2nd Annual Meeting

National Engineering Mathematics Consortium

June 22, 2010

Louisville, Kentucky

First Semester Freshmen in Various Math Classes

Math Classes	COE		Total	
Math 224 (Calculus III)	9	2.5%	15	1.3%
Math 123 (Calculus II)	58	16.5%	110	9.3%
Math 122 (Calculus I)	59	16.8%	111	9.4%
Both Math 113 and 111	103	29.3%	132	11.2%
Math 113 (Algebra)	47	13.4%	379	32%
Math 111 (Trigonometry)	44	12.5%	104	8.8%
MAPB 11 (Int. Algebra)	31	8.8%	331	28%
Total	**351**	**100%**	**1182**	**100%**

Issues with Current Curriculum Setup

- Assuming students are Math-ready, it takes at least one year for students to start taking the Tier 1 engineering courses in their disciplines.
- The math and physics prerequisites for the Tier 1 engineering courses in some disciplines are inappropriate.

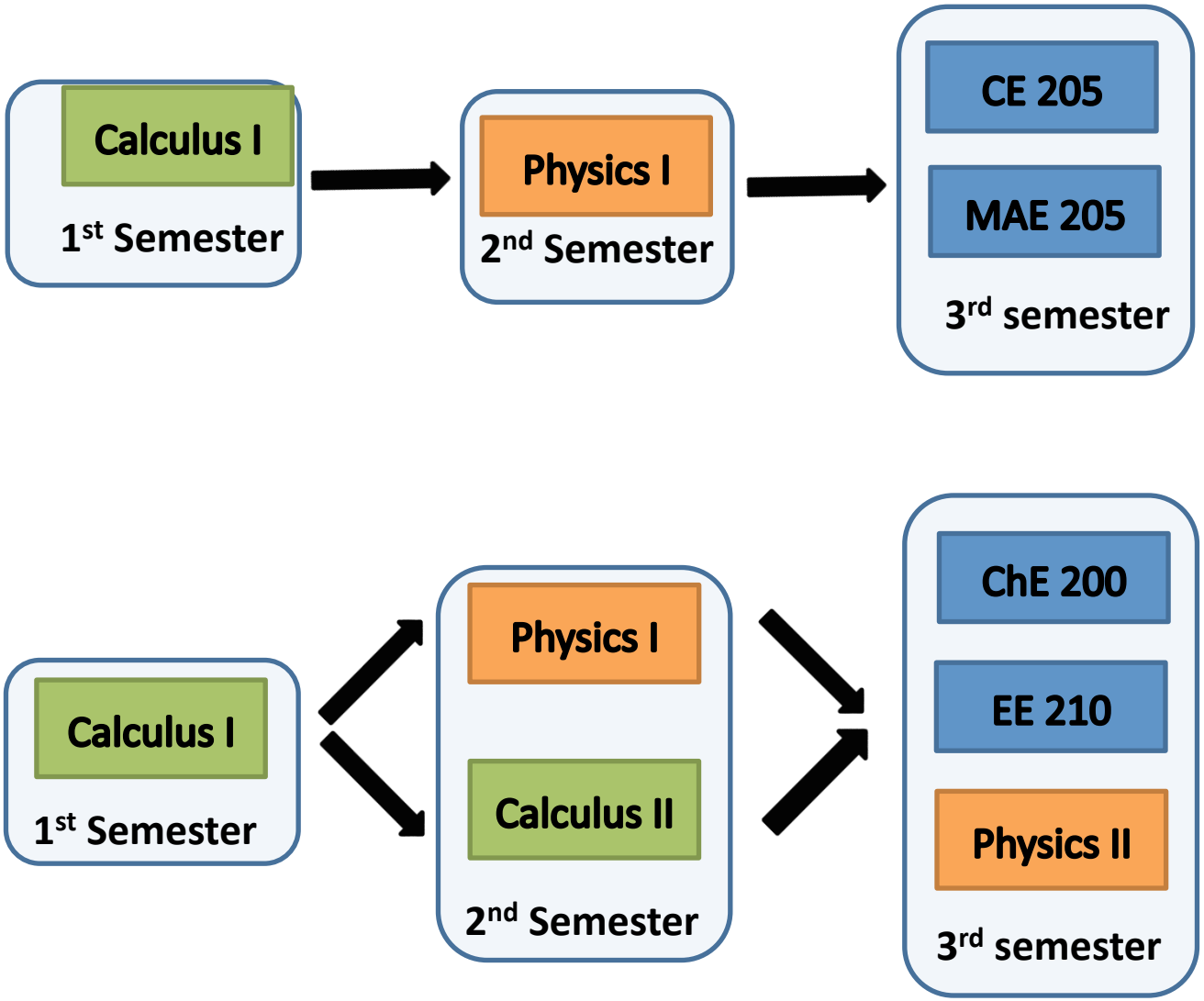
Department	Tier 1 Engineering Course	Semester Taken	Prerequisites
ChE	ChE 200 – ChemE Fundamentals	3	Calculus II, Phys I
CECEM	CE 205 – Statics CE 206 – Computer Programming	3 3	Calculus I, Phys I
CECS	CECS 271 – Intro to Numerical Methods	5	Math 222[*2]
EE	EE 210 – Electromagnetic Foundations	3	Calculus II, Phys I
MAE[*1]	MAE 205 – Computer Methods MAE 300 – Engineering Instrumentations	3 5	Calculus I, Phys I Calculus III, Phys I & II

