


**Program Information**
**Academic Program:** (334 new curriculum) B.Sc. in Earth System Science

**Academic Year:** 2021

**Select Language:** English ▾

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**Study Scheme**

**Earth System Science**  
**Applicable to students admitted in 2021-22**

There are two streams of specialization: the stream of *Atmospheric Science* and the stream of *Geophysics*. A student's selected stream will be printed on his/her transcript. Students admitted to the Earth System Science Major Programme through the Broad-based admission scheme may apply at their final year of attendance to specialize in the stream of *Atmospheric Science* or the stream of *Geophysics* and select the relevant courses as prescribed below.

**Major Programme Requirement**

Students are required to complete a minimum of 72 units of courses as follows:

	Units
1. Faculty Package: Group C: MATH1010 (preferred) or 1018 or 1520 Group D: PHYS1111 (preferred) or 1001 or 1002 or 1113 A course from the following Group B: CHEM1070 (preferred) or 1072 Group E: STAT1011 (preferred) or 1012	9
2. Required Courses:	
(a) Foundation Science: One course from the remaining group in the Faculty Package or one course from LSCI1002 (preferred) or 1000 or 1001	3
(b) ESSC2010, 2020, 4810, 4820	12
3. Elective Courses: At least 48 units of courses shall be taken from the following courses:	
(a) Introductory Earth System Science: ESSC1000	0-1[a]
(b) Intermediate-level Earth System Science: At least one course from each category Category A: ESSC3100, 3120 Category B: ESSC3200, 3220 Category C: ESSC3300, 3320 Category D: ESSC3600, 3800	18
(c) Basic Programming: One course from CSC1120, 1510, 1520, 1530, 1540, ESSC2030, PHYS2061#	3
(d) Intermediate-level Supporting Sciences: 12 units with at least 5 units from the same area (courses that appear in more than one area can only count towards one area) <u>Area 1 – Physical Sciences:</u> CHEM2300#, 2310#, 2400#, 2408#, 3320#, ESSC2800, 3020, MATH2550#, PHYS1122, 2041#, 2051#, 2401#, 3011#, 3051#, 3061# <u>Area 2 – Life and Environmental Sciences:</u> BCHE2030#, BIOL2120#, 2210#, 2213#, 3560#, 3570#, 3710#, CHEM2200#, 2400#, 2408#, ENSC2270#, 2515#, 2517#, 3230#, 3520#, ESSC2800, 3601, MATH2550#, MBTE2010# <u>Area 3 – Mathematical Sciences:</u> ESSC3020, MATH2010# (or MATH2530#), 2020#, 2050#, 2060#, 2230#, 2550#, 3093#, 3230#, 3270#, RMSC2001#, STAT2001#, 2003#, 2006#, 3008#	12
(e) Upper-level Earth System Science and Sciences: Five courses with at least 6 units from the following ESSC courses (i.e. (i) below)	14-15[a]
(i) Earth System Science[b]: ESSC2030, 2110, 2120, 2130, 2800, 3020, 3100, 3110, 3120, 3200, 3220, 3300, 3320, 3600, 3601, 3800, 3900,	

- 4010, 4020, 4030, 4110, 4120, 4130, 4140, 4160, 4180, 4210, 4220, 4230, 4240, 4250, 4260, 4510, 4520, 4540, 4601, 4602, 4603
- (ii) Sciences[c]:  
 BIOL4012#, 4260#, 4510#, CHEM3320#, 3330#, 3410#, 4710#, 4720#, 4780#, CSCI3320#, ELEG3503#, ENSC3230#, 3520#, 4240#, 4242#, 4250#, IERG3300#, MATH3093#, 3230#, 3270#, 4020#, 4030#, 4220#, 4230#, PHYS3011#, 3021#, 3031#, 3041#, 3051#, 3061#, 4011#, 4021#, 4031#, 4050#, 4420#, 4430#, RMSC4001#, 4002#, STAT3007#, 3008#, 4002#, 4003#, 4005#

