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# MATH 170, Section 002, Syllabus, Spring 2012

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## COURSE GOALS:

- Experience mathematics as a methodology for effective and critical thinking.
  - Understand the science and art of applied thinking. Develop techniques for exploration, analysis, and discovery.
  - Employ mathematical concepts and deductive reasoning in applications.
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TEXT: Edward B. Burger, Michael Starbird, *The Heart of Mathematics. An Invitation to Effective Thinking*. 3rd Edition, John Wiley & Sons, Inc., 2010. ISBN 978-0-470-42476-6

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| Section  | Topic                                  |
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| 2.1      | Counting and the pigeonhole principle. |
| 2.2      | Patterns and the Fibonacci numbers.    |
| 2.3      | Prime numbers.                         |
| 2.4      | Modular arithmetic.                    |
| 2.6      | Irrational numbers.                    |
| 3.1, 3.2 | Cardinality.                           |
| 3.3      | Cantor's diagonalization argument.     |
| 4.1      | The Pythagorean theorem.               |
| 4.3      | The golden rectangle.                  |
| 4.5      | Symmetry and the platonic solids.      |
| 4.7      | The four dimensional space.            |

| Section  | Topic                                       |
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| 5.1      | Distortion and topology.                    |
| 5.2      | Non-orientable surfaces.                    |
| 5.3      | Euler circuits.                             |
| 5.4      | Euler characteristics.                      |
| 6.2      | Creating fractals.                          |
| 6.5      | Dynamics and repeated processes.            |
| 7.2      | Probability.                                |
| 7.3      | Randomness and coincidence.                 |
| 8.1, 8.2 | Data mining.                                |
| 8.5      | Cause and effect.                           |
| 9.3      | Compound interest, mortgages and annuities. |
| 9.4      | Voting and Arrow's theorem..                |
| 9.5      | Fair division.                              |