Concurrent Session 1

Seminar 1

A simple SI-type model for HIV/AIDS with media and self-imposed psychological fear

Dr. Nasser Al-Salti, Sultan Qaboos University, Oman

Seminar 2

Understanding and Promoting the Needs of Gifted and High Ability Students in a School Context

Cynthia Lynn Bolton, Gifted Education of Qatar Foundation, Qatar

Gifted and high ability students have strengths and difficulties that shape the way they view the world, solve problems and relate to others. They have the ability to perform at higher academic levels if supported properly but may not demonstrate their ability in the school setting due to social pressures, boredom or teachers who may not understand how to best engage them. They may experience difficulties when trying to make friends, understanding and regulating their emotions and exploring who they are and who they want to be.

According to Dabrowski's Theory of Positive Disintegration ((Dabrowski 1964, 1967, 1970, 1972) gifted students experience the world at a heightened level of sensitivity which should be considered when developing programs that best support them. Dr. Jane Piirto in the book Understanding Creativity explores the social and emotional commonalities of successfully gifted individuals throughout history making a strong argument for the need of identification of gifted students at a young age and strategically planned targeted support for positive social and emotional development (Piirto 2000).

This presentation focuses on identifying gifted students, understanding their giftedness while raising awareness of their social and emotional needs and exploring ways to promote their development in the school context.

Seminar 3

Hepatitis C Virus Treatment in High Burden Country in the Middle East and North Africa: Mathematical Modeling Analyses

Dr. Houssein Ayoub, Qatar University

In this talk, I will present some numerical results of a research project related to the Mathematical Biology field. As background, breakthroughs in the pipeline and accessibility to direct-acting antivirals (DAAs) have opened ambitious opportunities for controlling hepatitis C virus (HCV) infection and reducing its burden and cost. Much policy and scientific attention have focused on the recently stipulated global target of HCV elimination by 2030. This has contributed to the launch of ambitious DAA treatment programs, such as that of Egypt, the nation most affected by this infection. In this project, we aimed to assess whether DAA treatment programs could be designed to serve as treatment as prevention programs for HCV infection, leading to HCV elimination by 2030 as per the World Health Organization plan. A nonlinear age-structured mathematical model was developed and analyzed to describe HCV transmission in a population. The mathematical model was fitted to epidemiological data using a non-linear least-square fitting method. Five optimal treatment program scenarios were considered from 2014 up to 2030 including different targets for HCV control and elimination. The results showed that DAA scale-up will have immense and immediate impact on the number of new HCV infections. Elimination by 2030 is feasible if sufficient resources are committed to program scale-up and sustainability.

Seminar 4

The numerical solution of a wind-driven current Oceanography Model using the Sinc-Derivative interpolation method.

Dr. Abdullah Kenzu, Qatar University

In this paper, the Sinc-Derivative Collocation method is used to solve an oceanography model. The model describes a wind-driven current with depth-dependent eddy viscosity. The model is developed in both complex velocity and coupled system formulations. In general, the Sinc-based methods excel over traditional numerical methods due to their exponentially decaying errors, rapid convergence and handling problems in the presence of system singularities. Together with these advantages, the Sinc-Derivative interpolation approach utilizes first derivative interpolation, minimizing the numerical errors associated with numerical differentiation. The approximate solutions determined by the Sinc-Derivative technique is shown to be more accurate and efficient than other methods in the literature.