

Engineering Mathematics

The “Wright State Model”

Oklahoma State University

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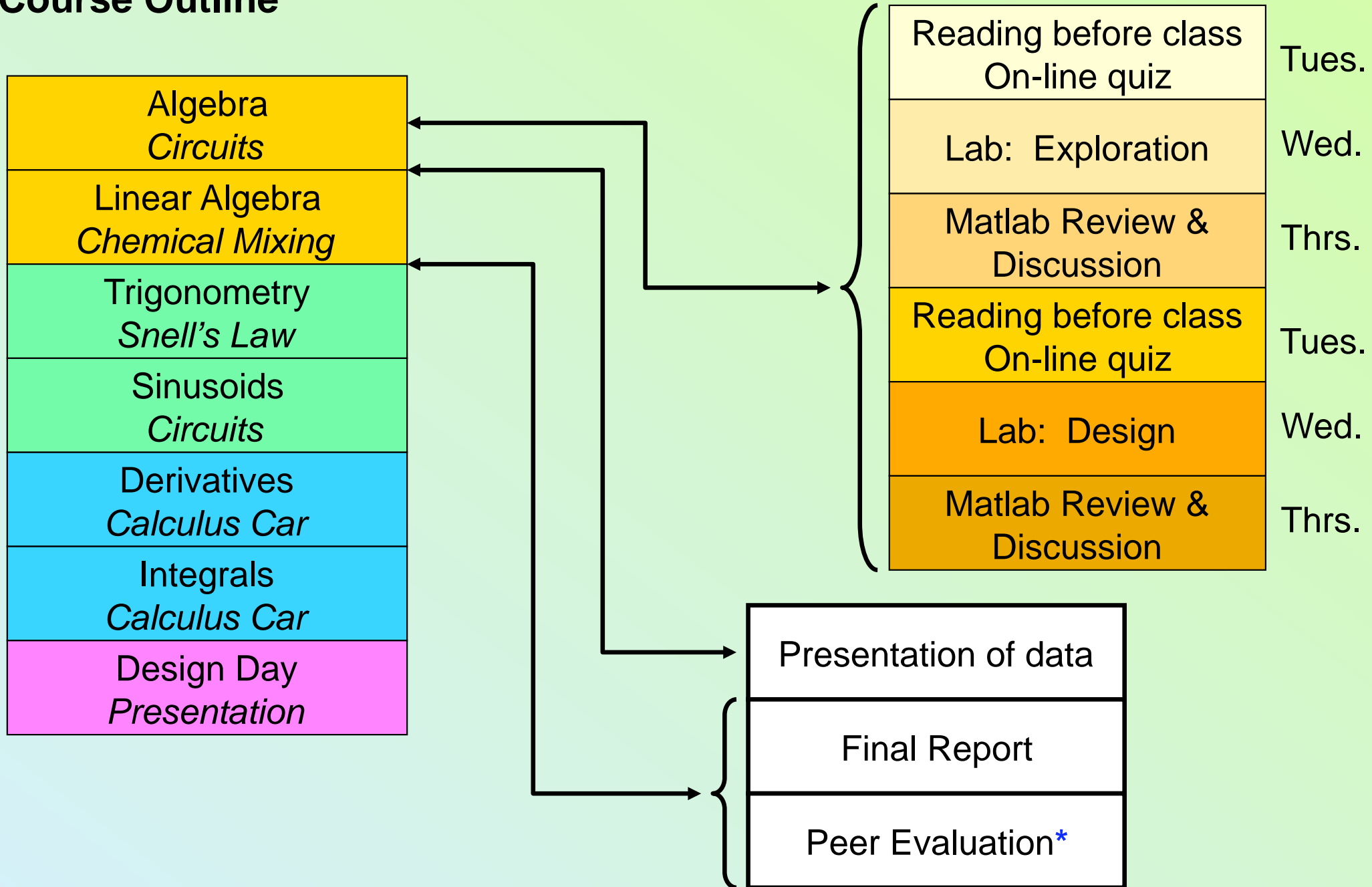
- 1) OSU's Implementation of the WSM
- 2) Course Outline and Structure
- 3) Development of Lab Projects
- 4) Preliminary Assessment Results