**Total:** 72

**Explanatory Notes:**

1. ESSC courses at 2000 and above level as well as those labeled as # will be included in the calculation of Major GPA for honours classification.
- [a] Students should take the required number of units of Upper-level Earth System Science and Sciences requirement as prescribed in Elective Courses 3(e) in accordance with the units completed in Introductory Earth System Science requirement as prescribed in Elective Courses 3(a) to fulfill the 48 units of Major Programme Elective Courses Requirement.
- [b] These courses if not taken to fulfill the Intermediate-level Earth System Science requirement as prescribed in Elective Courses 3(b)/the Basic Programming requirement as prescribed in Elective Courses 3(c)/the Intermediate-level Supporting Sciences requirement as prescribed in Elective Courses 3(d) can be taken to fulfill the Upper-level Earth System Science requirement as prescribed in Elective Courses 3(e)(i).
- [c] These courses if not taken to fulfill the Intermediate-level Supporting Sciences requirement as prescribed in Elective Courses 3(d) can be taken to fulfill the Upper-level Sciences requirement as prescribed in Elective Courses 3(e)(ii).

**Atmospheric Science Stream**

Students are required to complete a minimum of 72 units of courses as follows:

	Units
1. Faculty Package: Group C: MATH1010 (preferred) or 1018 or 1520 Group D: PHYS1111(preferred) or 1001 or 1002 or 1113 A course from the following Group B: CHEM1070 (preferred) or 1072 Group E: STAT1011(preferred) or 1012	9
2. Required Courses:	
(a) Foundation Science: One course from the remaining group in the Faculty Package	3
(b) Foundation Earth System Science: ESSC2010, 2020	6
(c) Intermediate-level Atmospheric and Oceanic Sciences: ESSC3200, 3220, 3300	9
(d) Intermediate-level Physics: (i) One course from ENGG1310, PHYS1122 (ii) One course from MAEG2030#, PHYS2041#	6
(e) Capstone: ESSC4810, 4820	6
3. Elective Courses: At least 33 units of courses shall be taken from the following courses:	
(a) Introductory Earth System Science: ESSC1000	0-1[a]
(b) Mathematics and Programming: (i) One course from MATH2550#[b], PHYS2051#[b] (ii) One course from CSCI1120, 1510, 1520, 1530, 1540, ESSC2030, PHYS2061#	6
(c) Intermediate-level Electives: (i) Intermediate-level Earth System Science: At least two courses from ESSC3100, 3120, 3320, 3600, 3800 (ii) Physics, Mathematics or Statistics: One course from ESSC3020, PHYS2401#, 3011#[d], 3021#, 3031#, 3041#, 3051#, 3061#, MATH2040#, 2050#, 2060#, 2230#, 3230#, 3240#, 3270#, 3290#, 3310#, STAT2001#, 2003#, 2006#, 3007#, 3008#	9
(d) Advanced Electives: At least four courses from ESSC4010, 4210, 4220, 4230, 4240, 4250, 4260, 4510, 4520, 4540, PHYS4420#	12
(e) Other Electives[c][e]: At least two courses from CHEM2300#, 2310#, 3320#, ENSC2270#, 2515#, 3230#, ESSC2030, 2110, 2120, 2130, 2800, 3020, 3100, 3120, 3320, 3600, 3601, 3900, 4010, 4020, 4030,	5-6[a]

4110, 4120, 4130, 4140, 4160, 4180, 4210, 4220, 4230, 4240, 4250, 4260, 4510, 4520, 4540, 4601, 4602, 4603, MATH1030[b], 2010#[b], 2020#[b], 2040#, 2050#, 2060#, 2230#, 2530#[b], 3230#, 3240#, 3270#, 3290#, 3310#, 4220#, PHYS2401#, 3011#, 3021#, 3031#, 3041#, 3051#, 3061#, 4011#[d], 4061#, 4420#, STAT2001#, 2003#, 2006#, 3007#, 3008#

**Total:** 72

#### Explanatory Notes:

1. ESSC courses at 2000 and above level as well as those labeled as # will be included in the calculation of Major GPA for honours classification.
- [a] Students should take the required number of units of Other Electives requirement as prescribed in Elective Courses 3(e) in accordance with the units completed in Introductory Earth System Science requirement as prescribed in Elective Courses 3(a) to fulfill the 33 units of Major Programme Elective Courses Requirement.
- [b] Students who have taken at least two courses of MATH1030, 2010, 2020 and 2530 or equivalent courses may, with approval by the Earth System Science Programme, use one of MATH1030, 2010, 2020 or 2530 (or an equivalent course) to substitute MATH2550 or PHYS2051 to satisfy the requirement as prescribed in 3(b)(i), and use the other one of MATH1030, 2010, 2020 or 2530 to satisfy the requirement as prescribed in Elective Courses 3(e).
- [c] These courses if not taken to fulfill the Mathematics and Programming requirement in Elective Courses 3(b)(ii)/the Intermediate-level Electives in Elective Courses 3(c)(i) or 3(c)(ii) or Advanced Electives requirement as prescribed in Elective Courses 3(d) can be taken to fulfill the Other Electives requirement as prescribed in 3(e).
- [d] Students who choose to take PHYS3011 are recommended to take PHYS4011 to fulfill part of the Other Electives requirement.
- [e] Students are encouraged to take more than two of the listed elective courses to strengthen their breadth of knowledge.

