

## 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   |
|---|--|---|--|
| <b>Level 1000 Gateway</b>                 | <b>LSM1111</b> Biological Challenges and Opportunities for Humankind   | <b>LSM1111</b> Biological Challenges and Opportunities for Humankind  | <b>LSM1111</b> Biological Challenges and Opportunities for Humankind   |
| <b>Level 2000 Essentials</b>              | <b>LSM2105</b> Molecular Genetics<br><b>LSM2106</b> Fundamental Biochemistry<br><b>LSM2107</b> Evolutionary Biology<br><b>LSM2191</b> Laboratory Techniques in Life Sciences   | <b>LSM2105</b> Molecular Genetics<br><b>LSM2106</b> Fundamental Biochemistry<br><b>LSM2107</b> Evolutionary Biology   |  |
| <b>Level 2000/3000/4000 Electives</b>     | <b>Pass 40 Units as follows:</b><br>(i) A LSM4288 variant (e.g., LSM4288M, LSM4288E, LSM4288X; 8 Units), or LSM3288/LSM3288R (4 Units) or <b>LSM2288/LSM2288R (4 Units)</b> .<br>(ii) 32-36 Units of LSM22xx/32xx/42xx/3991/4991 (excluding LSM2289/LSM2289R, LSM3289/LSM3289R, and LSM4288 variants), where:<br>a. At most 8 Units of LSM22xx ( <b>excluding LSM2288/LSM2288R</b> ).<br>b. At least 12 Units of LSM42xx/4991.<br>c. Only 4 Units can be fulfilled with either LSM3991 or LSM4991. | <b>Pass 24 Units of LSM21xx/22xx/32xx/42xx/3991/4991 (excluding LSM2288/LSM2288R, LSM2289/LSM2289R, LSM3289/LSM3289R and LSM4288 variants) as follows:</b><br>(i) 4 Units of LSM21xx/22xx.<br>(ii) 16 Units of LSM32xx/42xx/3991/4991.<br>(iii) 4 Units of LSM22xx/32xx/42xx.<br>(iv) Only 4 Units can be fulfilled with either LSM3991 or LSM4991. | <b>Pass 16 Units of LSM21xx/22xx/32xx/42xx (excluding LSM2288/LSM2288R, LSM2289/LSM2289R, LSM3289/LSM3289R and LSM4288 variants) as follows:</b><br>(i) 4 Units of LSM21xx/22xx.<br>(ii) 8 Units of LSM32xx/42xx.<br>(iii) 4 Units of LSM22xx/32xx/42xx. |
| <b>Compulsory Research Component</b>      | Complete at least one of the following: <b>a LSM4288 variant (e.g., LSM4288M, LSM4288E, LSM4288X), or LSM3288/LSM3288R or LSM2288/LSM2288R.</b>  |   |  |
| <b>Optional: Specialisation Electives</b> | To fulfil a specialisation, pass <b>a LSM4288 variant and three more LSM32xx/42xx electives (with 12 Units of UE)</b> , all listed with the declared specialisation.   |   |  |
| <b>Total Units</b>                        | <b>60</b> (72 if pursuing a specialisation)  | <b>40</b>   | <b>20</b>  |

- 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 courses LSM2289 and LSM3289 do not count towards the Major but fulfil as UE.
- 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 [Registrar's Office](#) for the details.

