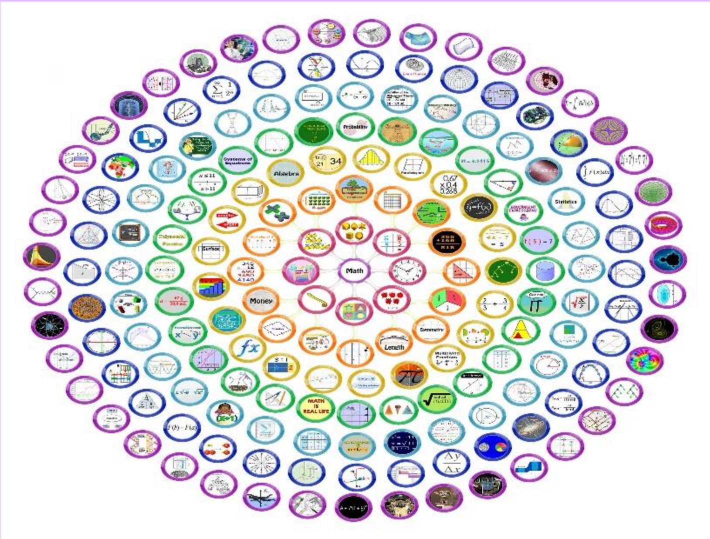
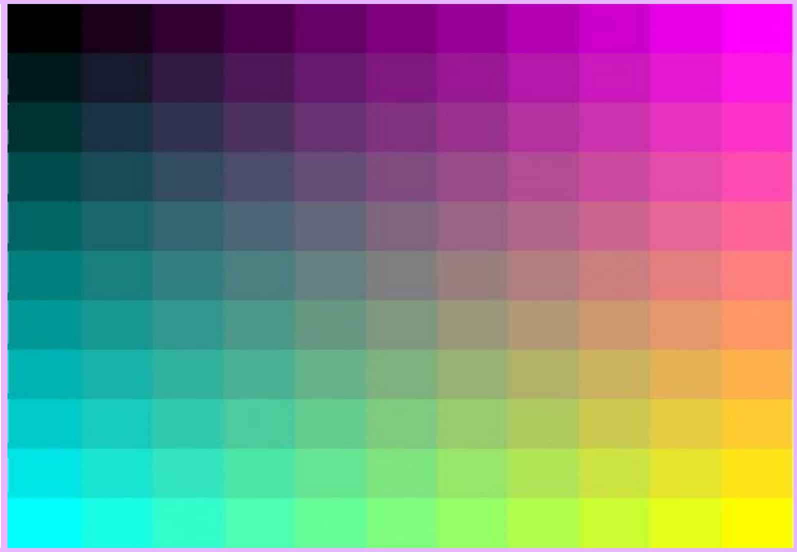
COLLOQUIUM





4-4-24

Place: Neckers 156   Time: 3:00pm

Reception immediately following in the Math Library.

Graduate Students "Double-Header" Colloquium

Speakers: **Devjani Basu,** SIUC
Title: **Modular Representations of the Special Linear Groups over a Finite Field**
Date: **4-4-2024**
Time: **3:00-3:25 pm**
Place: **Neckers 156**

Abstract: Let p be a prime number, F_q a finite field of q elements, where q is a power of p and F be its algebraic closure. The modular representations of the group $SL_n(F_q)$ are the representations over the field with characteristic $l > 0$. Our study is restricted to the case of equal characteristic, i.e. $l = p$. The overarching goal is to describe all the irreducible modular representations of $SL_n(F_q)$, explicitly, as vector spaces. Owing to the nature of $SL_n(F_q)$ as a finite group of Lie Type, we employ time-honored methods as well as explore new techniques to accomplish our goal.

+++

Speakers: **Shanika Chandrasena,** SIUC
Title: **Stochastic SEIR(S) model with nonrandom total population**
Date: **4-4-2024**
Time: **3:30-3:55 pm**
Place: **Neckers 156**

Abstract: In this study we are interested on the following 4-dimensional system of stochastic differential equations.

$dS=(-\beta SI+\mu(K-S)+\alpha I+\zeta R)dt-\sigma_1 SIF_1 (S,E,I,R)dW_1+\sigma_4 RF_4 (S,E,I,R)dW_4$

$dE=(\beta SI-(\mu+\eta)E)dt+\sigma_1 SIF_1 (S,E,I,R)dW_1-\sigma_2 EF_2 (S,E,I,R)dW_2$

$dI=(\eta E-(\alpha+\gamma+\mu)I)dt+\sigma_2 EF_2 (S,E,I,R)dW_2-\sigma_3 IF_3 (S,E,I,R)dW_3$

$dR=(\gamma I-(\mu+\zeta)R)dt+\sigma_3 IF_3 (S,E,I,R)dW_3-\sigma_4 RF_4 (S,E,I,R)dW_4$

with variance parameters $\sigma_i\geq 0$ and constants $\alpha,\beta,\eta,\gamma,\mu\ \zeta\geq 0$.

This system may be used to model the dynamics of susceptible, exposed, infected and recovering individuals subject to a present virus with state-dependent random transitions. Our main goal is to prove the existence of a bounded, unique, strong (pathwise), global solution to this system, and to discuss asymptotic stochastic and moment stability of the two equilibrium points, namely the disease free and the endemic equilibria. In this model, as suggested by our advisor, diffusion coefficients can be any local Lipschitz continuous functions on bounded domain

$D=\{(S,E,I,R)\in R_+^4: 0<S,E,I,R<K, S+E+I+R<K\}$

with fixed constant $K>0$ of maximum carrying capacity. At the end we carry out some simulations to illustrate our results. This is based on joint work with Prof. Dr. Henri Schurz (SIU), already submitted for publication and currently in revision process.

SOUTHERN ILLINOIS UNIVERSITY
SCHOOL OF MATHEMATICAL & STATISTICAL SCIENCES