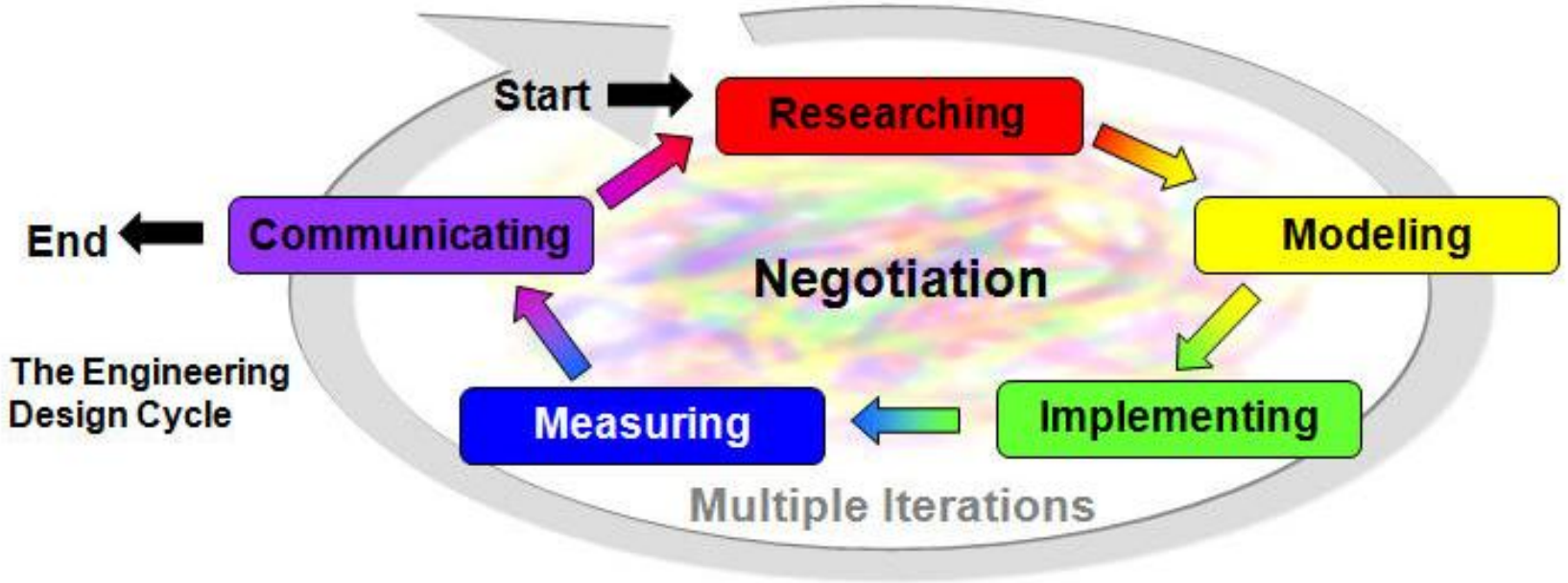
Engineering Mathematics The "Wright State Model"