## LIFE SCIENCES – COLLEGE OF HUMANITIES AND SCIENCES (CHS)

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

| Requirements                          | Courses Involved <i>(For Cohort AY2021/22 onwards)</i>   | Units   |
|---------------------------------------|--|---|
| <a href="#">CHS Common Curriculum</a> | Pass <b>one</b> course for each of the following plus <b>two</b> Interdisciplinary Courses:<br>- Asian Studies<br>- Humanities<br>- Social Sciences<br>- Scientific Inquiry I<br>- Data Literacy<br>- Design Thinking<br>- Artificial Intelligence<br>- Communities and Engagement<br>- Writing<br>- Scientific Inquiry II<br>- Digital Literacy<br>- 2x Interdisciplinary Courses   | 52  |
| <b>Life Sciences Major Essentials</b> | Pass all:<br>LSM1111 Biological Challenges and Opportunities for Humankind<br>LSM2105 Molecular Genetics<br>LSM2106 Fundamental Biochemistry<br>LSM2107 Evolutionary Biology<br>LSM2191 Laboratory Techniques in Life Sciences   | 20  |
| <b>Life Sciences Major Electives</b>  | Pass 40 Units as follows:<br>(i) A LSM4288 variant (e.g., LSM4288M, LSM4288E, LSM4288X; 8 Units), or LSM3288/LSM3288R (4 Units), or <b>LSM2288/LSM2288R (4 Units)</b> .<br>(ii) 32-36 Units of LSM22xx/32xx/42xx/3991/4991 (excluding LSM2289/LSM2289R, LSM3289/LSM3289R, and LSM4288 variants), where:<br>a. At most 8 Units of LSM22xx <b>(excluding LSM2288/LSM2288R)</b> .<br>b. At least 12 Units of LSM42xx/4991.<br>c. Only 4 Units can be fulfilled with either LSM3991 or LSM4991.<br><br><b>Optional: To fulfil a Specialisation</b><br>Pass a LSM4288 variant AND three more LSM32xx/42xx electives (with 12 Units of UE), all listed with the declared specialisation. <i>(Refer to Page 3.)</i> | 40<br>(52 if pursuing a specialisation)                               |
| <b>Unrestricted Electives</b>         | Top up with courses to meet the degree requirements. <i>[These courses can be those for requirements of Minor, Second Major or other enrichment programmes.]</i>   | 48 <i>[typically 12 courses]</i><br>(36 if pursuing a specialisation) |
| <b>Total</b>                          |  | <b>160</b>  |

- 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 courses LSM2289 and LSM3289 do not count towards the Major but fulfil as UE.
- 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 [Registrar's Office](#) for the details.

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

|   |   |          |   |  |  |
|---|---|----------|---|--|--|
| LSM1111   | <b><u>LSM1111/LSM21xx Essentials</u></b><br>Biological Challenges and Opportunities for Humankind | LSM2212  | <b><u>LSM22xx Electives</u></b><br>Human Anatomy        | LSM2288/R  | <b><u>LSM Electives (not for any specialisation)</u></b><br>Basic UROPS in Life Sciences I |
| LSM2105   | Molecular Genetics  | LSM2233  | Cell Biology  | LSM2289/R  | Basic UROPS in Life Sciences II (for UE)   |
| LSM2106   | Fundamental Biochemistry  | LSM2234  | Introduction to Quantitative Biology                    | LSM2302  | Computational Thinking for Life Sciences (for Digital Literacy requirement or UE)          |
| LSM2107   | Evolutionary Biology  | LSM2241  | Introductory Bioinformatics                             | LSM3201  | Research and Communication in Life Sciences  |
| LSM2191   | Laboratory Techniques in Life Sciences  | LSM2251  | Ecology and Environment                                 | LSM3288/R  | Advanced UROPS in Life Sciences I  |
|   |   | LSM2252  | Biodiversity  | LSM3289/R  | Advanced UROPS in Life Sciences II (for UE)  |
|   |   | LSM2254  | Fundamentals of Plant Biology                           |  |  |
|   |   | LSM2291  | Fundamental Techniques in Microbiology                  |  |  |
| <b><u>LSM32xx/LSM42xx Electives (Biomedical Science Specialisation – BMS)</u></b> |   |          |   | <b><u>LSM32xx/LSM42xx Electives (Ecology, Evolution and Biodiversity Specialisation – EEB)</u></b> |  |
| LSM3210   | 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 Biology  |
| LSM3226   | Medical Mycology and Drug Discovery   | LSM4226  | Infection and Immunity                                  | LSM4251  | Plant Growth and Development   |
| LSM3227   | General Virology  | LSM4227  | Stem Cell Biology                                       | LSM4255  | Methods in Mathematical Biology  |
| LSM3228   | Microbiomes and Biofilms  | LSM4228  | Experimental Models for Human Disease and Therapy       | LSM4256  | Evolution of Development   |
| LSM3231   | Protein Structure and Function  | LSM4229  | Therapeutic and diagnostic agents from animal toxins    | LSM4257  | Aquatic Vertebrate Diversity   |
| LSM3232   | Microbiology  | LSM4231  | Structural Biology                                      | LSM4259  | Evolutionary Genetics of Reproduction  |
| LSM3233   | Developmental Biology   | LSM4232  | Advanced Cell Biology                                   | LSM4260  | Plankton Ecology   |
| LSM3234   | Biological Imaging of Growth and Form   | LSM4234  | Mechanobiology  | LSM4261  | Marine Biology   |
| LSM3235   | Biomedical Applications of Human Epigenetics  | LSM4236  | Human Microscopic Anatomy                               | LSM4262  | Tropical Conservation Biology  |
| LSM3236   | Pattern Formation and Self-organisation in Biology  | LSM4241  | Functional Genomics                                     | LSM4263  | Field Studies in Biodiversity  |
| LSM3241   | Genomic Data Analysis   | LSM4242  | Protein Engineering                                     | LSM4264  | Freshwater Biology   |
| LSM3242   | Translational Microbiology  | LSM4243  | Tumour Biology  | LSM4267  | Light & Vision in Animal Communication   |
| LSM3243   | Molecular Biophysics  | LSM4245  | Advanced Epigenetics and Chromatin Biology              | LSM4268  | Environmental Bioacoustics   |
| LSM3244   | Molecular Biotechnology   | LSM4252  | Reproductive Biology                                    | LSM4288E   | Research Project in Life Sciences EEB (8 Units)  |
| LSM3245   | RNA Biology and Technology  | LSM4288M | Research Project in Life Sciences BMS (8 Units)         |  |  |
| LSM3246   | Synthetic Biology   |          |   |  |  |
| LSM3247   | Practical Synthetic Biology   |          |   |  |  |

