THE UNIVERSITY OF HONG KONG
DEPARTMENT OF MATHEMATICS

# Advice on Course Selection 2016-17 (4-year curriculum)

## Contents

# 1 Introduction

One of the key features of the Bachelor of Science programme is the great flexibility of the curriculum. Students are free to choose their major and to plan their own class schedule. Meanwhile, it is very likely that you will have questions about what courses you should enroll in for your first two years so as to better prepare your future courses. In view of this, we are going to provide you in this article with some advice on course selection, aiming at those who are interested in choosing one of the following programmes:

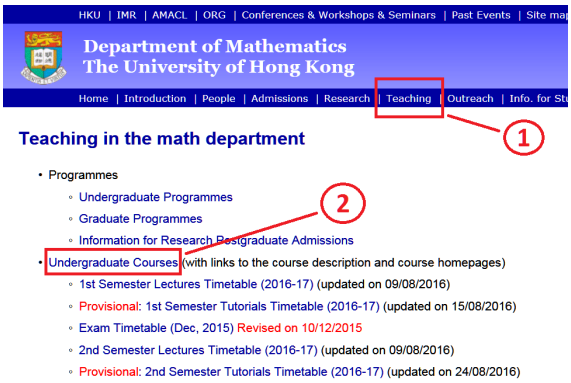
- Major in Mathematics
- Minor in Mathematics
- Minor in Computational and Financial Mathematics
- Minor in Operations Research and Mathematical Programming
  **(new minor programme)**

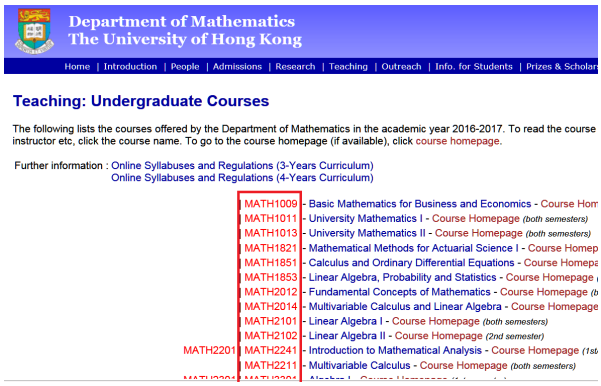
For further discussion and for endorsement of your course approval form, please contact our *Course Selection Advisers*.

## 1.1 List of courses offered (in 2016-17)

To find out the courses offered by our department, you can

1. go to `http://www.math.hku.hk/`
2. click **Teaching** $\Longrightarrow$ **Undergraduate Courses**. There are two columns of course codes: the left refers to codes for the 3-year curriculum whereas the right refers to codes for the 4-year curriculum.




Here we also extract the list of level 1 to level 4 courses for 4-year cohort:

| Course Code | Course Name | Semester Offered |
|---|---|---|
| MATH1009 | Basic Mathematics for Business and Economics | both |
| MATH1011 | University Mathematics I | both |
| MATH1013 | University Mathematics II | both |
| MATH1821 | Mathematical Methods for Actuarial Science I | 1st |
| MATH1851 | Calculus and Ordinary Differential Equations | both |
| MATH1853 | Linear Algebra, Probability and Statistics | both |
| MATH2012 | Fundamental Concepts of Mathematics | both |
| MATH2014 | Multivariable Calculus and Linear Algebra | both |
| MATH2101 | Linear Algebra I | both |
| MATH2102 | Linear Algebra II | 2nd |
| MATH2211 | Multivariable Calculus | both |
| MATH2241 | Introduction to Mathematical Analysis | both |
| MATH2822 | Mathematical Methods for Actuarial Science II | 2nd |
| MATH3301 | Algebra I | 1st |
| MATH3304 | Introduction to Number Theory | 2nd |
| MATH3401 | Analysis I | 1st |
| MATH3403 | Functions of a Complex Variable | 1st |
| MATH3405 | Differential Equations | 2nd |
| MATH3408 | Computational Methods and Differential Equations with Applications | 2nd |
| MATH3541 | Introduction to Topology | 2nd |
| MATH3600 | Discrete Mathematics | 1st |
| MATH3601 | Numerical Analysis | 1st |
| MATH3603 | Probability Theory | 1st |
| MATH3901 | Operations Research I | 2nd |
| MATH3904 | Introduction to Optimization | 1st |
| MATH3905 | Queueing Theory and Simulation | 2nd |
| MATH3906 | Financial Calculus | 1st |
| MATH3911 | Game Theory and Strategy | 2nd |
| MATH3943 | Network Models in Operations Research | 1st |
| MATH3999 | Directed Studies in Mathematics | both |
| MATH4302 | Algebra II | 2nd |
| MATH4402 | Analysis II | 2nd |
| MATH4404 | Functional Analysis | 1st |
| MATH4406 | Introduction to Partial Differential Equations | 2nd |
| MATH4501 | Geometry | 1st |
| MATH4902 | Operations Research II | 1st |
| MATH4907 | Numerical Methods for Financial Calculus | 2nd |
| MATH4910 | Senior Mathematics Seminar | 2nd |
| MATH4911 | Mathematics Capstone Project | 2nd |
| MATH4966 | Mathematics Internship | 1st/2nd/summer |
| MATH4999 | Mathematics Project | year long |

