Dean's Colloquium
Dr. Meaza Bogale, Assistant Professor
Department of Mathematics, Hampton University

When: Wednesday, November 01, 2023
Where: Turner 129
Time: 3:30 – 3:50 pm, Q&A: 5 min

Tittle: On Boral adjoint orbits in maximal nilpotent subalgebra.

Abstract: In this talk we describe the B_n-similarity orbits in $\mathcal{N}_n$ through the Belitskiĭ's canonical forms, where $\mathcal{B}_n$ and $\mathcal{N}_n$ be the set of $n \times n$ nonsingular and nilpotent triangular matrices respectively. Graphical and combinatorial approach will be provided to classify the B_n-similarity orbits in the set of $n \times n$ nilpotent upper triangular matrices $\mathcal{N}_n$. The Belitskii's canonical form of $A \in \mathcal{N}_n$ under $\mathcal{B}_n$-similarity is in $\sigma \mathcal{U}_n$, where $\mathcal{U}_n$ is the set of $n \times n$ unit upper triangular matrices and σ is the subpermutation such that $A \in \mathcal{B}_n \sigma \mathcal{B}_n$. As consequences, all Belitskii's canonical forms, the upper triangular similarity orbits of strictly upper triangular matrices for $n = 7, \ 8$ are completely classified. In the second part, we will consider $\mathcal{B}_{2n}, \ \mathcal{H}_{2n}$, and $\mathcal{U}_{2n}$ the set of Borel, Cartan, maximum unipotent subgroup of symplectic group Sp_{2n}, respectively. The adjoint action of Borel subgroup of the symplectic Lie group Sp_{2n} on the maximum nilpotent subalgebra $\mathfrak{n}$ of the Lie algebra $\mathfrak{sp}_{2n}$ will be considered to study adjoint orbits in the type C case. The elementary adjoint actions in $\mathfrak{n}$ in terms of the positive root system will be discribed, a redefined version of Belitskii's algorithm will be given and use this algorithm to describe the corresponding canonical forms on the symmetrized lattice of positive roots.

Biography: Dr. Meaza Bogale is an assistant professor of mathematics at the School of Science, Department of Mathematics at Hampton University. She joined Hampton University on August 21, 2023. Dr. Bogale received a B.Ed. degree in mathematics from Jimma University, Ethiopia, in 2005, an M.Sc. degree in mathematics from Addis Ababa University, Ethiopia, in 2008, and a Postgraduate Diploma/Pre-Ph.D. in mathematics from (ICTP) the Abdus Salam International Centre for Theoretical Physics at Trieste, Italy, in 2013. She earned her Ph.D. in mathematics from Auburn University in 2021. Dr. Bogale has been working as an instructor at the department of mathematics and statistics at Auburn University, Auburn, AL, and also as a Visiting Assistant Professor of Mathematics at the school of science and mathematics at Jacksonville University, Jacksonville, FL. She has an excellent teaching and research accomplishments record at Auburn University and Jacksonville University. She has a broad and strong mathematical background and specializes in algebra. Dr. Bogale's current research interests and areas of specialization are on Matrix theory, Linear Algebra, Lie Algebra, and Lie Groups.