#### Geophysics Stream

Students are required to complete a minimum of 72 units of courses as follows:

	Units
1. Faculty Package:	9
Group C: MATH1010 (preferred) or 1018 or 1520	
Group D: PHYS1111(preferred) or 1001 or 1002 or 1113	
A course from the following	
Group B: CHEM1070 (preferred) or 1072	
Group E: STAT1011(preferred) or 1012	
2. Required Courses:	
(a) Foundation Science:	3
One course from the remaining group in the Faculty Package	
(b) Foundation Earth System Science:	6
ESSC2010, 2020	
(c) Intermediate-level Solid Earth:	9
ESSC3100, 3120, 3320	
(d) Intermediate-level Physics:	6
(i) One course from ENGG1310, PHYS1122	
(ii) One course from MAEG2030#, PHYS2041#	
(e) Intermediate-level Mathematics:	3
One course from MATH2010#[a] (or MATH2530#), 2020#[a], 2550#[b], PHYS2051#[b], RMSC2001#	
(f) Capstone:	6
ESSC4810, 4820	
3. Elective Courses:	
At least 30 units of courses shall be taken from the following courses:	
(a) Introductory Earth System Science:	0-1[c]
ESSC1000[c]	
(b) Geoscience Field Courses:	1-3[c]
At least one course from the following field courses:	
ESSC2110, 2120, 2130, 3110, 4160	
(c) Basic Programming:	3
One course from CSC1120, 1510, 1520, 1530, 1540, ESSC2030, PHYS2061#	
(d) Supporting Sciences:	6
6 units from at least two areas below:	
<u>Area 1 – Mechanics:</u>	
ESSC4010, PHYS3011#[e], 3031#	
<u>Area 2 – Mathematics and Physics:</u>	
ESSC3020, MATH2010#[a] (or MATH2530#), 2020#[a], 2040#, 2050#, 2060#, 2230#, 2550#[b], PHYS2401#, 3041#, 3051#	
<u>Area 3 – Statistics, Signal Processing and Data Sciences:</u>	
CSCI3320#, STAT2001#, 2003#, 2006#, 3007#, 3008#, ENGG2020#, 2030#, ELEG3503#, IERG3300#	
(e) Upper-level Earth and Science:	18-20[c]
At least four courses from the following Solid Earth courses (6	

At least four courses from the following Solid Earth courses (i.e.

(i) below)

- (i) Solid Earth[d]:  
ESSC3110, 4010, 4020, 4030, 4110, 4120, 4130, 4140,  
4160, 4180, 4540
- (ii) Earth System Science[d]:  
ESSC2030, 2110, 2120, 2130, 2800, 3020, 3200, 3220,  
3300, 3600, 3601, 3800, 3900, 4210, 4220, 4230, 4240,  
4250, 4260, 4510, 4520, 4601, 4602, 4603
- (iii) Sciences[f]:  
CSCI3320#, ELEG3503#, IERG3300#, MATH3093#,  
3230#, 3240#, 3270#, 3310#, 4020#, 4030#, 4220#,  
4230#, PHYS3011#[e], 3021#, 3031#, 3041#, 3051#,  
3061#, 4011#[e], 4021#, 4031#, 4050#, 4420#, 4430#,  
RMSC4001#, 4002#, STAT3007#, 3008#, 4002#, 4003#,  
4005#

**Total:** 72

In addition to fulfilling the above Major Programme Requirement, students meeting the criteria as specified by the Faculty can take the following stream offered by the Faculty:

### Science, Technology And Research Stream

Students are required to complete a minimum of 12 units of courses as follows:

