# Assignment 5 – Regularization and model tuning

*The purpose of this assignment is to use Python to learn how to perform regularization with python.*

This assignment provides you with an opportunity to demonstrate the achievement of the following course learning outcomes:

* Understand regularization
* Understand and apply the Python programming language
* Understand parameter tuning (alpha for regularization)

## Key Information

* **Type:** *Individual*
* **Weight:** 6.5%
* **Delivery:** Course website upload
* **Due Date:** 05/02/2019

## Expectations

You are expected to complete this assignment individually.

Respect for academic integrity is crucial to your success. Make sure you understand what constitutes acts of academic dishonesty in the page: [What is Academic Dishonesty?](http://mcmaster.ca/academicintegrity/students/whatis.html)

## Instructions

Find a data set that is suitable as a topic of a regression analysis; you may use the data set that was discussed in class on January 30th, 2019 or the dataset data you have used for assignment 3 if they have at least 10 features. For such dataset perfom the following analysis,

Plot the learning curve for:

1. Regular linear regression
2. Polynomial regression with degree=5
3. Ridge regression for polynomial features created (from the original features)
4. Lasso regression for polynomial features created (from the original features)
5. Elastic Net for polynomial features created (from the original features)

Explain if you see any sign of overfitting/underfitting in each curve.

Find the optimal alpha and R^2 using:

1. [RidgeCV](https://scikit-learn.org/stable/modules/generated/sklearn.linear_model.RidgeCV.html)
2. [LassoCV](https://scikit-learn.org/stable/modules/generated/sklearn.linear_model.LassoCV.html)
3. [ElasticNetCV](https://scikit-learn.org/stable/modules/generated/sklearn.linear_model.ElasticNetCV.html)

## Submission

Please submit your .py or .ipynb files to avenue before 26/02/2019.