August 2024

MATH 104-02 MWF 1-1:50 p.m. Boswell 342

The Mathematics of Powered Flight

Course Syllabus—Fall 2024

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OFFICE HOURS: Wednesday and Thursday 2-3:30 p.m. or by appointment.

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 9 and the withdraw deadline is October 28. No classes on September 2 (Labor Day), October 10-13 (Fall Break), November 5 (Election Day), and November 27 - December 1 (Thanksgiving). Our final exam is part of the Math block exam time slot on Wednesday, December 11 from 7-10 p.m..

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.

TEXT: *Fear of Flying by the Numbers* 4th edition by G. Rublein (selected chapters available on course blackboard site). In addition, there are online materials that will be made available 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 the course Blackboard site under the "Information" tab) the navigation maps required for the course (should inlcude high-level maps H3/H4 and H9/H10 and area maps A1/A2). Online versions of these maps are availble as well.

EXAMINATIONS: There will be two exams (tentatively Monday, October 7 and Monday, November 18) as well as a final exam during the Math block on Wednesday, December 11 from 7-10 p.m.. 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 orginal 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.

Hmk. and Quiz Avg.	25%
Exam 1	22.5%
Exam 2	22.5%
Final	30%

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 (+/-)	90 % and above
B (+/-)	80–90 %
C (+/-)	70–80 %
D (+/-)	60–70 %
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)