	Units
1. Required Courses:	
(a) One Faculty Package Course: Choose from the two remaining groups of the Faculty Package that have not been used to fulfill the Faculty Package Requirement[g]	3
(b) Research Courses: STAR2000, 3000, 4000[h]	6
(c) Seminar Courses: STAR2050, 3050, 4050	3
2. Experiential Learning: At least 4 consecutive weeks of outside Hong Kong exposure[i]	---
<b>Total:</b>	<b><u>12</u></b>

#### Explanatory Notes:

1. ESSC courses at 2000 and above level as well as those labeled as # will be included in the calculation of Major GPA for honours classification.
- [a] Students who choose to take MATH2010 are recommended to take MATH2020 as well. MATH2010 and 2020 if not taken to fulfill the Intermediate-level Mathematics requirement as prescribed in Required Courses 2(e) can be taken to fulfill the Supporting Sciences requirement as prescribed in Elective Courses 3(d).
- [b] Students can take either MATH2550 or PHYS2051, but not both.
- [c] Students should take the required number of units of Upper-level Earth and Science requirement as prescribed in Elective Courses 3(e) in accordance with the units completed in Introductory Earth System Science requirement as prescribed in Elective Courses 3(a) and Geoscience Field requirement as prescribed in Elective Courses 3(b) to fulfill the 30 units of Major Programme Elective Courses Requirement.
- [d] These courses if not taken to fulfill the Geoscience Field Courses requirement as prescribed in Elective Courses 3(b)/the Basic Programming requirement as prescribed in 3(c)/the Supporting Sciences requirement as prescribed in Elective Courses 3(d) can be taken to fulfill the Upper-level Solid Earth requirement as prescribed in Elective Courses 3(e)(i)/the Upper-level Earth System Science requirement as prescribed in Elective Courses 3(e)(ii).
- [e] Students who choose to take PHYS3011 are recommended to take PHYS4011 as well.
- [f] These courses if not taken to fulfill the Supporting Sciences requirement as prescribed in Elective Courses 3(d) can be taken to fulfill the Upper-level Sciences requirement as prescribed in Elective Courses 3(e)(iii).
- [g] In addition to Faculty Package courses specified in the Major Programme, students may take one course from Group A: LSCI1000 or 1001 or 1002 of the Science Faculty Package to fulfill this requirement.
- [h] Students may select research-oriented course(s), as approved by the Major Programme, to substitute up to 4 units for fulfillment of Research Courses requirement.
- [i] Students must complete any exchange/research/internship programme(s) offered by the University, Colleges, the Faculty of Science or Major Programme, as approved by the Major Programme, to fulfill the Experiential Learning requirement. Students are responsible for the extra costs incurred in the exchange/research/ internship programme(s).

Earth System Science

**Recommended Course Pattern**

Units

<b>First Year of Attendance</b>	1 <sup>st</sup> term Faculty Package: 2 – 3 courses Major Required: ESSC2020 Major Elective(s): ESSC1000	6-9 3 0-1
	2 <sup>nd</sup> term Faculty Package: 0 – 1 course Foundation Science: 1 course Major Required: ESSC2010 Major Elective(s): Basic Programming course and Science course(s)	0-3 3 3 6-9
<b>Second Year of Attendance</b>	1 <sup>st</sup> term Major Required: ESSC2020 (if not taken) Major Elective(s): Basic Programming course (if not taken) 2 – 3 Intermediate-level ESSC and Science courses	0-3 0-3 6-9
	2 <sup>nd</sup> term Major Required: Major Elective(s): 2 – 4 Intermediate-level ESSC and Science courses	6-12
<b>Third Year of Attendance</b>	1 <sup>st</sup> term Major Required: Major Elective(s): 2 – 4 Intermediate-level and 1 – 2 Upper-level ESSC and Science courses	9-18
	2 <sup>nd</sup> term Major Required: Major Elective(s): 2 – 4 Intermediate-level and 1 – 2 Upper-level ESSC and Science courses	9-18
<b>Fourth Year of Attendance</b>	1 <sup>st</sup> term Major Required: ESSC4810 Major Elective(s): 2 – 3 Intermediate-level and Upper-level ESSC and Science courses	3 6-9
	2 <sup>nd</sup> term Major Required: ESSC4820 Major Elective(s): 2 – 3 Upper-level ESSC and Science courses	3 6-9
<b>Total (including Faculty Package):</b>		<b>72</b>