Table 1.1.1 List of level 1 to level 4 mathematics courses offered in 2016-17 (4-year cohort)

## 1.2 Programme requirements

In this section we list the requirements of our major/minor programmes for your reference. In fact, you can find all these information from

`http://webapp.science.hku.hk/sr4/servlet/enquiry`

### 1.2.1. Major in Mathematics

| Introductory level courses (48 credits) | |
|---|---|
| SCNC1111 | Scientific Method and Reasoning |
| SCNC1112 | Fundamentals of Modern Science |
| MATH1013 | University Mathematics II |
| MATH2012 | Fundamental Concepts of Mathematics |
| MATH2101 | Linear Algebra I |
| MATH2102 | Linear Algebra II |
| MATH2211 | Multivariable Calculus |
| MATH2241 | Introduction to Mathematical Analysis |
| Advanced level courses (42 credits) | |
| MATH3301 | Algebra I |
| MATH3401 | Analysis I |
| MATH3403 | Functions of a Complex Variable |
| Plus at least 24 credits advanced level Mathematics courses (MATH3XXX or MATH4XXX or MATH7XXX level), of which at least 12 credits should be from MATH4XXX or MATH7XXX level, subject to pre-requisite requirements. | |
| Capstone requirement (6 credits) | |
| At least 6 credits selected from the following courses: | |
| MATH3999 | Directed Studies in Mathematics |
| MATH4910 | Senior Mathematics Seminar |
| MATH4911 | Mathematics Capstone Project |
| MATH4966 | Mathematics Internship |
| MATH4999 | Mathematics Project (12 credits) |

Table 1.2.1 Programme requirements: **Major in Mathematics**

Please also refer to the notes and remarks listed in *Syllabuses and Regulations: Major in Mathematics*

### 1.2.2. Minor in Mathematics

| Introductory level courses (18 credits) |
|---|
| MATH1013 University Mathematics II<br>MATH2101 Linear Algebra I<br>MATH2211 Multivariable Calculus |
| Advanced level courses (18 credits) |
| At least 18 credits of advanced level Mathematics courses (MATH3XXX or MATH4XXX or MATH7XXX level), subject to pre-requisite requirements. |

Table 1.2.2 Programme requirements: **Minor in Mathematics**

Please also refer to the notes and remarks listed in *Syllabuses and Regulations: Minor in Mathematics*

### 1.2.3. Minor in Computational and Financial Mathematics

| Introductory level courses (18 credits) |
|---|
| MATH1013 University Mathematics II<br>MATH2101 Linear Algebra I<br>MATH2211 Multivariable Calculus |
| Advanced level courses (24 credits) |
| MATH3601 Numerical Analysis<br>MATH3906 Financial Calculus<br><br>Plus at least 12 credits selected from the following courses:<br><br>MATH3408 Computational Methods and Differential Equations with Applications<br>MATH3603 Probability Theory<br>MATH3904 Introduction to Optimization<br>MATH3911 Game Theory and Strategy<br>MATH4602 Scientific Computing<br>MATH4907 Numerical Methods for Financial Calculus<br>MATH7217 Topics in Financial Mathematics<br>MATH7224 Topics in Advanced Probability Theory |

Table 1.2.3 Programme requirements: **Minor in Computational and Financial Mathematics**

Please also refer to the notes and remarks listed in *Syllabuses and Regulations: Minor in Computational and Financial Mathematics*

### 1.2.4. Minor in Operations Research and Mathematical Programming

| Introductory level courses (18 credits) | |
|---|---|
| MATH1013 | University Mathematics II |
| MATH2101 | Linear Algebra I |
| MATH2211 | Multivariable Calculus |
| **Advanced level courses (24 credits)** | |
| MATH3901 | Operations Research I |
| MATH3904 | Introduction to Optimization |
| Plus at least 12 credits selected from the following courses: | |
| MATH3405 | Differential Equations |
| MATH3600 | Discrete Mathematics |
| MATH3905 | Queueing Theory and Simulation |
| MATH3911 | Game Theory and Strategy |
| MATH3943 | Network Models in Operations Research |
| MATH4902 | Operations Research II |
| MATH7502 | Topics in Applied Discrete Mathematics |
| MATH7503 | Topics in Mathematical Programming and Optimization |

Table 1.2.4 Programme requirements: **Minor in Operations Research and Mathematical Programming**

Please also refer to the notes and remarks listed in *Syllabuses and Regulations: Minor in Operations Research and Mathematical Programming*

**Remark (for students taking double majors, major-minor or double minors with overlapping course requirements):**

**See *Exemption and Replacement Arrangement*.**

# 2 Course Selection Advice

You may have several things to consider while selecting your courses. For instance, you may want to finish the compulsory courses as early as possible so as to enable yourself to enroll in more mathematics courses that you are interested in; or you may want to distribute the compulsory courses evenly so as to allow sufficient time to digest the materials and to strike a balance between the core subjects and your other interests.

