In this document we can collaborate to create an outline for the class

Description of the project:

**Project 7: Synchronization of coupled oscillators**

Coupled nonlinear oscillators can often exhibit synchronization, which results in many very interesting phenomena and has biological and industrial applications. This lecture should discuss:

* The idea behind the theory
* The Kuramoto model
* Provide some numerical examples of synchronization.

Reference:

* [This review by Strogatz](https://static1.squarespace.com/static/5436e695e4b07f1e91b30155/t/544525a8e4b0b8e2e8230fa3/1413817768995/from-kuramoto-to-crawford.pdf)

Outline for the class:

(the estimated times are to give a rough idea and edit them as we make progress)

**Introduction: (5 min)**

* Briefly show examples of oscillators we learned in lectures (i.e lecture #1, lecture #12, lecture #20)
* Define coupled oscillators
* Examples in nature and engineering

**The Kuramoto model:(9 min)**

* Background (Winfree model).
* Kuramoto model governing equations.
* Order parameter
* Numerical simulations

**Unanswered Questions and Assumptions in the Kuramoto Model (5 min)**

* Stabilityof steady solutions

**Continuous Spectrum>>>Landau Damping>>>Crawford Becomes Interested (5 min)**

**Crawford Contributions (3 min)**

* Local stabilityof Kuramoto analysis in a systematic way

**Summary/ Conclusions (3 min)**