Earth System Science — Science, Technology And Research Stream (STARS)		
	<b>Recommended Course Pattern</b>	Units
<b>First Year of Attendance</b>	1 <sup>st</sup> term Faculty Package: 2 – 3 courses Major Required: ESSC2020 Major Elective(s): ESSC1000	6-9 3 0-1
	2 <sup>nd</sup> term Faculty Package: 0 – 1 course Foundation Science: 1 course Major Required: ESSC2010 Major Elective(s): Basic Programming course and Science course(s)	0-3 3 3 6-9
	Summers session STARS: STAR2050	1
	1 <sup>st</sup> term Major Required: ESSC2020 (if not taken) Major Elective(s): Basic Programming course (if not taken) 2 – 3 Intermediate-level ESSC and Science courses STARS: STAR2000	0-3 0-3 6-9 1
<b>Second Year of Attendance</b>	2 <sup>nd</sup> term Major Required: Major Elective(s): 2 – 4 Intermediate-level ESSC and Science courses STARS: STAR3050	6-12 1
	1 <sup>st</sup> term Major Required: Major Elective(s): 2 – 4 Intermediate-level and 1 – 2 Upper-level ESSC and Science Courses STARS: STAR3000	9-18 2
<b>Third Year of Attendance</b>	2 <sup>nd</sup> term Major Required: Major Elective(s): 2 – 4 Intermediate-level and 1 – 2	9-18

	Upper-level ESSC and Science Courses STARS: STAR4050	1
<b>Fourth Year of Attendance</b>	1 <sup>st</sup> term Major Required: ESSC4810 Major Elective(s): 2 – 3 Intermediate-level and Upper-level ESSC and Science Courses	3 6-9
	2 <sup>nd</sup> term Major Required: ESSC4820@ Major Elective(s): 2 – 3 Upper-level ESSC and Science courses	3 6-9
<b>Total (including Faculty Package):</b>		<b>78</b>

@ Student may take ESSC4820 as a substitute for STAR4000.

Earth System Science (Atmospheric Science Stream)		
	Recommended Course Pattern	Units
<b>First Year of Attendance</b>	1 <sup>st</sup> term Faculty Package: 2 – 3 courses from MATH1010, PHYS1111, STAT1011 Foundation Science: CHEM1070 or 1072 Major Required: ESSC2020 Major Elective(s): ESSC1000; and 0 – 1 course from CSCI1120, 1540, PHYS2061	6-9 3 3 0-1 0-3
	2 <sup>nd</sup> term Faculty Package: 0 – 1 course from MATH1010, PHYS1111, STAT1011 Foundation Science: CHEM1070 (if not taken) Major Required: ESSC2010 Major Elective(s): 0 – 1 course from CSCI1510, 1520, 1530 (if not taken)	0-3 0-3 3 0-3
<b>Second Year of Attendance</b>	1 <sup>st</sup> term Major Required: ESSC2020 (if not taken) and PHYS2041 Major Elective(s): 0 – 1 course from MATH2550, PHYS2051; and 0 – 1 course from CSCI1120, 1540, PHYS2061 (if not taken)	3-6 3-6
	2 <sup>nd</sup> term Major Required: 1 – 2 course(s) from PHYS1122, ESSC3220, 3300 Major Elective(s): 0 – 1 ESSC elective course; 0 – 1 course from MATH2550, PHYS2051 (if not taken); and 0 – 1 course from ESSC4010, PHYS3011	3-6 3-9
<b>Third Year of Attendance</b>	1 <sup>st</sup> term Major Required: ESSC3120 or 3200 Major Elective(s): 1– 2 ESSC elective course(s); and 0 – 1 other elective course	3 3-9
	2 <sup>nd</sup> term Major Required: 1 – 2 course(s) from PHYS1122, ESSC3220, 3300 (if not taken) Major Elective(s): 0 – 1 course from ESSC4010, PHYS3011 (if not taken); 0 – 1 ESSC elective course; and 0 – 1 other elective course or PHYS4420	3-6 3-9
<b>Fourth Year of Attendance</b>	1 <sup>st</sup> term Major Required: ESSC4810; and ESSC3120 or 3200 (if not taken) Major Elective(s): 0 – 1 ESSC elective course; and 0 – 1 other elective course	3-6 3-6
	2 <sup>nd</sup> term Major Required: ESSC4820 Major Elective(s): 1 – 2 ESSC elective course(s); and 0 – 1 other elective course or PHYS4420 (if not taken)	3 3-9
<b>Total (including Faculty Package):</b>		<b>72</b>