## Compulsory Research Milestone for Life Sciences Major *(For Cohorts AY2021/22 onwards)*

For Life Sciences Major requirements, complete at least one of the following: a **LSM4288 variant** (e.g., LSM4288M, LSM4288E, LSM4288X), or **LSM3288/LSM3288R** or **LSM2288/LSM2288R**.

|                                   | <u><a href="#">Specialisation Project</a></u>  | <u><a href="#">UROPS Project – Level 3000</a></u>   | <u><a href="#">UROPS Project – Level 2000</a></u>  |
|-----------------------------------|--|---|--|
|                                   | LSM4288 Research Project in Life Sciences<br><br><i>Variants:</i><br>- LSM4288M – For Biomedical Science Specialisation<br>- LSM4288E – For Ecology, Evolution and Biodiversity Specialisation<br>- LSM4288X – For approved DDP purpose only | LSM3288 Advanced UROPS in Life Sciences I<br><br><i>Variants:</i><br>- LSM3288 – Default<br>- LSM3288R – UROPS plus <a href="#">REx Programme</a>                 | LSM2288 Basic UROPS in Life Sciences I<br><br><i>Variants:</i><br>- LSM2288 – Default<br>- LSM2288R – UROPS plus <a href="#">REx Programme</a>             |
| <b>No. of Units</b>               | 8 Units  | 4 Units   | 4 Units  |
| <b>Requirements Purpose</b>       | Fulfils Life Sciences Major Requirements and Specialisation Requirements   | Fulfils Life Sciences Major Requirements  | Fulfils Life Sciences Major Requirements   |
| <b>Advisory Prerequisite</b>      | 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.                 |
| <b>Duration</b>                   | 1 year (i.e., 2 consecutive regular semesters)   | 1 regular semester or 1 whole special term  | 1 regular semester or 1 whole special term   |
| <b>Earliest juncture possible</b> | First semester of Year 3<br><i>(Can start in Semester 1 or Semester 2, and progresses into following regular semester)</i>   | Second semester of Year 2   | Second semester of Year 1.   |
| <b>Deliverables</b>               | Project Report – 10,000 words (to be confirmed)<br>Presentation – (Format to be confirmed)   | UROPS Report – 3000 words<br>Presentation – Slide format  | UROPS Report – 3000 words<br>Presentation – Slide format   |
| <b>Choice of Supervisors</b>      | Academic staff (full-time, joint, adjunct) from all 6 Life Sciences teaching departments.  |   |  |
| <b>Other notes</b>                | 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). |

