

Maple Labs for Calculus at USC

Douglas B. Meade

meade@math.sc.edu

<http://www.math.sc.edu/~meade/>

Xian Wu

wux@math.sc.edu

Outline

- The Past
 - Origins
 - Evolution
- The Present
 - Organization
 - Improvement
 - Projects and Project Reports
- The Future
 - ???

The Past – Origins

- Old Format
 - Lecture: 3 hrs/wk
 - Recitation: 2 hrs/wk
- Objectives
 - Active Learning
Calculus is not a spectator sport
 - Improved Conceptual Understanding
 - Introduction to Modern Mathematical Software
- New Format
 - Lecture: 3 hr/wk
 - Recitation: 1 hr/wk
 - Lab: 1 hr/wk

The Past – Evolution

Year	Trans Funct's	# students per semester	Assessment
02-03	Late (VPR)	60 (1 section) [141] [142]	Overly optimistic; too much syntax; too much typing
03-04	Late (VPR)	170 (3 sections) [141] [142]	More reasonable; less typing/syntax; each week like a project
04-05	Early (ABD)	1000+ (all sections) [141] [142]	Begin to utilize M4C; labs are more “useful”
05-06	Early (ABD)	1000+ (all sections) [141] [142]	Fewer quizzes; extensive use of M4C

The Present – Organization

- Weekly lab session in computer lab
- Integral part of the first-year Calculus courses
- Content designed to follow lecture topics
- ~10 lessons with weekly HW/Mastery Quiz
- 2 in-lab quizzes
- 2 projects

- Access: site license / Maple Adoption Program

The Present – Improvement

- Keep good communication between lab coordinators, course instructors, teaching/lab assistants, and students
- End-of-course student surveys
- Improve as we go
- Website: <http://www.math.sc.edu/calclab/>

The Present – Projects & Project Reports

- Roller Coaster Design

Lab: <http://www.math.sc.edu/calclab/141L-S06/labs/RollerCoaster.pdf>

Project: <http://www.math.sc.edu/calclab/141L-S06/labs/Project1.pdf>

- Designer Goblets

Lab / Project:

<http://www.math.sc.edu/calclab/142L-S06/labs/GobletProj106s.pdf>

[Sample Student Solution](#)

- Koch Snowflake

Lab / Project:

<http://www.math.sc.edu/calclab/142L-S06/labs/SnowFlakeProj206s.pdf>

[Original](#), Student Samples: [3-](#), [4-](#), [4+](#)

- Project Report Guidelines

<http://www.math.sc.edu/calclab/142L-S06/labs/ReportDesc.pdf>

The Future – ???

- Utilize Maple 10 GUI
 - 2D input / document
 - more user-friendly / less syntax.
- Investigate use of Maple TA
- Increase use of M4C; suggest additions
- Continue to convince all instructors and students to see Maple as a very useful tool
 - today – for learning Calculus
 - tomorrow – general Science/Engineering/Math

Maplets for Calculus

Collection of more than 50 maplets

... utilizing Maple's *symbolic, numeric, and graphic* capabilities

... to create *student-(and instructor-) friendly* environments

... for learning and teaching fundamental calculus *concepts, manipulations, theory, and applications.*

➤ Maplet

- ✦ Applet created in the Maple programming language

➤ Co-Authors

- ✦ Phil Yasskin (TAMU) and Doug Meade (USC)

Maplets for Calculus

- Problem Solution / Checking
 - ✦ Step-by-step approach closely follows standard methods and terminology found in textbooks
 - ✦ Hints are available
 - ✦ Solution is checked **symbolically** step-by-step
 - ✦ Correct solution can be displayed

Maplets for Calculus

- Maple Conference 2006
 - ✦ Wednesday, July 26, 1:45 – 2:15, BA 113
 - ✦ Phil Yasskin & **Doug Meade**
 - ✦ *Demonstration of Maplets for Calculus, and a discussion with the authors.*
- MathFest (Knoxville, TN)
 - ✦ Saturday, August 12, 3:35 – 3:50
 - ✦ **Phil Yasskin & Doug Meade**
- Conference on Mathematics in the Digital Era (Aveiro, Portugal)
 - ✦ August 15 – 17, time TBA
 - ✦ Phil Yasskin & **Doug Meade**