OSU Implementation

OSU's implementation has some differences from that of Wright State

- Focus on integrating design into the course
 - Initial exploratory lab
 - Second “design” lab
- Reduce the number of math topics covered to six.
- More formal integration of Matlab.
- Labs done by students are different than those at Wright State in some cases.
- At this stage course is for electrical and chemical engineers only
- Some sections are integrated with the required English composition course- strong emphasis on communication and writing.
- Integration of “engineering fellows” and “writing fellows” into the course.
- Having our own textbook printed from print-on-demand publisher.
- Working hard to implement assessment of learning outcomes.
- No lecture!

Course Outline



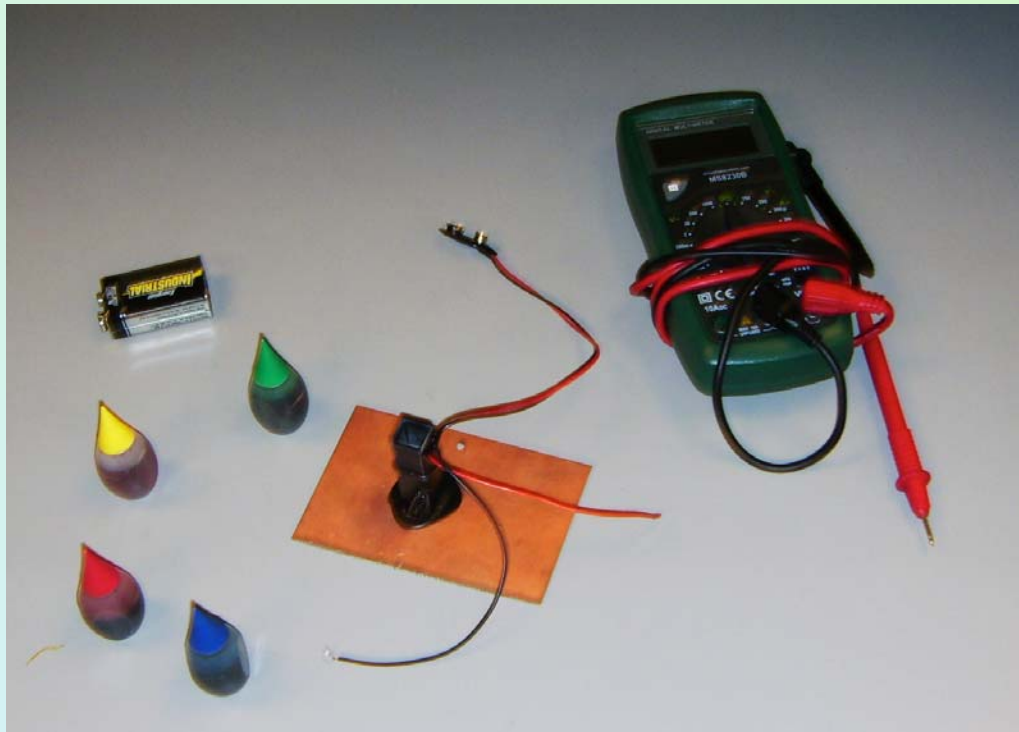
Changes to Wright State Labs

Circuits Projects:

- Moved away from “protoboards” to fabricated printed circuit board since protoboard fabrication distracted from learning goals.
- Students did not easily comprehend function of oscilloscopes.

