INSTRUCTOR: Rex K. Kincaid
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Email—rrkinc@math.wm.edu

OFFICE HOURS: Monday and Thursday 2-4 p.m. an by appointment. Please feel free to stop by and ask questions any time I am in my office. If I am busy (and it is not my office hours) I may ask you to come by later.

PREREQUISITES: This course has no formal prerequisites in mathematics or physics. However, physical concepts will be introduced in order to derive straightforward formulas. Mathematics is the language for these formulas. Concepts from trigonometry, exponential functions, and logarithms will be introduced as needed.

DESCRIPTION: The course has no mathematical agenda. We will not study trigonometry, calculus, or any other standard part of the usual mathematics curriculum. Instead, we will examine some commonly experienced (by pilots and/or passengers) aspects of airplane flight and try to understand them via quantitative tools.

KEY DATES: The add/drop deadline is September 8 and the withdraw deadline is October 27.

COLL 200: Math 104 is a COLL 200 anchored in the Natural World and Quantitative Reasoning (NQR) knowledge domain while looking outward to the Cultures, Societies, and the Individual (CSI) knowledge domain.

Courses in the Natural and Quantitative Reasoning (NQR) knowledge domain examine the natural world and physical universe and the means by which humans observe, measure, model, and interpret it. Courses explore the process of scientific discovery, including the methods required to gather and assess empirical data, investigate the predictions of existing theories, and develop experimentally testable hypotheses. Courses may also focus on mathematical or computational methods as applied to these investigations. Students develop their understanding not only of the foundations, implications, and uses of scientific knowledge but also how scientific approaches can be used to create tangible products.

Courses in the Cultures, Societies, and Individuals (CSI) in this domain examine the realm of human cultures, societies, and individuals through their development, organization, and interaction. Some courses employ mathematical modeling, statistical analysis, and scientific experimentation; some, the analysis of artifacts and texts; and others, observation, inference, and extrapolation. Students learn to describe, theorize, and explain human cultures, societies, and individuals in their variety over time and space.

COLL 200 Learning Expectations: the faculty expects students to learn and be able: master basic ideas and methods central to the knowledge domain in which the course
is anchored; and make coherent and meaningful interconnections across the academic disciplines.

**GER 1 CRITERIA:** Courses offered that fulfill GER 1 must:

a. involve numerical calculations;

b. include mathematical justifications explaining why the approaches and calculations in the course actually work;

c. include applications of mathematics to real-world settings or to disciplines other than mathematics

**TEXT:** *Fear of Flying by the Numbers* 4th edition by G. Rublein available at the W&M bookstore. In addition, there are online materials that will be made available at no cost for the air network transportation portion of the course.

**OTHER REQUIREMENTS:** You will need an inexpensive calculator which has the buttons $\sin$, $\cos$, $\tan$, $\log$, and $Y^x$. Fancier calculators are fine, but are of no additional help with regard to this course. You will need a simple protractor, available in the W&M bookstore or any store that sells school supplies. You are encouraged to either purchase or download (instructions available on [www.math.wm.edu/~rrk-inc/teaching.html](http://www.math.wm.edu/~rrk-inc/teaching.html)) the navigation maps required for the course (should include high-level maps H3/H4 and H9/H10 and area maps A1/A2). Online versions of these maps are available as well.

**EXAMINATIONS:** There will be two exams (tentatively Wednesday, October 11 and Friday, November 17) as well as a final exam during the Math block on Tuesday, December 19 from 9 a.m. until noon. All three exams will be “almost closed book”. For the two in-class exams a formula sheet will be provided. For the final exam students may use two 8.5 by 11 inch sheet of notes. Such notes may be on both sides of the paper, but they should be in original pen or pencil, not photo-copies. Makeup exams will be considered only in the case of unanticipatable absences. Students who miss an exam for any other reason will receive a grade of zero.

**GRADING:** Final grades will be based on five values: homework and quiz average, class participation, exam 1, exam 2, and the final exam. Homework average is the total number of points you have received on homeworks as a percent of the total possible. The five percent values will be weighted.

<table>
<thead>
<tr>
<th>Component</th>
<th>Weight (%)</th>
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<tbody>
<tr>
<td>Hmk. and Quiz Avg.</td>
<td>25%</td>
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<tr>
<td>Class Participation</td>
<td>5%</td>
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<tr>
<td>Exam 1</td>
<td>20%</td>
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<tr>
<td>Exam 2</td>
<td>20%</td>
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<tr>
<td>Final</td>
<td>30%</td>
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Final course grades may be "curved" (in your favor). If the final grades are not curved then the following scale will apply. Please note that "plus" and "minus" course grades will be given and are included in these ranges.

A (+/-) 92 % and above
B (+/-) 80–91 %
C (+/-) 70–79 %
D (+/-) 60–69 %
F 59 % and below.

Please note that the above ranges include “plus” and “minus” grades. Make-up exams will be given (and late homework accepted) only in the case of officially approved absences or for substantiated medical reasons.

**TENTATIVE COURSE OUTLINE**

Ch. 1 Cross Winds (and Appendix 1a: Triangles)
Ch. 2 Roses
Ch. 3 Navigation (and Appendix 3: Instruments)
Ch. 4 Service
Ch. 5 Luggage
  • Exam 1
Ch. 6 Maps—true North and magnetic North
Net-1 Air Route Networks: background and definitions
Net-2 Air Route Networks: Which design is best?
Ch. 7 Short Paths (Appendix 7a: COMPSYS)
Ch. 8 Falling Bodies
  • Exam 2
Ch. 9 Pressure (Appendix 9: Instruments)
Ch. 12 Pressure Vessels
Ch. 13 Cruising (if time permits)