

## Mathematics Education

### Course List

<i>Code</i>	<i>Course Title</i>	<i>Unit</i>
<b>I. Mathematics Teaching</b>		
<b>Required Courses</b>		
*BME 3010/3020	Subject Curriculum and Teaching: Mathematics III	3/3
*BME 3030	Mathematical Literacy and Understanding	4
*BME 3050	The Teaching of Algebra	3
*BME 3060	The Teaching of Number Sense	3
BME 3070	The Teaching of Probability and Statistics	3
BME 3080	The Teaching of Spatial Sense and Geometry	3
@BME 3091, 3092	Independent Study I, II	3 each
<b>Elective Course</b>		
BME 3040	History of Mathematics in Mathematics Teaching	3
<b>II. Mathematics</b>		
<b>Required Courses</b>		
MAT 2010, 2020	Advanced Calculus I, II	3 each
MAT 2030, 2040	Linear Algebra I, II	3 each
MAT 2071	Symbolic Computing	2
MAT 2080, 2090	Essential Mathematical Methods I, II	3 each
<b>Elective Courses</b>		
<i>Group 1</i>		
MAT 2050	Elementary Analysis I	3
MAT 2110	Mathematics and Culture	3
MAT 3030	Algebra I	3
MAT 3080	Number Theory	3
MAT 3250	Complex Variables and Applications	3
<i>Group 2</i>		
MAT 3270	Ordinary Differential Equations	3
MAT 3280	Introductory Probability	3
MAT 3310	Computational and Applied Mathematics	3
MAT 4270	Discrete Dynamics and Fractals	3
<i>Group 3</i>		
CSC 1110	Introduction to Computing	3
CSC 1410	Digital Logic	3
MAT 2060	Elementary Analysis II	3
MAT 2072	Numerical Computing	2
MAT 3010	Higher Geometry	3
MAT 3040	Algebra II	3
*MAT 3060	Complex Analysis	3

\* Courses offered in 2002-03 and before.

@ As a substitute for a required course that is no longer offered.

MAT 3070	Introduction to Topology	3
MAT 3210	Linear Programming	3
MAT 3220	Operations Research and Logistics	3
MAT 3230	Numerical Analysis	3
MAT 3240	Numerical Methods for Differential Equations	3
MAT 3260	Graph Theory	3
MAT 3290	Discrete Mathematics	3
MAT 3300	Mathematical Modelling	3
MAT 3330	IT for Mathematics Teaching	3
MAT 4001	Project	3
MAT 4010	Functional Analysis	3
MAT 4020	Calculus of Variations	3
MAT 4030, 4040	Differential Geometry I, II	3 each
MAT 4050	Real Analysis	3
MAT 4210	Financial Mathematics	3
MAT 4220	Partial Differential Equations	3
MAT 4230	Optimization Theory	3
MAT 4240	Stochastic Processes	3
MAT 4250	Game Theory	3
MAT 4260	Coding Theory and Cryptography	3
STA 2101	Basic Statistical Concepts and Methods I	3
STA 2102	Basic Statistical Concepts and Methods II	3

### Course Description

(For the course descriptions of Computer Science (CSC), Mathematics (MAT) and Statistics (STA) courses, please refer to the programmes concerned. Unless otherwise specified, all are 3-unit term courses of three hours of lecture per week.)

#### BME 3040

##### History of Mathematics in Mathematics Teaching

This course aims at exploring the ways to integrate the history of mathematics into school mathematics teaching. With examples from the history of mathematics, mathematical concepts and logical thinking associated with the school mathematics curriculum are analysed in terms of their development of the basic mathematical ideas. The aesthetic and cultural aspects of mathematics can be demonstrated and thereby be appreciated as well. Rationales for integrating the history of mathematics into mathematics teaching are discussed, followed by examples and guidelines for implementing this integration. Student teachers will develop their conceptual skills and frameworks for effective design of using the history of mathematics in school mathematics teaching.

