Initial FrED Statistical Exploration 1

Exploration of basic statistics on initial FrED data.

Uses data - "Run_Comparison_1.csv"

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In [57]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
```

In [58]:
```
# import data - no path - data should be in same folder as notebook
data1 = pd.read_csv('Run_Comparison_1.csv')
data1
```

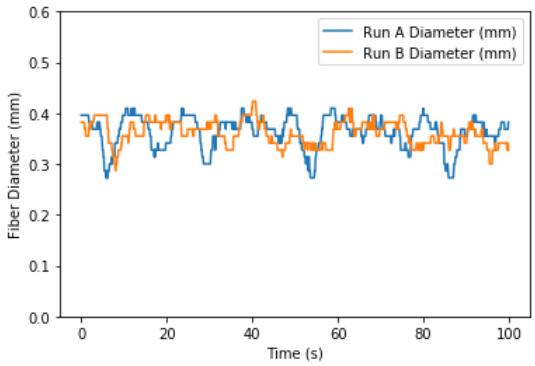
Out[58]:

	Time (s)	Run A Diameter (mm)	Run B Diameter (mm)
0	0.0	0.395941	0.382270
1	0.1	0.395941	0.382270
2	0.2	0.395941	0.382270
3	0.3	0.395941	0.382270
4	0.4	0.395941	0.382270
...	...	...	...
995	99.5	0.368600	0.341259
996	99.6	0.368600	0.327588
997	99.7	0.368600	0.327588
998	99.8	0.368600	0.341259
999	99.9	0.382270	0.327588

1000 rows × 3 columns

In [59]:
```
# plot data
# display options
%matplotlib inline
#%matplotlib notebook
plt.plot(data1['Time (s)'], data1['Run A Diameter (mm)'])
plt.plot(data1['Time (s)'], data1['Run B Diameter (mm)'])
plt.xlabel('Time (s)')
plt.ylabel('Fiber Diameter (mm)')
plt.legend()
plt.ylim(0,.6)
```

Out[59]: (0, 0.6)



In [60]:
```
# add rolling averages
data1['Run A Rolling Ave'] = data1['Run A Diameter (mm)'].rolling(window=10).mean()
data1['Run B Rolling Ave'] = data1['Run B Diameter (mm)'].rolling(window=10).mean()
data1
```

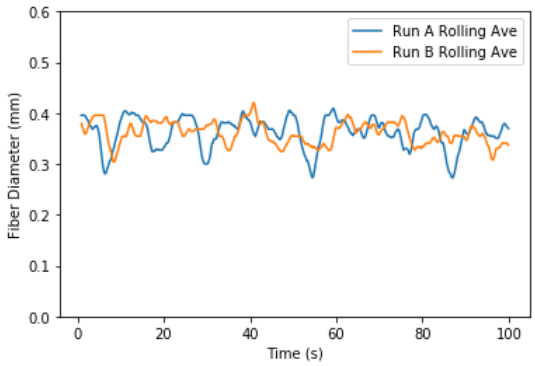
Out[60]:

	Time (s)	Run A Diameter (mm)	Run B Diameter (mm)	Run A Rolling Ave	Run B Rolling Ave
0	0.0	0.395941	0.382270	NaN	NaN
1	0.1	0.395941	0.382270	NaN	NaN
2	0.2	0.395941	0.382270	NaN	NaN
3	0.3	0.395941	0.382270	NaN	NaN
4	0.4	0.395941	0.382270	NaN	NaN
...	...	...	...	...	...
995	99.5	0.368600	0.341259	0.374068	0.341259
996	99.6	0.368600	0.327588	0.372701	0.339892
997	99.7	0.368600	0.327588	0.371334	0.338525
998	99.8	0.368600	0.341259	0.369967	0.338525
999	99.9	0.382270	0.327588	0.369967	0.337158

1000 rows × 5 columns

In [61]:
```
# plot rolling averages
plt.plot(data1['Time (s)'], data1['Run A Rolling Ave'])
plt.plot(data1['Time (s)'], data1['Run B Rolling Ave'])
plt.xlabel('Time (s)')
plt.ylabel('Fiber Diameter (mm)')
plt.legend()
plt.ylim(0,.6)
```

Out[61]: (0, 0.6)

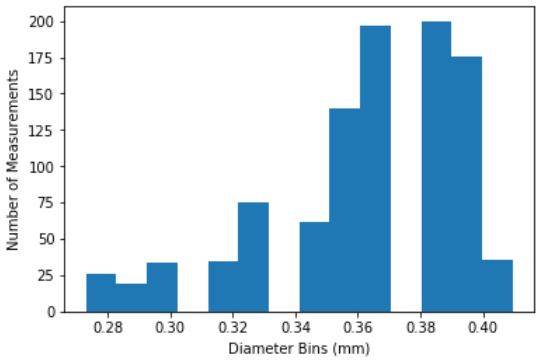


In [62]:
```
# basic statistics
print('Run A Mean:', data1['Run A Diameter (mm)'].mean())
print('Run A Std Dev:', data1['Run A Diameter (mm)'].std())
print('Run B Mean:', data1['Run B Diameter (mm)'].mean())
print('Run B Std Dev:', data1['Run B Diameter (mm)'].std())
```