Linear Algebra: Solution mixing

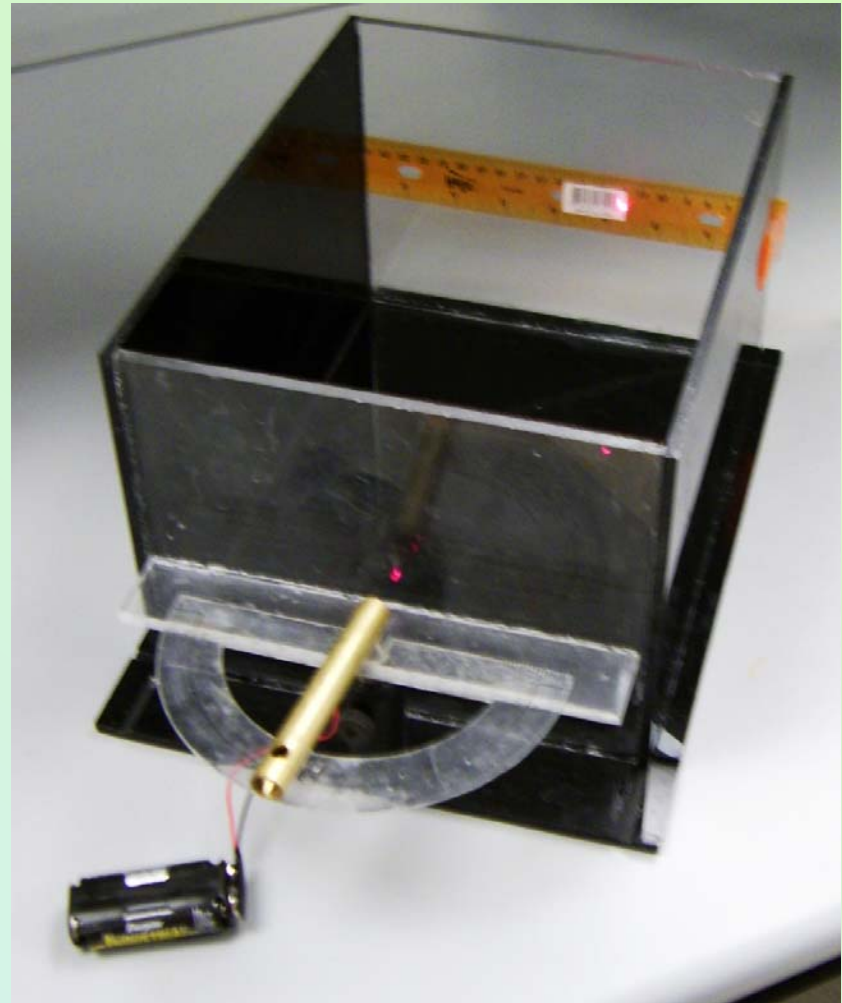
- Use photocells in combination with LED's and cuvette to measure the transmission of two different solutions of food coloring- A & B.
- Determine concentrations of mixed solutions of A and B from data.



