A. Briefly describe overall research program at your laboratory.

The mathematical modeling projects we are currently working on are: (1) polynomial regression for 2 dimensional and 3 dimensional parametric curves; (2) mathematical modeling with dimensionality reduction methods; and (3) mathematical modeling with machine learning.

B. Briefly describe specific project(s) for your teacher:

Mathematical models are of great importance in natural sciences and engineering. Often a mathematical model: discrete or continuous, linear or nonlinear, explicit or implicit, static or dynamical, deterministic or probabilistic, is chosen to best fit the given data (supervised and unsupervised) from a real-world application. For this RET project, we will first study to develop mathematical models from given data sets using polynomial regressions or linear spline, and then study data driven mathematical modeling using machine learning methods such as deep regression, principal component analysis and hard clustering. Each studied algorithm will be implemented in Excel or MatLab and be applied to a real-world application in finance, medicine, imaging processing, or DNA sequencing.

We look forward to hosting you!

C. Will any other people (post docs, grad students, undergraduate students, colleagues, etc.) be involved directly with your teacher?

We may have one undergraduate student to work with the teacher.

D. Will you require any advanced reading/preparation for the teacher? If yes, please briefly describe.

No prerequisite is required for this project. Some brief reading on background information about algorithms for mathematical modeling and machine learning and real-world applications will be recommended. A document file will be created for each participant in Google Docs at https://docs.google.com. Weblinks to all reading materials will be posted in this document. We will go over the reading materials through working on the project. All discussion and work for the project will be recorded in this document.