The datafile `oscillator.dat` contains the magnetization of a magnetic spin-torque oscillator. The following tasks should be implemented in python using numpy/scipy (you can easily compare the runtime with a naive python implementation using `timeit`).

- read time t and $\vec{m}_{\text{freelayer}}$ from data file `oscillator.dat` (e.g. use `loadtxt`, or `genfromtxt`)
- calculate time-average of m_x, m_y, m_z and |m|

Finally the data should be processed and the frequency of the oscillator should be determined. The following steps should be performed:

- interpolate magnetization m_x on equi-distant grid using `interp`
- (optional) perform a least-squares fit of a sine function to determine the frequency of the steady-state signal using `curve_fit`
- use `fft` to calculate spectrum (how does Δt influence the peak amplitude)
- plot the time-signal $m_x(t)$, its derivative $\frac{\partial m_x}{\partial t}(t)$ (optional) and its spectrum $|\tilde{m}_x|(\omega)$ using `matplotlib`

The program should be structured into individual functions or classes in order to avoid duplication of code. Please submit the source-code, a text-file with the calculated averages/frequency as well as an image file containing the created plots. NOTE: Check the correct time / frequency units!