Changes to Wright State Labs

Sinusoids: Snell's Law

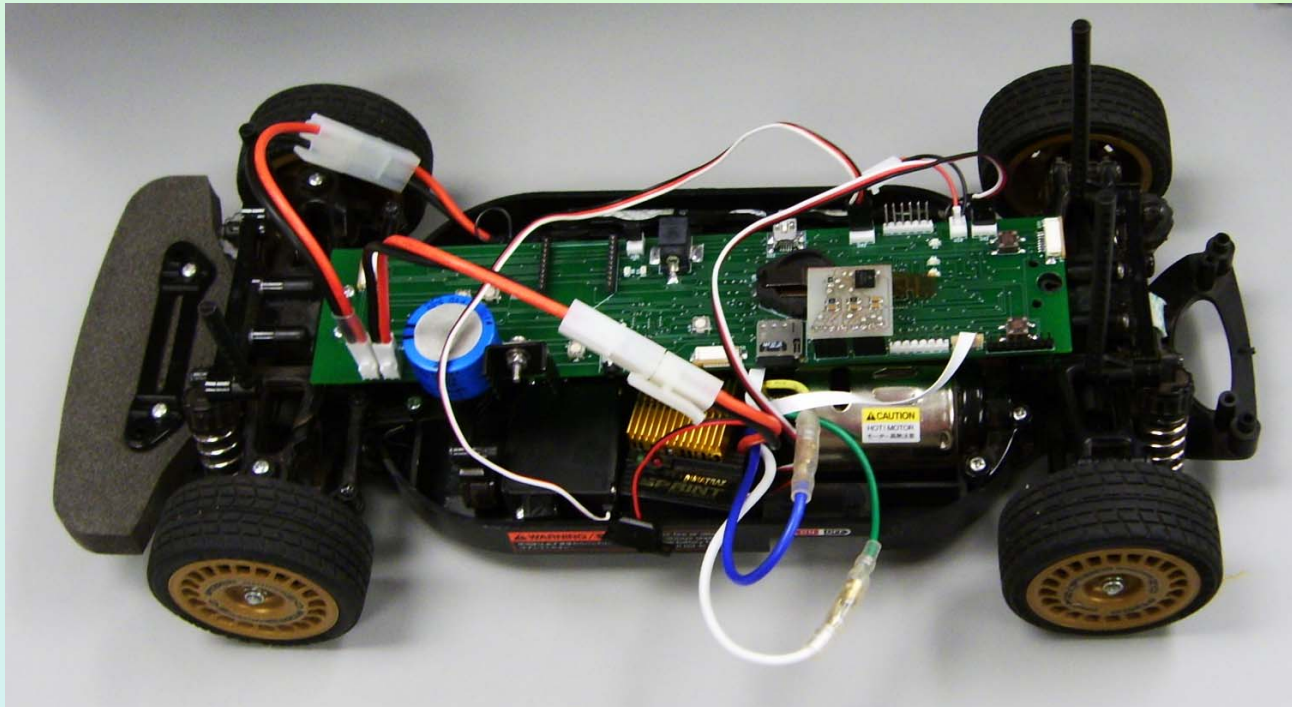
- Use tank of water with concentrated sugar solution and a diode laser to measure the index of refraction.



Changes to Wright State Labs

Calculus: The Calculus Car

- Robotic vehicle is programmed by students and returns data on position, velocity, and acceleration as a function of time.
- Teams design a “crash attenuator” and analyze data.

