Mathematics is fundamental to the formulation and analysis of scientific theories. It is a rich and independent field of inquiry, and its study is an excellent preparation for life in our highly specialized society.

- Aims and goal

This project aim at revitalizing computational skills in the graduate students and teaching the fundamental concepts of calculus and algebra through the use of computer software and algorithms such as Matlab, Maple software, C++ and python programming. This program also aims to introduce the teaching of fluid dynamics at both undergraduate and graduate levels.

- Plan/Schedule of the project

Webinars July to August, 2022
There will be two Webinars
(i)   Computational Methods in Fluid Dynamics;
(ii)   Teaching the basic concepts of calculus with applications through the use of computer software

Teaching September – December, 2022
   ➢ Differential Calculus
      Week 1:   Definition of Limits
      Week 2:   Rules on the evaluation of limits and limits at infinity
      Week 3:   Infinite limit and limit at infinity
      Week 4:   Undetermined forms
      Week 5:   Asymptotes
      Week 6:   Continuity
      Week 7:   Exponential and Logarithm
      Week 8:   Quiz
      Weeks 9-11: Differentiability
      Week 12:   Revision
      Weeks 13-14: Examination
      Weeks 15-16: Markings

   ➢ Fluid Dynamics
      Week 1:   Blasius solution method

      Week 2:   Boundary layer flow equation over a plate

      Week 3:   Navier Stoke equations: Continuity, momentum and energy equations

      Week 4:   Orr-Sommerfield equation

      Week 5:   Rankine-Hugoniot relation

      Week 6:   Stability analysis

      Week 7:   Autonomous and non- autonomous systems

      Week 8:   Quiz

      Week 9:   Regular and singular pertubation methods for flow problems

      Week 10:   Compressible and incompressible flow

      Week 11:   Two and three diomensional flow between parallel plates

Week 12:   Revision
Weeks13-14:   Examination
Weeks15-16:   Markings

Teaching January – May, 2023
  ➢ Integral Calculus
    Week 1:   Indefinite Integral
    Week 2:   Standard integrals
    Weeks 3-4:   Riemann sums

    Weeks 5-6:   Partial Fractions of Integral

    Weeks 7-10:   Applications of Integration

    Week 11:   Quiz
    Week 12:   Revision
    Weeks 13-14: Examination
    Weeks 15-16: Markings

    Post graduate Research in Fluid Dynamics January-May,2023

  ➢ Use of computer software and algorithms such as Matlab, Maple software, C++ and
    python programming.

    Tour/Benediction June,2023

- Expected results of the project
  ➢ This program will provide students with extensive research and educational experiences
    in modelling, analysis, algorithm development, and simulation for problems arising
    throughout mathematics, sciences, and engineering.
  ➢ The graduate support program aims to offer graduate students a wide range of
    considerable computational techniques in fluid dynamics.
  ➢ The learning outcomes of the project will contribute immensely to the development of
    mathematics education in Kampala International University and her sister universities.

  - When the project is expected to be finalized: June 30, 2023

  - Researchers/teachers involved in the project
    Prof O.D. Makinde- South Africa
    Prof O.M. Bamigbola-Nigeria
    Prof Amos O. Ogunsola- Nigeria
    Pro. Rachel W. Mbogo- Kenya
    Associate Prof B.A. Peter-Uganda
    Associate Prof Onuorah Martins- Uganda
    Associate Prof Sulaiman-Swaziland
    Dr Godwin Kakuba- Uganda
    Dr Titus Okello-   Kenya
    Dr R.O. Oderinu- Nigeria

- Expected total cost of the project and a breakdown of total cost (in EUR)

Travel Cost	**EUR3000**
Accommodation	**EUR3000**
Training/Teaching	**EUR2000**
Cordinating/Administrative Cost	**EUR1000**
Other Cost	**EUR1000**
Total Cost	**EUR10,000**

Project start date: July 1, 2022

Project end date: June 30, 2023

Total duration of the project: I year

Project name:

GRADUATE SUPPORT PROGRAM IN COMPUTATIONAL FLUID DYNAMICS AND TEACHING OF CALCULUS-ALGEBRA

Country/Institution where the project will be held/based is Kampala International University, Uganda

How many mathematicians/mathematics educators and from which countries will be reached with this project:

10-15 mathematicians from Uganda, Kenya, South Africa, Swaziland and Nigeria.

20 postgraduate and 200 undergraduate students

How will this project address CDC's mandate to support mathematics in the developing world:

- ➢ This program will contribute immensely to the development of diploma, undergraduate and graduate students in fluid dynamics and innovative basic concepts in differential calculus at Kampala International University, Kampala.
- ➢ The program will strengthen the established institutional partnership between Kampala International University, Kampala and CDC.
- ➢ This program will form a genuine partnership to increase the level of students' understanding in calculus and algebra.
- ➢ This project will contribute to strengthen the cooperation between the Home and Host institutions and the established contacts.

Project Aim:

This project aim at revitalizing computational skills in graduate students and teaching the fundamental concepts of calculus and algebra through the use of computer software and algorithms such as Matlab, Maple software, C++ and python programming. This program also aims to introduce the teaching of fluid dynamics at both undergraduate and graduate levels.

Target Group: diploma, undergraduate and graduate students.