

Laboratory Assignment 3 – Curve Fit

Objectives

This lab enables you to use different methods to fit a curve.

Grading

Refer to the section **Python Programming** for grading criteria.

Bibliography

Refer to the lecture notes for background information.

You will use this website to generate the curves: <https://www.desmos.com/calculator>.

You can either write your own code or use these websites to generate the audio tones:

- https://www.audiocheck.net/audiofrequencysignalgenerator_index.php
- <https://www.wavtones.com/functiongenerator.php>

Sample Python Program

Refer to the lecture notes for sample Python codes.

Laboratory Hand-In Requirements

Once you have completed a working design, prepare for the submission process. You are required to demonstrate a working design. You are also required to submit an archive of your project in the form of a ZIP file. Use 7-Zip option to create **one single ZIP file** for the entire team. Name the archive **lab#_Team#.zip**.

You will submit your zip file to the instructor through Canvas by the due date and time. If the class will be on campus, then you will expect to demonstrate in the classroom. If we ever have to go back to an online mode, turn in your archive to Canvas along with a narrated video capturing the screen of your computer running your program demonstration. If your program is not completely functional by the due date, you should demonstrate and turn in what you have accomplished to receive partial credit. See the syllabus for the late penalty guideline

Python Programming

Lab Submission

Program or Requirement	Use Case	Earned Score / Max Score
Lab report	Turn in lab report (using the group report template) and the video recordings of all your work with your own voice narration for each requirement below and Submit Lab3_TeamName.Zip file on time to Canvas	____ / 10
Curve fit using Polynomial Regression method from Lecture 1	Use this website to generate a curve from a 3 rd or higher order polynomial of your choice: https://www.desmos.com/calculator . Write a Python program to generate a plot of the first curve using the same polynomial. Show that it matches the same one that you generated from the website. Add code to fit the curve using the Polynomial Regression Method.	____ / 15
Curve fit using Pipeline Ridge OR Pipeline Linear Regression method from Lecture 4	Using this website to generate a curve from a 3 rd or higher order polynomial of your choice: https://www.desmos.com/calculator . Write a Python program to generate a plot of the first curve using the same polynomial. Show that it matches the same one that you generated from the website. Add code to fit the curve using the Ridge OR Linear Regression Method.	____ / 15
Damped Sine Wave Curve Fit from Lecture 2	Define an arbitrary damped sine wave function and plot it using this website: https://www.desmos.com/calculator/hcamzyeuji Use the same equation that you just defined, write a Python program to plot the first curve representing the same function, and a second curve to fit the first curve.	____ / 15
Curve Fit with Noise from Lecture 2	You can leverage the following websites (or search for other websites) for tone generation or write your own Python code to generate your own tones then convert it to CSV format. Write a Python to add noise to the signal then try to fit a curve to that signal. <ul style="list-style-type: none"> https://www.audiocheck.net/audiofrequencysignalgenerator_index.php https://www.wavtones.com/functiongenerator.php 	____ / 15
Curve Fit with Multi-Variables from Lecture 3	Write a Python program to generate a waveform with two independent variables. Try 5 different scenarios to test the curve fitting and provide your own comments for each scenario.	____ / 15
Game Development: Coin Collector	Leverage the base code from the Coin Collector and add your own Hacks and Tweaks.	____ / 15
	TOTAL	100%

That's all for this lab. Hopefully you found it useful and increase your interest in the Python world! See you in the next lab.