#### BME 3070

##### The Teaching of Probability and Statistics

This course focuses on the teaching of probability and statistics in school mathematics. At primary school level, statistics is introduced in relation to real-life applications. At higher grade levels, statistics is taught with more computational elements and their interpretations, and real-world experiences in probabilistic events are basis for developing a formal understanding of probability in mathematics. In this course, topics in probability and statistics in the mathematics curriculum are analysed from multiple perspectives, that is, in terms of the mathematics content knowledge, psychology of learning, pedagogical approaches and epistemological relationships between mathematical concepts involved. Emphasis is on the development of stochastic thinking

among school students. Through different learning activities which include the implementation of available information technology resources, student teachers will develop their conceptual skills and frameworks for effective instructional design in these curriculum topics.

**BME3080**

**The Teaching of Spatial Sense and Geometry**

This course focuses on the teaching of geometry in school mathematics. At junior primary school level, spatial sense is to be cultivated through concrete activities with shapes and solid forms. At higher grade levels, there is a gradual shift from synthetic or empirical geometry to deductive geometry. In this course, topics in geometry in the mathematics curriculum are analysed from multiple perspectives, that is, in terms of the mathematics content knowledge, psychology of learning, pedagogical approaches and epistemological relationships between mathematical concepts involved. Emphasis is on the development of spatial sense and geometrical thinking among school students. Through different learning activities which include the implementation of available information technology resources, student teachers will develop their conceptual skills and frameworks for effective instructional design in these curriculum topics.

**BME 3091, 3092**

**Independent Study I, II**

Students will pursue independent study in selected topics and areas under the supervision of teachers appointed by the Board of the Faculty of Education. (A student should only elect this course to fulfil the programme requirements if a required course is not offered within the normative study period of the student, and no other substitute can be found.)

### Study Scheme

*I. Major Programme*

<b>I.</b>	<b>Educational Core Component</b>	26 units
	Please refer to the "Faculty Requirements for 4-year Bachelor of Education Programmes" for details.	
<b>II.</b>	<b>Mathematics Teaching</b>	
(i)	Required Courses: BME3010,3020,3030,3050,3060,3070,3080	22 units
(ii)	Elective Courses: BME 3040	0-3 units
<b>III.</b>	<b>Mathematics</b>	
(i)	Required Courses: MAT 2010, 2020, 2030, 2040, 2071, 2080, 2090	20 units
(ii)	Elective Courses: Students are required to study - 6 units from Groups 1; - 6 units from Group 2; and - 15-18 units from Groups 1 to 3 Group 1: MAT 2050, 2110, 3030, 3080, 3250 Group 2: MAT 3270, 3280, 3310, 4270	27-30 units

Group3: CSC1110,1410,MAT2060,2072,3010,3040,3060,  
3070,3210,3220,3230,3240,3260,3290,3300,3330,  
4001,4010,4020,4030,4040,4050,4210,4220,4230,  
4240,4250,4260;STA2101,2102

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Total: 98 units

- Notes: 1. Students are required to complete at least 123 units of courses for graduation, including 98 units of Major courses, 2 units of Physical Education courses and 15 units of General Education courses.
2. Major GPA Calculation: All BME, CSC, EDU, MAT and STA courses of the Major programme coded 2000 and above will be included in the calculation of the Major GPA for honours classification.

## 2. Course Exemptions

Students who obtained Grade “B” or above in the HKALE\* “Pure Mathematics” subject may apply for exemption for MAT 2080/2090. Those students should take 6 more units of MAT courses from Groups 1 to 3 of the Mathematics Elective Courses in place of the exempted courses.

\* *Only applicable to students admitted on the strength of HKALE results. The HKALE results to be deemed acceptable for course exemption purpose must be obtained in that particular sitting of HKALE which the University has used to assess the admission qualification of the student concerned.*

## 3. Faculty Language Requirement

Please refer to the “Faculty Requirements for 4-year Bachelor of Education Programmes” for details.