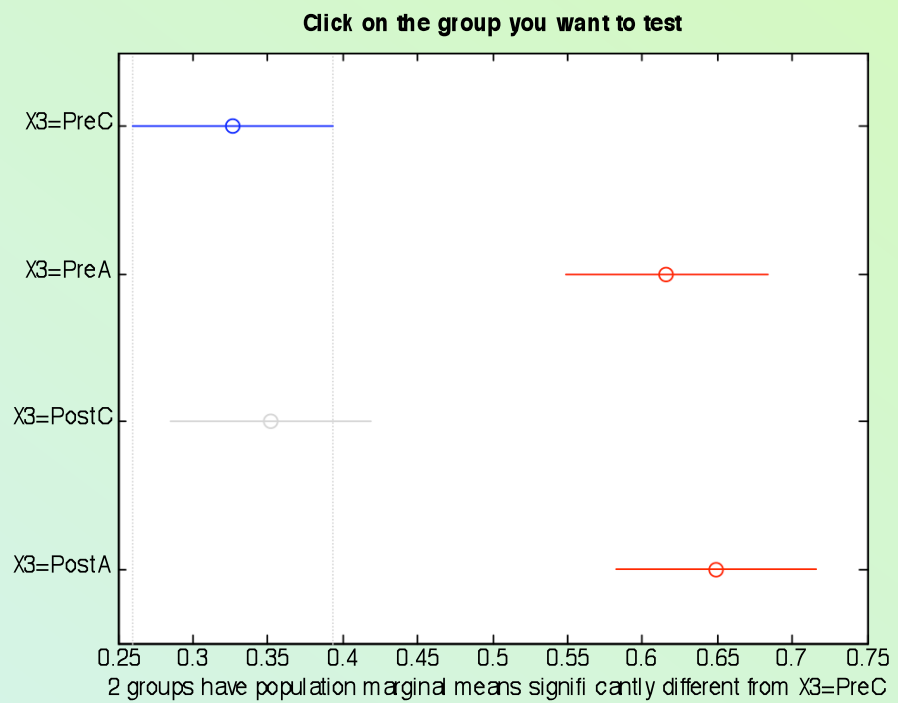


Assessment And Evaluation

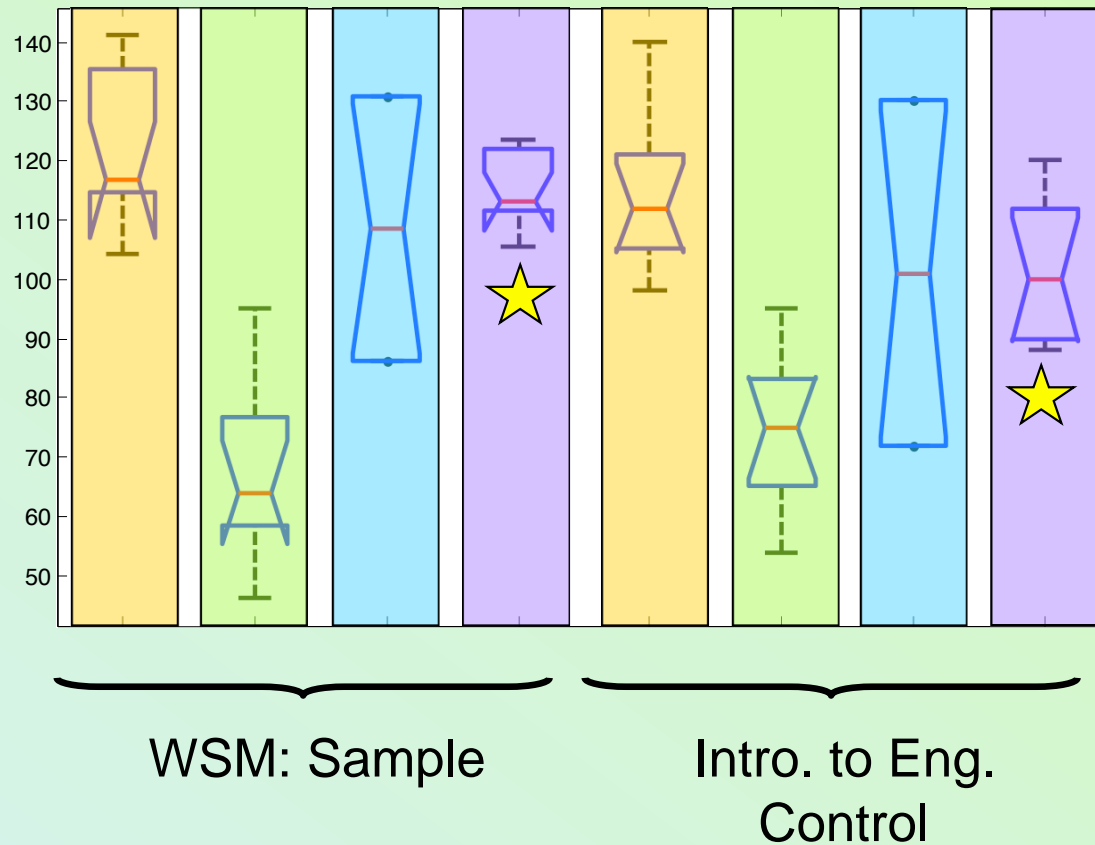
Tried three measures in preliminary offering of course:

- Concept Inventory- pre/post
- Student Assessment of Learning Gains – still analyzing
- Attitude Survey- pre/post for sample only

Two concept inventories were obtained- one for calculus and one for algebra. The calculus concept inventory was determined to be too focused on mathematics. The algebra concept inventory measures more process skills than conceptual knowledge. We are working on developing/finding more suitable exams.



Control group did much better, no significant pre-post differences.



- Intrinsic motivation
- Pre-concieved notions about mathematics
- Technology/Communication
- Motivation to continue learning mathematics