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**Quantitative Reasoning**
**Master Syllabus**

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**Cluster**

Quantitative and Scientific Reasoning

Courses in this cluster prepare King's graduates to be scientifically literate members of society.  Over time, the quest for truth and understanding has led inquisitive people to ponder questions about the physical world and to discover – through the process of hypothesis, experiment, and observation – the rules, both simple and complex, that govern natural phenomena.  In this vein, the overarching goals of the courses within this cluster are to inspire students to be curious about the world around them and to provide the mathematical and analytical tools necessary to draw sound conclusions from observations and evidence. From the study of the matter in the universe, the organization of matter into complex living organisms and ecosystems, and the effects of human behavior and organization on the physical world and each other, students will ultimately form connections between the governing principles of scientific inquiry and our human experience within the natural world. The foundational knowledge developed in the "Scientific and Quantitative Reasoning" cluster will enable students to identify scientific issues underlying national and local decisions and to utilize their skills of quantitative and scientific analysis to respond in meaningful and ethically responsible ways to issues of contemporary importance to society.

**Core Goals Served in this Category**

Goal 1: To help students develop the foundational skills and competencies of . . . quantitative reasoning

Goal 5: To advance our students' scientific reasoning and literacy

**Core Learning Outcomes**

A student successfully completing a course in Quantitative Reasoning will be able to

1. Convert information into various mathematical forms (Core Goal 1)
2. Perform calculations successfully (Core Goal 1)
3. Explain information presented in mathematical forms (Core Goal 1)
4. Analyze a problems' framework, including generalizations of the problem and how modifying the problems' assumptions will affect conclusions that can be drawn from the problem. (Core Goal 1)
5. Demonstrate familiarity with theories and research methods in the natural and social sciences, including qualitative and quantitative interpretations and analyses (Core Goal 5.1)

**Catalog Description / Introduction**

A liberally educated person should appreciate both the beauty and utility of mathematics. Studying mathematics increases the intellectual sophistication of students by engaging them in rigorous thought, increasing the aptitude for dealing with abstraction, fostering the ability to approach problems creatively, and requiring precise communication of ideas. As a result, mathematics contributes significantly to a liberal arts education by enhancing the ability of students to learn how to learn. In addition, it has become imperative in a society grown more and more quantitative for the well-educated person to have a deeper understanding of mathematics. No matter one's primary field of study, a college student will be confronted in school and beyond with arguments and decisions that are rooted in mathematics. It is thus essential for students to enhance both their understanding of how mathematics plays a role in everyday life and their overall perception of mathematics as a discipline.

**Intangibles / Aspirations / Other Category-Level Elements**

In addition to the outcomes assessed in this category, other Core outcomes might be developed and addressed. Skills, competencies, and dispositions relevant to the subject of math might also be cultivated in this category.
- Develop students' skills in writing and critical inquiry/analysis (Core Goal 1)
- Critically assess sources and claims to test their validity from a scientific and quantitative perspective (Goal 5.2)

**Teaching Methods and Assessment**

Classes are mainly composed of lecture/discussion and group work.  Homework is discussed in class regularly.  In addition, we frequently use computer demonstrations in class to illustrate mathematical ideas and techniques.

**Texts**

Tannenbaum, *Excursions in Modern Mathematics*, 8th edition, Pearson Prentice Hall, 2012.  ISBN-10: 032182573X

**Additional Information / Resources for Instructors**
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**Courses**

MATH 120 – Mathematical Ideas (3)
A study of four distinct units to explore various branches of mathematics that intend to inspire students to be curious about mathematics in the world around them. The units address social choice through the exploration of elections and voting, basic elements of statistics, management science with a focus on organization and efficiency, and shape, growth and form through symmetry and fractal geometry or financial mathematics. On some occasions, units on other suitable topics may replace those denoted here. Students should be proficient in those skills taught in MATH 100 College Algebra.