Earth System Science (Atmospheric Science Stream) — Science, Technology And Research Stream (STARS)		
	Recommended Course Pattern	Units
<b>First Year of Attendance</b>		

<b>First Year of Attendance</b>	1 <sup>st</sup> term Faculty Package: 2 – 3 courses from MATH1010, PHYS1111, STAT1011 Foundation Science: CHEM1070 or 1072 Major Required: ESSC2020 Major Elective(s): ESSC1000; and 0 – 1 course from CSCI1120, 1540, PHYS2061	6-9 3 3 0-1 0-3
	2 <sup>nd</sup> term Faculty Package: 0 – 1 course from MATH1010, PHYS1111, STAT1011 Foundation Science: CHEM1070 (if not taken) Major Required: ESSC2010 Major Elective(s): 0 – 1 course from CSCI1510, 1520, 1530, PHYS2061 (if not taken)	0-3 0-3 0-3 0-3
	Summers session STARS: STAR2050	1
<b>Second Year of Attendance</b>	1 <sup>st</sup> term Major Required: ESSC2020 (if not taken) and PHYS2041 Major Elective(s): 0 – 1 course from MATH2550, PHYS2051; and 0 – 1 course from CSCI1120, 1540, PHYS2061 (if not taken) STARS: STAR2000	3-6 3-6 1
	2 <sup>nd</sup> term Major Required: 1 – 2 course(s) from PHYS1122, ESSC3220, 3300 Major Elective(s): 0 – 1 ESSC elective course; 0 – 1 course from MATH2550, PHYS2051 (if not taken); and 0 – 1 course from ESSC4010, PHYS3011 STARS: STAR3050	3-6 3-9 1
	1 <sup>st</sup> term Major Required: ESSC3120 or 3200 Major Elective(s): 1 – 2 ESSC elective course(s); and 0 – 1 other elective course STARS: STAR3000	3 3-9 2
<b>Third Year of Attendance</b>	2 <sup>nd</sup> term Major Required: 1 – 2 course(s) from PHYS1122, ESSC3220, 3300 (if not taken) Major Elective(s): 0 – 1 course from ESSC4010, PHYS3011 (if not taken); 0 – 1 ESSC elective course; and 0 – 1 other elective course or PHYS4420 STARS: STAR4050	3-6 3-9 1
	<b>Fourth Year of Attendance</b>	1 <sup>st</sup> term Major Required: ESSC4810; and ESSC3120 or 3200 (if not taken) Major Elective(s): 0 – 1 ESSC elective course; and 0 – 1 other elective course
	2 <sup>nd</sup> term Major Required: ESSC4820@ Major Elective(s): 1 – 2 ESSC elective course(s); and 0 – 1 other elective course or PHYS4420 (if not taken)	3 3-9
<b>Total (including Faculty Package):</b>		<b>78</b>

@ Student may take ESSC4820 as a substitute for STAR4000.

Earth System Science (Geophysics Stream)		
	Recommended Course Pattern	Units
<b>First Year of Attendance</b>	1 <sup>st</sup> term Faculty Package: 2 – 3 courses Major Required: ESSC2020 Major Elective(s): ESSC1000	6-9 3 0-1
	2 <sup>nd</sup> term Faculty Package: 0 – 1 course Foundation Science: 1 course Major Required: ESSC2010 Major Elective(s): Basic Programming course and Science course(s)	0-3 3 3 3-6
<b>Second Year of Attendance</b>	1 <sup>st</sup> term Major Required: ESSC2020 (if not taken), PHYS1122 and 0 – 1 Intermediate-level Mathematics course	6-9

	Major Elective(s): Basic Programming course (if not taken) 1 – 2 Geoscience Field course(s) and Science course(s)	0-3 3-6
	2 <sup>nd</sup> term Major Required: ESSC3100, PHYS2041 and 0 – 1 Intermediate-level Mathematics course (if not taken) Major Elective(s): 1 – 2 Geoscience Field course(s) and Science course(s)	6-9 3-6
<b>Third Year of Attendance</b>	1 <sup>st</sup> term Major Required: ESSC3120 Major Elective(s): 1 Geoscience Field course and 1 – 3 Upper-level ESSC and Science courses	3 6-12
	2 <sup>nd</sup> term Major Required: Major Elective(s): 1 Geoscience Field course and 2 – 3 Upper-level ESSC and Science courses	9-12
<b>Fourth Year of Attendance</b>	1 <sup>st</sup> term Major Required: ESSC4810 Major Elective(s): 2 – 3 Geoscience Field courses and Upper-level ESSC and Science courses	3 6-9
	2 <sup>nd</sup> term Major Required: ESSC4820 Major Elective(s): 2 – 3 Geoscience Field courses and Upper-level ESSC and Science courses	3 6-9
<b>Total (including Faculty Package):</b>		<b>72</b>