**Here we would like to provide you with some study plans, focussing on your first and second years. Note that these are just suggestions – we do not intend to fix the menu for you and you can always design one that fits you better. Again, you are strongly advised to consult our *Course Selection Advisers* before making up your study plans.**

## 2.1 For students intending to major in mathematics

**Plan A** – with the prerequisites of MATH1013 at the beginning of Year 1 Sem 1 (e.g. students with M1 or M2 in HKDSE):

| | | |
|---|---|---|
| Year 1 | Sem 1 | MATH1013 University Mathematics II |
| | Sem 2 | MATH2012 Fundamental Concepts of Mathematics<br>MATH2211 Multivariable Calculus |
| Year 2 | Sem 1 | MATH2101 Linear Algebra I |
| | Sem 2 | MATH2102 Linear Algebra II<br>MATH2241 Introduction to Mathematical Analysis |

Plan A : For students intending to **major in mathematics**
(with the prerequisites of MATH1013 at the beginning of Year 1 Sem 1)

Remark: According to this plan, you will complete all the introductory level disciplinary courses as required by the major programme by the end of your second year.

**Plan B** – without the prerequisites of MATH1013 at the beginning of Year 1 Sem 1:

| | | | |
|---|---|---|---|
| Year 1 | Sem 1 | | MATH1011 University Mathematics I **OR** |
| | | † | MATH1009 Basic Mathematics for Business and Economics |
| | Sem 2 | | MATH1013 University Mathematics II |
| Year 2 | Sem 1 | | MATH2012 Fundamental Concepts of Mathematics |
| | | | MATH2211 Multivariable Calculus |
| | Sem 2 | | MATH2101 Linear Algebra I |
| | | | MATH2241 Introduction to Mathematical Analysis |

Plan B : For students intending to **major in mathematics**
(without the prerequisites of MATH1013 at the beginning of Year 1 Sem 1)

† MATH1009 Basic Mathematics for Business and Economics is **NOT** for students from the Faculty of Science or Engineering. It is **NOT** for students who have passed MATH1011 or MATH1013, or have already enrolled in these courses.

**Plan C** – this is an example of study plan for more aggressive students (assuming the prerequisites of MATH1013 at the beginning of Year 1 Sem 1 are satisfied):

| | | | |
|---|---|---|---|
| Year 1 | Sem 1 | | MATH1013 University Mathematics II |
| | | † | MATH2012 Fundamental Concepts of Mathematics |
| | Sem 2 | | MATH2101 Linear Algebra I |
| | | | MATH2211 Multivariable Calculus |
| Year 2 | Sem 1 | | MATH2241 Introduction to Mathematical Analysis |
| | | | MATH3301 Algebra I **OR** |
| | | | MATH3401 Analysis I |
| | Sem 2 | | MATH2102 Linear Algebra II |
| | | | MATH3XXX |

Plan C : For more aggressive students intending to **major in mathematics**

† Note that you need to seek approval from one of our *Course Selection Advisers* for taking MATH2012 concurrently with MATH1013.

Remark: According to this plan, you are able to enroll to some of our advanced level courses in your second year.

Remark: For all plans above you can fill up the remaining credits with common cores, SCNC and CAES courses as well as some other electives that you are interested in.

## 2.2 For students intending to minor in mathematics/minor in computational and financial mathematics/minor in operations research and mathematical programming

- Students doing a major in risk management, major in economics/finance or major in quantitative finance are **highly recommended** to attempt one of our minor programmes.

**Plan D**

| | | | |
|---|---|---|---|
| Year 1 | Sem 1 | | |
| | Sem 2 | † | MATH1013 University Mathematics II |
| Year 2 | Sem 1 | | MATH2012 Fundamental Concepts of Mathematics |
| | | † | MATH2211 Multivariable Calculus |
| | Sem 2 | † | MATH2101 Linear Algebra I |

Plan D : For students intending to do one of our **minor programmes**

† Required introductory level courses (for all our minor programmes)

Remark: Year 1 Sem 1 is left blank for mathematics courses to reserve room for the major and faculty requirements. However, students without the prerequisites of MATH1013 are suggested to put MATH1009 or MATH1011 in this semester.

Remark: Though not required by the minor programmes, MATH2012 is recommended so as to facilitate the understanding of other level 2 or above courses.

If you are more aggressive and would like to explore more about mathematics, then you can try the following:

**Plan E**

| | | | |
|---|---|---|---|
| Year 1 | Sem 1 | † | MATH1013 University Mathematics II |
| | Sem 2 | | MATH2012 Fundamental Concepts of Mathematics |
| | | † | MATH2101 Linear Algebra I |
| Year 2 | Sem 1 | † | MATH2211 Multivariable Calculus |
| | | | MATH2241 Introduction to Mathematical Analysis |
| | Sem 2 | | MATH2102 Linear Algebra II |
| | | | MATH3XXX |

Plan E : For more aggressive students intending to do one of our **minor programmes**

† Required introductory level courses (for all our minor programmes)