[*1]: CE 205 is also the Tier 1 engineering courses in MAE department.

[*2]: Intermediate Calculus

The prerequisite for Phys I is Calculus I and for Phys II is Calculus II.

Current Flowchart



Options

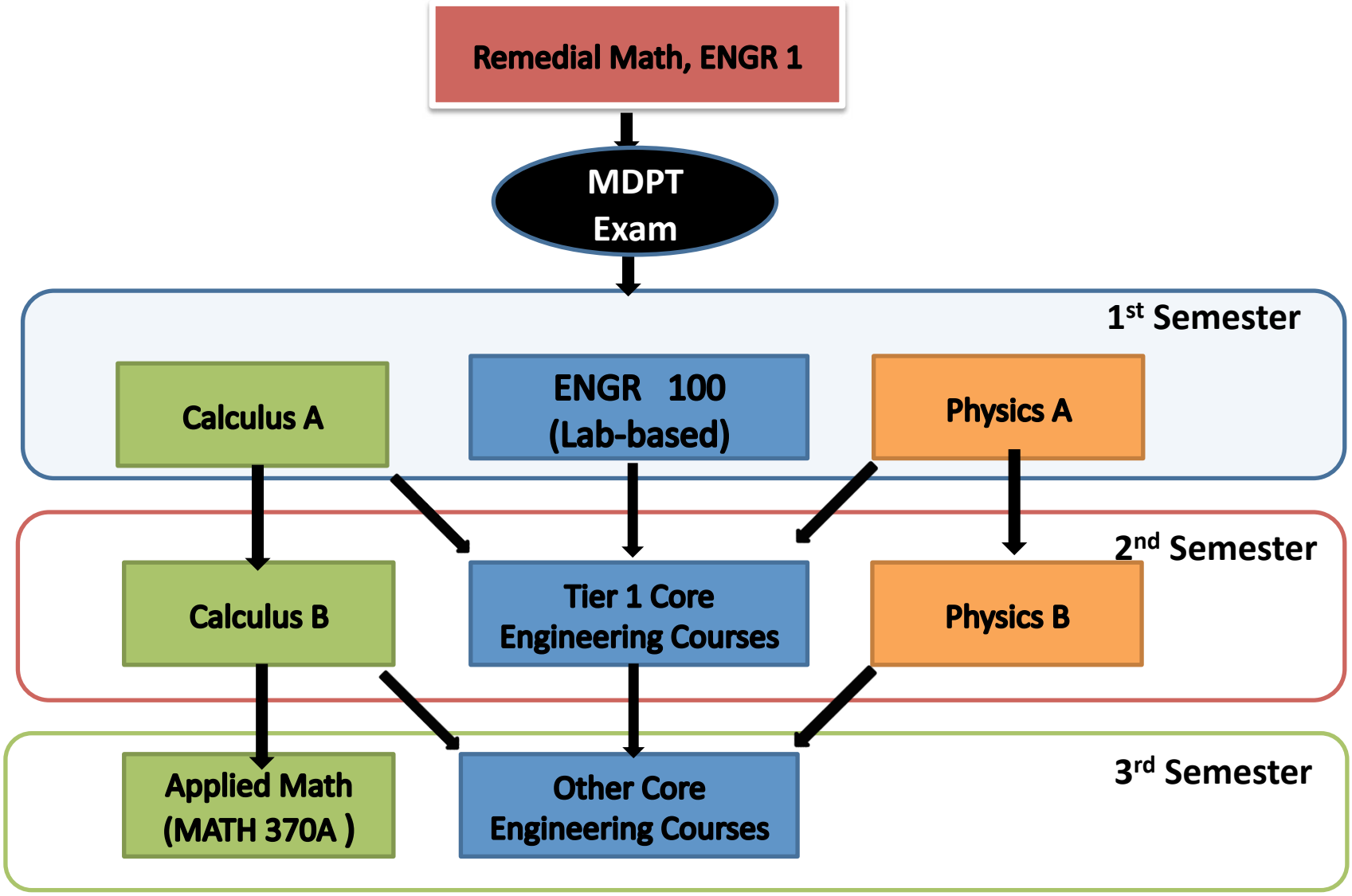
- Two Tracks
  - Old track

$$\text{Math } 111 \rightarrow \text{Math } 113 \xrightarrow{MDPT} \text{Math } 122 \rightarrow \text{Phys } 151 \rightarrow \text{Tier 1 Engineering}$$

  - New Track

$$\text{ENGR } 1 \xrightarrow{MDPT} \text{ENGR } 100 \rightarrow \text{Tier 1 Engineering}$$

Proposed Flowchart



Tier 1 engineering courses include CE 205, CE 206, MAE 205, MAE 300, CECS 271, CHE 200, and EE 210.

New thinking

- Currently → ENGR 100 (4 units, 3 units inst, 1 unit lab)
- Future → ENGR 1 (0 unit)
  ENGR 100 (3 units)

Remedial Math (ENGR 1)

- Pass/Fail (no credit)
- Course Content
  - Trigonometry
    - Trigonometric relationships
    - Graphics
  - Algebra
    - Exponents and radicals
    - Logarithms
    - Polynomials and functions
    - Algebraic equations

Fundamentals of Engineering Analysis (ENGR 100)

