IBDP-MATH

Nature of the subject

The nature of mathematics can be summarized in a number of ways: for example, it can be seen as a well-defined body of knowledge, as an abstract system of ideas, or as a useful tool. For many people it is probably a combination of these, but there is no doubt that mathematical knowledge provides an important key to understanding the world in which we live. Mathematics can enter our lives in a number of ways: we buy produce in the market, consult a timetable, read a newspaper, time a process or estimate a length. Mathematics, for most of us, also extends into our chosen profession: artists need to learn about perspective; musicians need to appreciate the mathematical relationships within and between different rhythms; economists need to recognize trends in financial dealings; and engineers need to take account of stress patterns in physical materials. Scientists view mathematics as a language that is central to our understanding of events that occur in the natural world. Some people enjoy the challenges offered by the logical methods of mathematics and the adventure in reason that mathematical proof has to offer. Others appreciate mathematics as an aesthetic experience or even as a cornerstone of philosophy. This prevalence of mathematics in our lives provides a clear and sufficient rationale for making the study of this subject compulsory within the Diploma Programme.

科目性质简介

数学的性质可以以多种方式来展现：如，数学可以被看作是知识的完美阐释，是理想的具体表达，或是一种有用的工具。对大多数人来说，数学是以上几种理解的组合，但毫无疑问的是数学知识对于我们认识所处的世界提供了一个重要的途径。数学以各种方式进入了我们的生活：我们在市场上购买产品、查看时间表、读报、测量一个时间过程或估算长度等等。对大多数人来说，数学也影响着我们所选择的职业：艺术家需要学习角度；音乐学家需要理解不周音律之间的关系；经济学家需要在财政交易中识别趋势；工程师需要考虑物理材料的应力模式。

Summary of courses available

Because individual students have different needs, interests and abilities, there are four different courses in mathematics. In making this selection, individual students should be advised to take account of the following types of factor.

• Their own abilities in mathematics and the type of mathematics in which they can be successful

• Their own interest in mathematics, and those particular areas of the subject that may hold the most interest for them

• Their other choices of subjects within the framework of the DP

• Their academic plans, in particular the subjects they wish to study in future

• Their choice of career

课程摘要

由于不同学生的需求、兴趣和能力不同，数学共有四个课程类型供学生选择。在选择课程时，建议学生考虑以下因素：

• 学生现有的数学能力以及在预选择课程中的成功率

• 学生的数学兴趣，以及能吸引学生继续学习的特殊领域

• 学生在IBDP中的其他科目选择

• 学生的学术规划，特别是未来所要学习的科目

• 职业选择方向

Mathematical studies SL

This course is available at standard level (SL) only. It caters for students with varied backgrounds and abilities. More specifically, it is designed to build confidence and encourage an appreciation of mathematics in students who do not anticipate a need for mathematics in their future studies. Students taking this course need to be already

equipped with fundamental skills and a rudimentary knowledge of basic processes.

数学研究普通课程

数学研究只开设普通课程，它满足了学生多样化的背景和能力。此课程主要针对在今后不再学习数学的学生，以建立这些学生在数学学习中的自信并激励学生提高对数学的理解。选择本课程的学生应具备基本的数学能力。

Mathematics SL

This course caters for students who already possess knowledge of basic mathematical concepts, and who are equipped with the skills needed to apply simple mathematical techniques correctly. The majority of these students will expect to need a sound mathematical background as they prepare for future studies in subjects such as chemistry, economics, psychology and business administration.

数学普通课程

本课程适合于已掌握基本数学概念并能够正确运用简单数学运算的学生。这些学生中的大部分人今后多选择化学、经济、心理学和商业科目，合适的数学背景将有助于未来学科的学习。

Content of mathematics SL

The course consists of the study of seven topics. (Total 150 hrs)

Syllabus content (140 hrs)

Requirements

All topics are compulsory. Students must study all the sub-topics in each of the topics in the syllabus as listed in this guide. Students are also required to be familiar with the topics listed as presumed knowledge (PK).

Topic 1—Algebra	8 hrs
Topic 2—Functions and equations	24 hrs
Topic 3—Circular functions and trigonometry	16 hrs
Topic 4—Matrices	10 hrs
Topic 5—Vectors	16 hrs
Topic 6—Statistics and probability	30 hrs
Topic 7—Calculus	36 hrs

Portfolio 10 hrs

Two pieces of work, based on different areas of the syllabus, representing the following two types of tasks:

• mathematical investigation

• mathematical modelling.

数学普通课程内容

本课程由7章内容组成（总课时为150小时）

大纲内容（140 小时）

要求

所有章节都为必修内容，学生必须学习大纲中所列示的章节内所有内容。学生也需要熟悉假定知识内所列示的内容。

第一章—代数	8 小时
第二章—函数与方程	24 小时
第三章—三角函数	16 小时
第四章—矩阵	10 小时
第五章—矢量	16 小时
第六章—统计与概率	30 小时
第七章—微积分	36 小时

组合 10 小时

基于大纲中的不同知识领域，完成两项作品，表现出以下两个任务类型：

- 数学调查
- 数学模型

Mathematics HL

This course caters for students with a good background in mathematics who are competent in a range of analytical and technical skills. The majority of these students will be expecting to include mathematics as a major component of their university studies, either as a subject in its own right or within courses such as physics, engineering and technology. Others may take this subject because they have a strong interest in mathematics and enjoy meeting its challenges and engaging with its problems.

数学高级课程

本课程适合于具有优秀数学背景的学生，这部分学生具有一系列的分析和计算能力。这些学生中大多数将把数学作为大学学习中的重要组成部分，或作为专业单独学习，或包含于像物理、工程和技术课程中。另外一些学生由于他们对数学有着强烈的兴趣并乐于解决数学问题而选择本课程。

Contents of mathematics HL

The course consists of the study of seven core topics and one option topic. (Total 240 hrs)

Core syllabus content 190 hrs

Requirements

All topics in the core are compulsory. Students must study all the sub-topics in each of the topics in the syllabus as listed in this guide. Students are also required to be familiar with the topics listed as presumed knowledge (PK).

Topic 1—Algebra	20 hrs
Topic 2—Functions and equations	26 hrs
Topic 3—Circular functions and trigonometry	22 hrs
Topic 4—Matrices	12 hrs
Topic 5—Vectors	22 hrs
Topic 6—Statistics and probability	40 hrs
Topic 7—Calculus	48 hrs

Requirements

Students must study all the sub-topics in one of the following options as listed in the syllabus details.

Topic 8—Statistics and probability	40 hrs
Topic 9—Sets, relations and groups	40 hrs
Topic 10—Series and differential equations	40 hrs
Topic 11—Discrete mathematics	40 hrs

Portfolio 10 hrs

Two pieces of work, based on different areas of the syllabus, representing the following two types of tasks:

- mathematical investigation
- mathematical modelling.

数学高级课程内容

本课程由7章核心章节和一个选修内容组成（总课时为240小时）

核心大纲内容（190 小时）

要求

所有核心章节都为必修内容，学生必须学习大纲中所列示的章节内所有内容。学生也需要熟悉假定知识内所列示的内容。

第一章—代数	20 小时

第二章—函数与方程 26 小时
第三章—三角函数 22 小时
第四章—矩阵 12 小时
第五章—矢量 22 小时
第六章—统计与概率 40 小时
第七章—微积分 48 小时
要求
学生必须学习以下选修内容之一的所有大纲列示内容
第八章—统计与概率 40 小时
第九章—集合 40 小时
第七章—级数和微分方程 40 小时
第七章—离散数学 40 小时

组合 10 小时

基于大纲中的不同知识领域，完成两项作品，表现出以下两个任务类型：

- 数学调查
- 数学模型

Further mathematics SL

This course is available at SL only. It caters for students with a good background in mathematics who have attained a high degree of competence in a range of analytical and technical skills, and who display considerable interest in the subject. Most of these students intend to study mathematics at university, either as a subject in its own right or as a major component of a related subject. The course is designed specifically to allow students to learn about a variety of branches of mathematics in depth and also to appreciate practical applications.

进阶数学普通课程

本课程仅提供普通课程。本课程适合于具有优秀数学背景的学生，这部分学生具有高水平的分析和计算能力并对本学科具有浓厚的学习兴趣。大多数这部分学生将在大学中学习数学专业，或作为专业单独学习或作为相关学习的重要组成部分。本课程的设置将使学生更深入地学习数学中的多个分支内容，也能增强学生的实际应用能力。