Earth System Science (Geophysics Stream) — Science, Technology And Research Stream (STARS)		
	<b>Recommended Course Pattern</b>	Units
<b>First Year of Attendance</b>	1 <sup>st</sup> term Faculty Package: 2 – 3 courses Major Required: ESSC2020 Major Elective(s): ESSC1000	6-9 3 0-1
	2 <sup>nd</sup> term Faculty Package: 0 – 1 course Foundation Science: 1 course Major Required: ESSC2010 Major Elective(s): Basic Programming course and Science course(s)	0-3 3 3 3-6
	Summers session STARS: STAR2050	1
	1 <sup>st</sup> term Major Required: ESSC2020 (if not taken), PHYS1122 and 0 – 1 Intermediate-level Mathematics course Major Elective(s): Basic Programming course (if not taken) 1 – 2 Geoscience Field course(s) and Science course(s) STARS: STAR2000	6-9 0-3 3-6 1
<b>Second Year of Attendance</b>	2 <sup>nd</sup> term Major Required: ESSC3100, PHYS2041 and 0 – 1 Intermediate-level Mathematics course (if not taken) Major Elective(s): 1 – 2 Geoscience Field course(s) and Science course(s) STARS: STAR3050	6-9 3-6 1
	1 <sup>st</sup> term Major Required: ESSC3120 Major Elective(s): 1 Geoscience Field course and 1 – 3 Upper-level ESSC and Science courses STARS: STAR3000	3 6-12 2
<b>Third Year of Attendance</b>	2 <sup>nd</sup> term Major Required: Major Elective(s): 1 Geoscience Field course and 2 – 3 Upper-level ESSC and Science courses STARS: STAR4050	9-12 1
	1 <sup>st</sup> term Major Required: ESSC4810 Major Elective(s): 2 – 3 Geoscience Field courses and	3 6-9



	Upper-level ESSC and Science courses	
	2 <sup>nd</sup> term Major Required: ESSC4820@ Major Elective(s): 2 – 3 Geoscience Field courses and Upper-level ESSC and Science courses	3 6-9
<b>Total (including Faculty Package):</b>		<b>78</b>

@ Student may take ESSC4820 as a substitute for STAR4000.

<b>Minor Programme Title</b> Earth System Science	
<b>Minor Programme Requirement</b>	
Students are required to complete a minimum of 18 units of courses as follows:	
	Units
1. Required Courses:	6
ESSC2010, 2020	
2. Elective Courses:	12
A minimum of 6 units of courses at 3000 or above level from Area 1:	
(a) <b>Area 1: Earth System Science</b>	
ESSC3100, 3120, 3200, 3220, 3300, 3320, 3600, 3800	
(b) <b>Area 2: General</b>	
BIOL2210, ENSC2270, 2515, 3230, 4240, ESSC1000, 2030, 2110, 2120, 2130, 2800, 3020, 3110, 4010, 4020, 4030, 4110, 4120, 4130, 4140, 4160, 4180, 4210, 4220, 4230, 4240, 4250, 4260, 4540, 4601, 4602, 4603, PHYS2401, 4420	
(c) <b>Area 3: Statistical and Computational Methods (a maximum of TWO courses)</b>	
ESSC4510, 4520, PHYS2061, 3061	
<b>Total:</b>	<b>18</b>

