

## Sub-theme 6.4. Mathematical Research

### **Rationale**

The need of mathematics is strongly increasing in areas of natural sciences, education, technology, finance, economics and medicine. Nowadays mathematics is categorised in to pure mathematics and applied mathematics. Applied mathematics is more interdisciplinary than pure mathematics. However, the two sub-disciplines are interconnected in such a way that pure mathematics enriches and develops applied mathematics under some constraints. On the other hand, some new technologies may be in need of new and highly advanced mathematical concepts to be formulated for addressing the real problems of technologies. This can be addressed by conducting research at a high level pure mathematics. Hence, the two sub-disciplines complementary roles in serving the advancement of other sciences.

### **Aim**

The main aim of this sub-theme is to explore, introduce, and transfer new computational mathematics knowledge, and to formulate and develop mathematical theories in different streams.

### **Description**

This sub-theme encompasses analysis, ordinary and partial differential equations, optimisation, control theory, algebra, operational research, dynamical systems, etc, which have their own applications in real world problems and sciences such as engineering, agriculture, economics, medicine, finance, etc. In addition to its role in developing new mathematical theories, the sub-theme deals with relevant applications and models.

### **Potential Collaborators**

Schools, universities, MOE, industries and NGOs involved in promoting mathematics education

## **Expected Output**

- New mathematical methods and theories
- Transformative mathematical knowledge
- Applicable mathematics

## **Research Areas**

### **6.4.1. Computational mathematics theories and applications**

The focus of this research area is integrated modeling, formulation, analysis and numerical algorithms for solving mathematical and computational real world problems. This includes ordinary differential equation (ODE), partial differential equation (PDE), integro-differential equations and stochastic methods, modeling and numerical simulation, computational and mathematical biosciences, and computational algebra. The research area also encompasses studies related to computational methods in solving problems through linear algebra, analysis, ordinary and partial differential equations, asymptotic analysis, elements of harmonic analysis, numerical analysis, optimisation and nonlinear equations.

### **6.4.2. Transformative new mathematical knowledge and applications**

This research area covers a wide range of pure and applied mathematics. It focuses on identifying new mathematical research results in pure as well as applied areas such as analysis, optimisation, operational research, mathematical control theory, numerical analysis, ordinary and partial differential equations, bio-mathematical models, algebra, etc in which an extension, formulation and developing new theories in connection with agricultural economics, engineering, physics, finance etc. will be conducted.

## **Beneficiary**

Public institutions, industries, scientific community, policy makers, and the wider community