

## **AN ABSTRACT OF A THESIS**

# **PREDICTION OF WASTE TEMPERATURES IN A BIOREACTOR WITH THE AID OF ARTIFICIAL NEURAL NETWORKS**

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This thesis contains an artificial neural network (ANN) model used to predict the waste temperatures in a forced aerated landfill bioreactor. The ANN model architecture chosen for developing the model is a two layer feedforward backpropagation neural network. MATLAB 7.0 was used as the computational software for establishing the neural network architecture and carrying out the neural processes. The Neural Network toolbox in MATLAB was used in developing the model for the prediction of the internal temperatures in the landfill bioreactor. Levenberg – Marquardt, Powell – Beale, Polak Ribiere, and scaled conjugate gradient techniques were used in training the artificial neural network.

Analysis of the data by using the training set indicated that the Levenberg – Marquardt algorithm was best, based on linear regression analysis coefficients. Sensitivity analysis was also carried out on all the input variables for the test set. Results indicated that the prediction of waste temperature by using the test set and the training set produced 90 % confidence level and justified the accuracy of the model.