<b>Course List</b>		
<i>Course Code</i>	<i>Course Title</i>	<i>Unit(s)</i>
ESSC1000	Exploring the Earth System	1
ESSC2010	Solid Earth Dynamics	3
ESSC2020	Climate System Dynamics	3
ESSC2030	Introduction to Computational Earth System Science	3
ESSC2110	Geoscience Field Study	1
ESSC2120	Integrated Geoscience Field Study	2
ESSC2130	Fundamental Geoscience Fieldwork	3
ESSC2800	Introduction to Environmental Engineering	3
ESSC3020	Analytic Methods in Earth and Environmental Sciences	3
ESSC3100	Structural Geology	3
ESSC3110	Geoscience Field Course	3
ESSC3120	Physics of the Earth	3
ESSC3200	Atmospheric Dynamics	3
ESSC3220	Atmospheric Chemistry	3
ESSC3300	Ocean and Climate	3
ESSC3320	Hydrogeology	3
ESSC3600	Ecosystems and Climate	3
ESSC3601	Principles of Ecosystems and Climate	2
ESSC3800	Global Environmental Change	3
ESSC3900	Internship	3
ESSC4010	Solid and Fluid Mechanics	3
ESSC4020	Rock and Soil Mechanics	3
ESSC4030	Engineering Geology	3
ESSC4110	Applied Geophysics	3
ESSC4120	Petrology	3
ESSC4130	Geomorphology	3
ESSC4140	Seismology	3

ESSC4160	Marine Geology and Geophysics	3
ESSC4180	Earthquake Source Physics	3
ESSC4210	Land-Atmosphere Interactions and Boundary Layer Meteorology	3
ESSC4220	Tropical Meteorology	3
ESSC4230	Introduction to the Physics and Chemistry of Aerosol	3
ESSC4240	Air Pollution Science and Engineering	3
ESSC4250	Advanced Topics in Atmospheric Dynamics	3
ESSC4260	Urban Climatology	3
ESSC4510	Statistical Methods and Data Analysis for Earth System Science	3
ESSC4520	Numerical Methods and Modeling for Earth System Science	3
ESSC4540	Remote Sensing – Principles and Applications	3
ESSC4601	Research Seminar in Earth System Science	1
ESSC4602	Selected Topics in Earth System Science	2
ESSC4603	Advanced Topics in Earth System Science	3
ESSC4810	Senior Project I	3
ESSC4820	Senior Project II	3
STAR2000	Undergraduate Research in Science I	1
STAR2050	Seminar I	1
STAR3000	Undergraduate Research in Science II	2
STAR3050	Seminar II	1
STAR4000	Undergraduate Research in Science III	3
STAR4050	Seminar III	1

[Study Scheme](#)   [Learning Outcomes](#)

## Learning Outcomes

### 1. Major Programme:

#### Knowledge Outcomes (Content)

Graduates will have possessed fundamental knowledge of Earth System Science, and a broadly based core in science subjects, including:

- (1) concepts and principles on the components of the Earth system and the complex and dynamic interactions among the components;
- (2) concepts related to climate change and other important global issues;
- (3) methodologies of detecting, monitoring, understanding, predicting Earth system events, and providing mitigation strategies for coping with global changes, and analytic, numerical, and experimental methods in Earth System Science; and
- (4) a broad-based knowledge in science disciplines with a certain depth on a selected branch of science.

#### Skills Outcomes

##### Professional Skills

Graduates will have possessed the following professional skills:

- (1) identifying the key factors and applying appropriate principles and methods in the study of a broad range of problems related to Earth System Science;
- (2) applying appropriate technical know-how for solving decision problems related to Earth System Science;
- (3) applying appropriate numerical methods, scientific programming skills, and statistical methods to analyze large amount of data; and
- (4) reporting the solutions to technical problems and project studies concisely in speech and in writing.

##### Generic Competencies

Graduates will have acquired broad generic skills and good habits in their study, including:

- (1) the ability to identify the key issues, to consider various factors, and to attempt different methods in dealing with problems;
- (2) the ability to evaluate an issue critically based on evidence and scientific principles;
- (3) the ability to acquire knowledge effectively by self-study and using information technology, and to work independently;
- (4) the ability to work effectively in a team; and
- (5) the ability to present information in a clear, concise and logical manner.

#### Attitude/Value Outcomes

Graduates will have developed positive attitudes and values, including:

- (1) appreciation of the beauty of the planet Earth and a responsible attitude on important global issues;
- (2) awareness of the latest developments in Earth System Science, climate change, environmental protection, sustainability, and other key issues;
- (3) ability to adapt in a changing environment;
- (4) willingness to take up responsibility in study and work; and
- (5) motivation for life-long learning.

### 2. Minor Programme:

Through the programme training, the students will master systemic approaches facilitating the analysis of Earth system events in terms of cause and effects and feedbacks in a holistic framework. These skills will be useful to government agencies, NGO or commercial entities that are in the weather and climate information, environmental, city planning, energy, water and food sectors. The programme is designed to be flexible so that students are equipped to pursue further graduate studies.

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