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## 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   |
|---------------------------------------|--|--|--|--|
| <a href="#">CHS Common Curriculum</a> | <input type="checkbox"/> Asian Studies [4]<br><input type="checkbox"/> Humanities [4]<br><input type="checkbox"/> Social Sciences [4]<br><input type="checkbox"/> Scientific Inquiry I [4]<br><input type="checkbox"/> Data Literacy [4]<br><input type="checkbox"/> Design Thinking [4]                                     | <input type="checkbox"/> Artificial Intelligence [4]<br><input type="checkbox"/> Writing [4]<br><input type="checkbox"/> Scientific Inquiry II [4]<br><input type="checkbox"/> Digital Literacy [4]  | <input type="checkbox"/> Communities and Engagement [4]<br><input type="checkbox"/> 1x Interdisciplinary Course [4]  | <input type="checkbox"/> 1x Interdisciplinary Course [4]   |
| <b>Life Sciences Major</b>            | <input type="checkbox"/> <b>LSM1111</b> Biological Challenges and Opportunities for Humankind [4]  | <input type="checkbox"/> <b>LSM2105</b> Molecular Genetics [4]<br><input type="checkbox"/> <b>LSM2106</b> Fundamental Biochemistry [4]<br><input type="checkbox"/> <b>LSM2107</b> Evolutionary Biology [4]<br><input type="checkbox"/> <b>LSM2191</b> Laboratory Techniques in Life Sciences [4] | Pass 40 Units as follows:<br>(i) A LSM4288 variant (e.g., LSM4288M, LSM4288E, LSM4288X; 8 Units), or LSM3288/LSM3288R (4 Units), or LSM2288/LSM2288R (4 Units).<br>(ii) 32-36 Units of LSM22xx/32xx/42xx/3991/4991 (excluding LSM2289/LSM2289R, LSM3289/LSM3289R, and LSM4288 variants), where:<br>a. At most 8 Units of LSM22xx (excluding LSM2288/LSM2288R).<br>b. At least 12 Units of LSM42xx/4991.<br>c. Only 4 Units can be fulfilled with either LSM3991 or LSM4991.<br><br><input type="checkbox"/> <b>Optional: To fulfil a Specialisation (20 Units)</b><br>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.) |  |
| <b>Unrestricted Electives</b>         | <input type="checkbox"/> <b>Unrestricted Elective 1</b> – 2 <sup>nd</sup> Major/Minor (Course 1) [4]<br><br><input type="checkbox"/> <b>Unrestricted Elective 2</b> – 2 <sup>nd</sup> Major/Minor (Course 2) [4]<br><br><input type="checkbox"/> <b>Unrestricted Elective 3</b> – 2 <sup>nd</sup> Major/Minor (Course 3) [4] | <input type="checkbox"/> <b>Unrestricted Elective 4</b> – 2 <sup>nd</sup> Major/Minor (Course 4) [4]<br><br><input type="checkbox"/> <b>Unrestricted Elective 5</b> – 2 <sup>nd</sup> Major/Minor (Course 5) [4]   | <input type="checkbox"/> <b>Unrestricted Elective 6</b> – 2 <sup>nd</sup> Major (Course 6) [4]<br><br><input type="checkbox"/> <b>Unrestricted Elective 7</b> – 2 <sup>nd</sup> Major (Course 7) [4]<br><br><input type="checkbox"/> <b>Unrestricted Elective 8</b> – 2 <sup>nd</sup> Major (Course 8) [4]   | <input type="checkbox"/> <b>Unrestricted Elective 9</b> – 2 <sup>nd</sup> Major (Course 9) [4]<br><br><input type="checkbox"/> <b>Unrestricted Elective 10</b> – 2 <sup>nd</sup> Major (Course 10) [4]<br><br><input type="checkbox"/> <b>Unrestricted Elective 11</b> [4]<br><br><input type="checkbox"/> <b>Unrestricted Elective 12</b> [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.
- **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](#)
- [Undergraduate Professional Internship Programme \(UPIP\)](#)
- [Undergraduate Teaching Opportunities Programme by Science \(UTOS\)](#)
- [Design Your Own Course \(DYOC\)](#)