon reviewing the nature of the project/internship.

To seek department approval for the LSM UPIP to be recognised as meeting the research experiential requirement:

1. Secure the confirmation and complete the registration for a UPIP internship as per instructed by the UPIP office.
2. After your UPIP has concluded, make an online submission with the details of the internship via this form.
    - Full name and student number
    - LSM UPIP course code
    - Academic Year and Semester of the UPIP participation
    - TalentConnect Job ID
    - Company/Employer
    - Internship position/title
    - Workplace supervisor
    - Academic advisor for UPIP
3. In the same form, attach the following details of the project:
    - Project title
    - Project abstract/description
    - Project objectives – including problem statement, research question, and/or hypothesis.
    - Research design and methods
    - Supervisor/Mentor
    - Other remarks – such as confidentiality statement or non-disclosure agreement.
    - Brief write-up of results and conclusion (Do not share confidential results. Seek supervisor clearance if required).

Having questions on this? You may write to Ms Eng Lay Ming (layming@nus.edu.sg).

LIFE SCIENCES – COLLEGE OF HUMANITIES AND SCIENCES (CHS)

BSC (HONS) DEGREE IN LIFE SCIENCES *(For Cohorts AY2021/22 onwards)*

Suggested study plan for students reading Life Sciences as the Primary Major. Numbers in [] are Units.

Requirements	Year 1	Year 2	Year 3	Year 4
CHS Common Curriculum	☐ **Asian Studies** [4] ☐ **Humanities** [4] ☐ **Social Sciences** [4] ☐ **Scientific Inquiry I** [4] ☐ **Data Literacy** [4] ☐ **Design Thinking** [4]	☐ **Artificial Intelligence** [4] ☐ **Writing** [4] ☐ **Scientific Inquiry II** [4] ☐ **Digital Literacy** [4]	☐ **Communities and Engagement** [4] ☐ 1x **Interdisciplinary Course** [4]	☐ 1x **Interdisciplinary Course** [4]
Life Sciences Major	☐ **LSM1111** Biological Challenges and Opportunities for Humankind [4]	☐ **LSM2105** Molecular Genetics [4] ☐ **LSM2106** Fundamental Biochemistry [4] ☐ **LSM2107** Evolutionary Biology [4] ☐ **LSM2191/A/B** Laboratory Techniques in Life Sciences [4]	☐ **Pass 40 Units LSM22xx/32xx/42xx/4352/3991/4991 (excluding LSM2289/R and LSM3289/R), where:** (i) At most 12 Units of LSM22xx. (ii) At least 12 Units of LSM42xx/4352/4991 (can include one LSM4288 variant). (iii) Only 4 Units can be fulfilled with either LSM3991 or LSM4991. ☐ **Optional: To fulfil a Specialisation (20 Units)** Pass a LSM4288 variant AND three more LSM32xx/42xx electives (with 12 Units of UE), all listed with the declared specialisation. (LSM4288 variant is double counted between Major and Specialisation.)	
Unrestricted Electives	☐ **Unrestricted Elective 1** – 2nd Major/Minor (Course 1) [4] ☐ **Unrestricted Elective 2** – 2nd Major/Minor (Course 2) [4] ☐ **Unrestricted Elective 3** – 2nd Major/Minor (Course 3) [4]	☐ **Unrestricted Elective 4** – 2nd Major/Minor (Course 4) [4] ☐ **Unrestricted Elective 5** – 2nd Major/Minor (Course 5) [4]	☐ **Unrestricted Elective 6** – 2nd Major (Course 6) [4] ☐ **Unrestricted Elective 7** – 2nd Major (Course 7) [4] ☐ **Unrestricted Elective 8** – 2nd Major (Course 8) [4]	☐ **Unrestricted Elective 9** – 2nd Major (Course 9) [4] ☐ **Unrestricted Elective 10** – 2nd Major (Course 10) [4] ☐ **Unrestricted Elective 11** [4] ☐ **Unrestricted Elective 12** [4]

Students are strongly encouraged to complete the CHS Common Curriculum in their first two years except for the following 3 courses:

- ***Communities and Engagement – can be taken from Years 2 to 4* (see page 8).***
- ***Two Interdisciplinary Courses – can be taken in Years 3 and 4.***

A typical workload is 5 courses (20 Units) per semester or 10 courses (40 Units) per year.

Some ideas for Unrestricted Electives (CS/CU basis):

- ***Centre for Future-ready Graduates (CFG) Programmes – CFG1002 Career Catalyst, Roots & Wings 2.0, Financial Wellbeing, Industry Insights, CFG1500 Women's Professional Development, CFG1600 CommsLab Public Speaking***
- ***ALS1010 Learning to Learn Better***
- ***HS1301 Workplace Communication***
- ***Undergraduate Professional Internship Programme (UPIP)***
- ***Undergraduate Teaching Opportunities Programme by Science (UTOS)***

A maximum of 60 Units earned from Level 1000 courses can be counted towards graduation. Please refer to Office of the University Registrar for the exceptions.

*****Important note on workload: Semester vs. Year-long C&E courses

- Some C&E courses, usually the field/project-work courses, are regular intense 4-Unit courses with work completed within one semester.
- Other C&E courses, especially the service-work courses, are spread out over two consecutive semesters, or up to one year, that is, **Semester 1 through Semester 2 to Special Term 2**; or **Semester 2 through the Special Terms to Semester 1 of following Academic Year (AY)**. You may click **here** for more details on the service-work courses.
- For those students who read the year-long C&E courses which extend till Special Term (during the summer break) after their 8th semester, please note that grades are awarded at the end of Special Term 2, which means your degree will be conferred in end-Aug, and you will join the Commencement ceremony in the following year instead of the same AY of completion of the course. For more details, please check out the FAQ **here**.
- As such, students who prefer to take such year-long C&E courses instead of semester-long courses (where the latter might have limited capacity in each semester) are encouraged to plan in advance. You may do so by including the C&E course in your study plan earlier in your candidature; for example, during Year 2 of study.
- This would allow students to plan for other enrichment programmes (such as Student Exchange programmes, NOC and/or UPIP/Internships) during Year 3 instead of delaying this requirement to Year 4 when students will need to devote time for their job search in the final semester as they complete the remaining graduation requirements.
- For more enquiries, please check out the **FAQ**, or email the C&E team at **AskCnE@nus.edu.sg**.