```
Run A Mean: 0.36265313700000157
Run A Std Dev: 0.03198784886968082
Run B Mean: 0.3609715840000002
Run B Std Dev: 0.023382381495933205
```

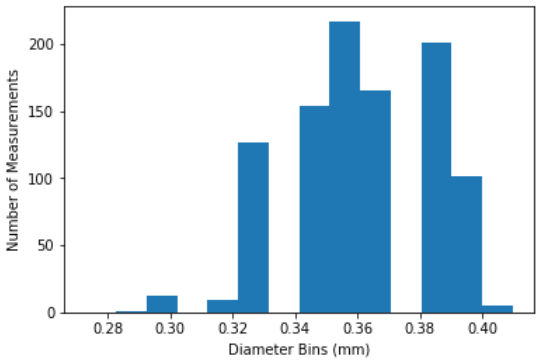
In [63]:
```
# histogram - A
n, bins, patches = plt.hist(data1['Run A Diameter (mm)'],14)
plt.xlabel('Diameter Bins (mm)')
plt.ylabel('Number of Measurements')
print('Run A Histogram')
print(bins)
```

```
Run A Histogram
[0.272907   0.28267157 0.29243614 0.30220071 0.31196529 0.32172986
 0.33149443 0.341259   0.35102357 0.36078814 0.37055271 0.38031729
 0.39008186 0.39984643 0.409611  ]
```



In [64]:
```
# histogram - B
plt.hist(data1['Run B Diameter (mm)'],bins)
plt.xlabel('Diameter Bins (mm)')
plt.ylabel('Number of Measurements')
print('Run B Histogram')
```

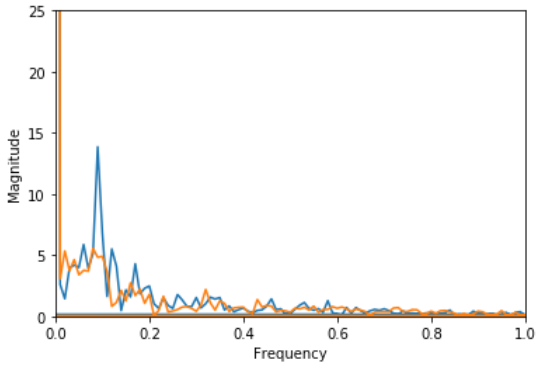
```
Run B Histogram
```



In [65]:
```
# import FFT module
from scipy import fftpack
```

In [66]:
```
# Frequency analysis
# sampling rate #/s
f_sample = 10
magnitudesA = fftpack.fft(data1['Run A Diameter (mm)'])
magnitudesB = fftpack.fft(data1['Run B Diameter (mm)'])
freqs = fftpack.fftfreq(len(data1['Run A Diameter (mm)'])) * f_sample
plt.plot(freqs, np.abs(magnitudesA))
plt.plot(freqs, np.abs(magnitudesB))
plt.xlim(0,1)
plt.ylim(0,25)
plt.ylabel('Magnitude')
plt.xlabel('Frequency')
print('Fiber Diameter Signal Analysis')
```

```
Fiber Diameter Signal Analysis
```



In [ ]: