

May 16th, 2022 2:00 PM- 14:00 PM

All are invited to attend the defense. For more information please contact Graduate Coordinator at [dstgerma@gmu.edu](mailto:dstgerma@gmu.edu)

**Candidate:** Kamil Can Kural

**Program:** PhD, Bioinformatics and Computational Biology

**Date:** Monday, May 16th, 2022

**Time:** 2:00 PM

**Zoom Link:** <https://gmu.zoom.us/j/92765910648?pwd=VkZhbDZFSh5SGpHR0lwSCs4aFN6dz09>

**Title:** A Machine Learning And Networks Approach To Infer Disease Mechanisms

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**Committee Chair:** Dr. Ancha Baranova

**Committee Members:** Dr. Iosif Vaisman, Dr. Ilya Mazo

**ABSTRACT:**

All biological problems, including cancer, mental disorders, rare diseases, and immunological disorders, are complex multisystem events facilitated by functional changes. Multiple points of origin and mechanisms can be responsible, including genetic mutations, epigenetic factors, protein misfolding, and differential gene expression, which promote such functional abnormalities. This dissertation describes mega-analysis and machine learning methods to identify and select essential entities that are prime candidates for such disorganization. Furthermore, heterogeneous networks have been employed to achieve a more thorough pathway analysis that takes protein-protein interactions into account. The dissertation contains four projects, investigating PPAR $\delta$ 's role in major depressive disorder, exploring the link between schizophrenia and myocardial infarctions, identifying the links between atopic dermatitis and major depressive disorder, and finally, biomarker identification for survival status prediction of patients with brain cancer. The results for the last 2 projects will be presented in the Doctoral Defense.