Oklahoma State University
Karen High
Alan Cheville

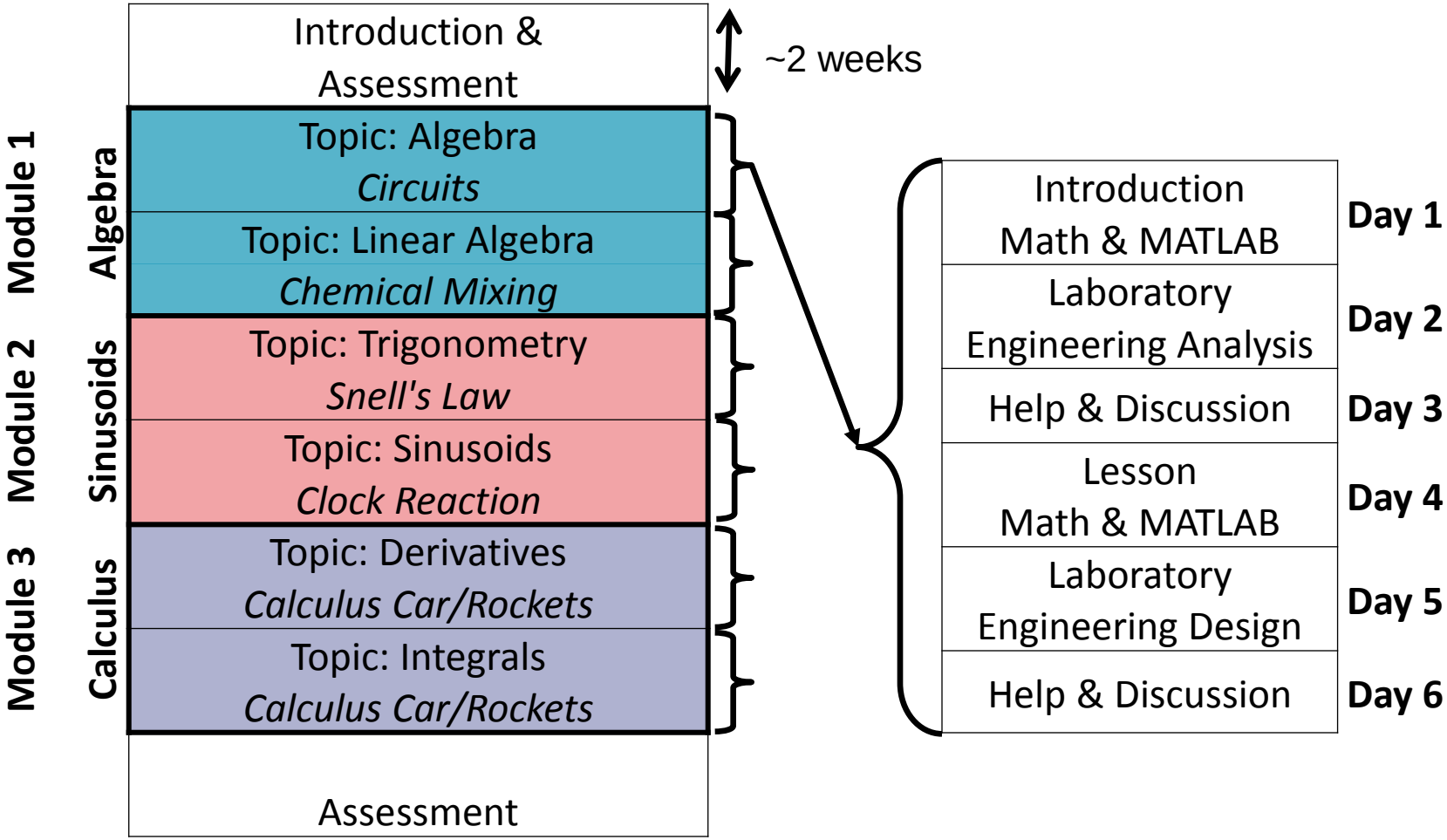
OSU Implementation

- Design cycle
- Course structure
- Project information
- Assessment data from three years (+1)
- Where do we go from here?

Design Cycle



Course Outline – ENGR 1113



Project Information

- 2008 cohort
  - Students mostly weak in math skills
- 2009 cohort
  - Students with weak, medium and high math skills
  - Most positive attitude
- 2010 cohort
  - Students with weak, medium and high math skills
  - Graduate student left
  - Statistician left (new hired Spring 2011)
- 2011 cohort (not part of grant)
  - New instructor Fall 2011 – EXCEL instead of MATLAB
  - KAH in Texas Fall 2011
  - Many students weak in math skills, engineering fortitude

Assessment

- Comparison groups
  - Engineering 1111 – One credit "Introduction to Engineering Class"
  - Chemical Engineering 2033 – Three credit sophomore class – 2010
  - Should be ENGR 13x2 – Two credit "Engineering Design Class"

Two TUES Projects – Engineering Math and Critical Thinking and Writing for Freshman

Main Assessment Items

- Cognitive (content knowledge):
  Pre/post math test (2009–2011)
  Grades in future math classes (2008–2010)

- Affective (motivation, attitudes):
  Pre/post math attitude survey (2008–2011)
  Pre/post Pittsburgh Freshmen Engineering Attitude Survey (PFEAS) (2008–2011)

- Longitudinal rates:
  Retention (2008–2010)

Math Content Test

		N	Pre %	Post %
2009	1113	39	43.0	51.6
	1111	*16*	*62.8*	*63.6*
2010	1113	45	53.7	66.2
	1111	*38*	*51.0*	*59.2*
2010	CHE 2033	40	67.2	68.0

Math Test Confidence

		N	Pre	Post	Diff			
2010	1113	45	53.7	66.2	12.6	%		
			3.2	3.9	0.7	1 to 5 with 5 being most confident		
	1111	38	51.0	59.2	8.2	%		
			3.1	3.5	0.4	1 to 5 with 5 being most confident		

Math Attitude Survey

		Fall 2008	Fall 2009	Fall 2010	Fall 2011
21	This course has increased my motivation to study engineering.	3.0	3.7	3.4	3.7
22	This course has increased my chances of success in engineering.	3.0	4.0	3.4	3.8
23	This course has increased my motivation to study math.	2.9	3.7	3.3	3.5
24	This course has increased my chances of success in future math courses.	3.0	3.8	3.2	3.5

Larger CCLI/TUES studies

- 1113 students start out with lower writing and critical thinking skills
- Make larger gains over the semester than the comparison ENGR 1111 group – in class 2 more hours, completed one more report
- Seeing the same thing in the math skills/confidence
- Retention and grades not useful
- Now analyzing attitudes as well as corpus analysis of written documents

Where do we go from here?

- ENGR 1113 maybe gone but a version 1013 for students with weak math skills, summer course
- ENGR 1412 – KAH teaching – computer course in Visual basic
- HS Engineering Math course