In [3]:
```
# 연습문제 4 p243, node (12)
import numpy as np
from scipy import stats

x = [4.6, 3.6, 4.0, 6.1, 8.8, 5.3, 1.2, 5.6, 3.3, 1.6]

x_mean = np.mean(x)
s = np.std(x, ddof=1)
sem = s / np.sqrt(len(x))
t_value = stats.t.ppf((1 + 0.90) / 2, len(x) - 1)
margin_of_error = t_value * sem

ci_lower = x_mean - margin_of_error
ci_upper = x_mean + margin_of_error

print(f"90%에 대한 모평균 뮤의 신뢰구간 : ({ci_lower:.2f} < mu < {ci_upper:.2f})")
```
90%에 대한 모평균 뮤의 신뢰구간 : (3.12 < mu < 5.70)

In [6]:
```
# 연습문제 4 p243, node (12) + 시각화
import matplotlib.pyplot as plt
import numpy as np

x = np.linspace(0, 10, 1000)
sample = [4.6, 3.6, 4.0, 6.1, 8.8, 5.3, 1.2, 5.6, 3.3, 1.6]
sample_mean = np.mean(sample)
s = np.std(sample, ddof=1)
pdf = (1 / (s * np.sqrt(2 * np.pi))) * np.exp(-0.5 * ((x - sample_mean) / s) ** 2)

plt.plot(x, pdf, color='blue')
plt.fill_between(x, pdf, where=(x > 3.12) & (x < 5.70), color='blue', alpha=0.3)
plt.xlabel('years')
plt.axvline(3.12, color="red", linestyle="--")
plt.axvline(5.70, color="red", linestyle="--")
plt.title('3.12 < mu < 5.70')
plt.show()
```