This specialism is designed for researchers, educators and pre-service or in-service Mathematics teachers in primary or secondary schools, especially those from direct subsidy scheme schools, mainstream schools and international schools, who want to equip themselves to research and teach Mathematics in local as well as various global contexts. The programme caters for practitioners in the teaching of the mathematics curriculum in Hong Kong, making reference to the teaching of other curricula, such as International Baccalaureate (IB), GCSE etc.

This specialism is recognised by the IBO (International Baccalaureate Organization) as a course provider for the IB Certificate in Teaching and Learning and the IB Advanced Certificate in Teaching and Learning Research (DP).

Please visit the following website for more information about the IB Educator Certificate: http://www.ibo.org/professional-development/professional-certificates/ib-educator-certificates/.

Who would benefit from this specialism?
(i) Mathematics Educators: from Direct Subsidy Scheme schools, mainstream schools and international schools in Hong Kong; (ii) Local and mainland university graduates who intend to work in international schools; (iii) Serving and pre-serving mathematics teachers from Asian-Pacific area and all over the world; (iv) Mathematics teachers in the secondary or tertiary sectors, and other educators who are directly involved with mathematics education; (v) The specialism also provides an important foundation for students who would like to carry out a PhD or EdD study in the field of mathematics education.

Mode of study:
The specialism is available in 1-year full-time and 2-year part-time modes of study.

Outline of the four specialist courses:

Course 1: Integrating IB Philosophy into the Teaching of Chinese Language, Mathematics and Science (6 credits)

This course includes an in-depth exploration into how to integrate IB DP philosophy in curriculum design, teaching and learning, assessment and research. Students will be guided on designing and refining Chinese language/ Mathematics/Science curriculum that reflects the overall IB DP philosophy and learner profile and at the same time aligns with the Chinese language/ Mathematics / Science curriculum guides. Students will also be engaged in exploring various pedagogies and technological tools to integrate IB philosophy and learner profiles in language and culture instruction. Students will explore TOK, CAS and Extended Essay and Chinese language/ Mathematics / Science education. Furthermore, the course will also enhance students' understanding on how to reflect IB philosophy, cross-disciplinary application and learner profile in assessment design and how to design assessments that reflect IB subject matter specific assessment criteria.
In this course, students will not only understand the integration of IB philosophy in various aspects of instruction, but also generate a series of research questions around the integration of IB philosophy in instruction.

**Course 2: Research and/or Mathematics Teaching Practice in Classrooms (6 credits)**

In order to integrate knowledge with real school experience, this course provides opportunity for students with experience in application of IB Philosophy and mathematics teaching in classrooms aside from getting to understand the theories on mathematics teaching and learning. The aim is to familiarise students with day-to-day teaching practice at international minded schools in Hong Kong, by engaging students in actual teaching at international schools in Hong Kong, to identify and tackle students' learning difficulties. This course will be a strong theoretical and practical emphasis on the development of students' research and teaching ability on mathematics teaching and learning in classrooms. During their school experience, student-teachers are required to identify their students' learning difficulty; using appropriate theories to analyze it; design and conduct a small-scale action research with the application of suitable teaching strategies to deal with the identified learning difficulties. The student-teachers will conduct classroom observation, and compile a self-directed portfolio based on data collected and experience encountered in their action research. This portfolio contains a journal, lesson plans and teaching materials developed by the student-teachers during the practicum, self-reflections on lessons taught and feedback from the students.

**Course 3: Research into the Teaching and Learning of Mathematics (6 credits)**

This course gives an overview of theories and research on the teaching and learning of mathematics. Research in the teaching and learning of some major areas in mathematics such as algebra is reviewed. In addition, examples of investigation of mathematics teacher's pedagogical content knowledge, teacher conception, assessment related to the teaching and learning of mathematics, classroom research, small-scale and large-scale studies will be discussed. The course and assessment are designed in such a way for an introduction to a virtual experience of research culture for mathematics teachers and professionals. It is hoped that in the course the students will read, talk about, reflect upon how research may have an implication in their profession. They are expected to make presentations, plan their own research, and develop an awareness of how a research culture can be an enhancement of their life-long professional development.

**Course 4: The Philosophical, Social and Cultural Aspects of Mathematics Education (6 credits)**

This course focuses on the features that characterise mathematics as a distinctive discipline. It explores the relationship between the nature of the discipline, the aims of mathematics education, and the nature of mathematics teaching and learning. The effect on teachers' and students' beliefs and attitudes, and on students' achievement will also be discussed. In addition, this course investigates the social and cultural factors that affect the teaching and learning of mathematics. This includes international comparisons of socio-cultural differences; ethnomathematics from anthropological and utilitarian perspectives; social inequalities including gender issues; and the relationship between language and mathematics.

**Outline of two specialist electives:**

**Specialist Elective 1: Curriculum Research and Development in Mathematics (6 credits)**

This course discusses issues that revolve around the mathematics curriculum and its development in schools. Without limiting the discussion to Hong Kong, a deeper understanding of the issues and concepts concerned with curriculum research and development is expected to be emerging from a better knowledge about the mathematics curricula in various other countries. Important issues to be discussed include: the ongoing development of curriculum in mathematics; current mathematics curriculum projects overseas; the history of the mathematics curriculum; forces that shape the mathematics curriculum in Hong Kong; the relevance of school mathematics; mathematics across the curriculum; assessment in mathematics; school
mathematics that caters for individual differences; and diversification and standardisation of the mathematics curriculum.

**Specialist Elective 2: Innovation and Development of Instructional Design in Mathematics (6 credits)**

This course focuses on research and development of educational design in mathematics. By analysing cases of pedagogical practice and innovation, students will understand and reflect on principles and theoretical frameworks guiding the process of developing mathematics pedagogy. There will be study of task design, involving different tools and representations, situated in various contexts of mathematics learning, from the perspectives of teachers, designers and researchers. Special attention will be given to the role of digital technology in shaping the goals and means of developing mathematics instructions and building learning environments.

In addition to four specialist courses, students will also have to complete:
- A compulsory core course: Educational Issues and Research (6 credits);
- Three elective courses including at least one of the specialist electives (6 credits each); and
- An option of a professional portfolio (12 credits) or a research project (12 credits).