- Instruction/lab (3-units)
- Course Content
  - Vectors and derivatives
  - Integrals
  - ODE with constant coefficients
  - MATLAB
  - Engineering Applications

Engineering Applications

- Scientific notations
- Unit conversion
- Kinematics of falling bodies
- Static equilibrium
- Forces and free body diagram
- Energy storage
- Mass-spring system
- Electrical circuits (Ohm's law)
- Analysis of experimental data

MDPT Results

	Student	Before	After		
1	SG	MAPB11	MATH 111	- 1 point	F09
2	MF	MAPB11	MATH 113	-2 points	F07-52 units
3	MP	MAPB11	*MATH 122*	***PASSED***	F09
4	IB	MAPB11	*MATH 122*	***PASSED***	F09
5	VC	MAPB11	*MATH 122*	***PASSED***	F09
6	FV	MAPB11	*MATH 122*	***PASSED***	F09
7	NC	MATH 111 and 113	*MATH 122*	***PASSED***	F09
8	ES	MATH 111 and 113	MATH 113		F07-21 units
9	AA	MATH 111 and 113	MATH 113		F06-43 units

In summary …

- Students have math anxiety
- Pre-baccalaureate students benefited the most
- Pre-calculus students saved one to two courses
- Sample size is small; additional quantitative and qualitative analysis are needed.

website