This course was created using a conceptual approach versus the traditional path of teaching arithmetic through topics, e.g. whole numbers, fractions, decimals, pre-algebra.

All of the objectives of a traditional arithmetic course are covered, but they are taught in a different sequence. Each traditional arithmetic course is repeated within multiple conceptual units.

Examples:

- The Addition Unit includes addition of whole numbers, fractions, decimals, signed numbers, like terms, equations using the addition property, as well as perimeter and other applications that involve addition.
- The Combinations Unit consists of order of operations, multiple step applications and solving linear equations.

The course begins with a historical perspective that gives students some background to better understand the evolution of our present system of numbers. The contributions of many cultures, including Egyptian, Babylonian, African, Roman and Mayan are presented. The discussion of the Real Number System follows. This places all of the concepts that follow into the context that fractions, decimals, percents, etc., are all just numbers. This unit is probably the most important. The operation concepts of combining (addition), finding differences (subtraction), multiplication and division are then introduced and the course finishes with a combination unit.

While this approach does not represent a revolution in teaching math, it is an attempt to create active learners. So, instead of presenting definitions, providing examples, and then practice problems, students are asked to figure out problems first. While attempting to complete a problem before a rule is given, students usually find a way to solve the problem. While their solutions may not utilize the shortest methods, the discovery approach makes them active participants in their own education and they won’t forget the “rules” because they can recreate the algorithm.

Feedback from Student Course Evaluations:

- “This semester was the first time that this course was taught in a different way. I believe the way that it was presented is an easier way to understand math.”

- “I liked the way she taught this new method of re-learning basic math skills. It made me feel confident about math for the first time, it made me feel like I was good at it. I am an older student and was never good at math.”

- “With this course, I feel that I have learned so much and got to fully understand math and became good at it. I am a lot more confident about math now.”

"Teach me, and I will forget. Show me, and I will remember. Involve me, and I will understand.”
A Chinese Proverb
MAT 010 Concepts of Numbers versus MAT 010 Traditional Course

The Concepts approach began as a single pilot course that met with significant success. While the following two semesters showed a more modest improvement, positive results continued to occur even as the top Accuplacer arithmetic scorers were placed in an accelerated beginning algebra course.

|                  | Fall 2008 | Spring 2009 | Fall 2009 | Spring 2009 | Fall 2010 | Spring 2010 | Fall 2011 | Spring 2011 | Fall 2012 | Spring 2012 | Fall 2013 | Spring 2013 | Fall 2013 |
|------------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|
| Concepts of Numbers | 74%       | 63%         | 68%       | 60%         | 58%**     | 57%         | 58%       | 61%         | 60%       | 62%         | 62%       | 62%         |
|                  | N=19      | N=19        | N=19      | N=255       | N=380     | N=289       | N=704     | N=316       | N=545     | N=327       | N=523     |
| Traditional Arithmetic | 45%       | 34%         | 41%       | 40%         | 40%       | 38%         | 40%       | 40%         | 38%       | 38%         | 38%       | 38%         |
|                  | N=664     | N=429       | N=567     | N=236       | N=284     | N=150       | N=0       | N=0         | N=0       | N=0         | N=0       | N=0         |

* the top 13% of Arithmetic Accuplacer scorers were accelerated into the next course (a 4 credit beginning algebra class)
** an additional top 12% of Arithmetic Accuplacer scorers were accelerated into the next course (a 4 credit beginning algebra class)

Conclusion

The range of Accuplacer scores for Arithmetic placement, prior to Spring 2010 was 20 – 72; the range for placement has been narrowed to 20 – 54.

Since fall 2011, all arithmetic classes at the College use the Concepts approach. Other colleges who are offering this course are West Chester University, Reading Area Community College, Berkshire Community College, Palomar College, Triton College, Luzerne County Community College and Imperial College.

For More Info:
Barbara Lontz
Assistant Professor of Mathematics
Montgomery County Community College
101 College Drive
Pottstown, PA 19464
610.819.2058
blontz@mc3.edu