

MATHEMATICAL METHODS OF PHYSICS I
PHYS 5401
Fall 1996
Assignment No. 1

Instructor:

Prof. C. D. Cantrell
Telephone: 883-2868
Email (Internet): cantrell@utdallas.edu
World Wide Web: <http://www.utdallas.edu/~cantrell/>
Office: EC 2.926
Office hours: Saturdays 9:45 AM – noon

Teaching Assistant:

Ms. Dawn Hollenbeck
Telephone: 690-2867
Email (Internet): dawnh@utdallas.edu
Office: FO 1.414
Office hours: Saturdays noon – 2 PM, Tuesdays 4–6 PM

Course Web Page:

<http://www.utdallas.edu/~cantrell/ph5401/>

General References:

- 1) George Arfken, *Mathematical Methods for Physicists*, Third Edition (Academic Press, 1985). ON 3-DAY RESERVE.
- 2) Schaum's Outline Series, especially *Linear Algebra*, by Seymour Lipschutz, *Advanced Mathematics for Scientists and Engineers*, by Murray R. Spiegel, and *Theory and Problems of Complex Variables*, also by Spiegel. Schaum's Outlines can be quite useful as readable summaries of theory and as sources of worked examples.
- 3) P. M. Morse and H. Feshbach, *Methods of Theoretical Physics* (McGraw-Hill, 1953), QC20.M6. One of the highest compliments one can pay a theoretical physicist is, "You know your Morse and Feshbach." This two-volume work is no longer as comprehensive as the title suggests, but it is still an essential reference on partial differential equations, complex variables and integral transforms. ON 3-DAY RESERVE.

References on Linear Algebra and Abstract Algebra:

- 4) Abraham P. Hillman and Gerald L. Alexanderson, *A First Undergraduate Course in Abstract Algebra*, Third Edition (Wadsworth Pub. Co., 1983), QA162.H54 1983. A simple, readable introduction to several of the topics in abstract algebra that are relevant to PHYS 5401. ON 3-DAY RESERVE.
- 5) Garret Birkhoff and Saunders MacLane, *A Survey of Modern Algebra*, Third Edition (Macmillan, 1965), QA 251.B53 1953. The classic undergraduate text on abstract algebra. For many years, this book defined the approach and subject matter of the undergraduate algebra course in every good university. ON 3-DAY RESERVE.
- 6) Gilbert Strang, *Linear algebra and its applications*, Third Edition (Harcourt, Brace, Jovanovich, 1988), QA184 .S8 1988. A good contemporary textbook. ON 3-DAY RESERVE.

References on Complex Variables and Applications:

- 7) Ruel V. Churchill, James W. Brown and Roger F. Verhey, *Complex Variables and Applications*, Fifth Edition (McGraw-Hill, 1990), QA331.C524 1990. A standard undergraduate text for physicists and engineers. Very clearly written. ON 3-DAY RESERVE.
- 8) Lars V. Ahlfors, *Complex Analysis: An Introduction to the Theory of Analytic Functions of One Complex Variable*, Third Edition (McGraw-Hill, 1979), QA331.A45 1979. The standard undergraduate textbook for mathematics majors. ON 3-DAY RESERVE.
- 9) Konrad Knopp, *Elements of the Theory of Functions* (Dover), QA331.K6814. A good discussion of complex numbers and infinite series. ON 3-DAY RESERVE.
- 10) Konrad Knopp, *Theory of Functions*, Parts I and II (Dover), QA331.K713. Dated, but more readable than Ahlfors, and probably just as useful for most physicists. Moderately priced. ON 3-DAY RESERVE.
- 11) N. W. McLachlan, *Complex Variable Theory and Transform Calculus*, Second Edition (Cambridge University Press, 1963), AQ432.M3 1963. A very useful source of examples of tricky contour integrals. ON 3-DAY RESERVE.

Functional Analysis

- 12) Andrei Nikolaevich Kolmogorov and Sergei Vasilevich Fomin, *Introductory Real Analysis* (Dover), QA331.K73213 1975. A highly readable introduction to functional analysis (despite the misleading title). Recommended for purchase. ON 3-DAY RESERVE.
- 13) Boris Zakharovich Vulikh, *Introduction to Functional Analysis for Scientists and Technologists* (Pergamon, 1963), QA320.V813 1963. ON 3-DAY RESERVE.
- 15) Eduard Prugovečki, *Quantum mechanics in Hilbert space*, Second Edition (Academic Press, 1981), QA3.P8 vol. 92. A good summary of the applications of Hilbert space in quantum mechanics. ON 3-DAY RESERVE.

Grading Policy:

Grades will be determined by homework, two midterm examinations and a comprehensive final examination. The total homework grade, the total of the grades on the two midterm examinations, and the grade on the final examination will receive equal weight in the determination of the grade for the course. Final grades will be assigned by renormalizing the actual total grades in such a way that one of the best students in the class receives a renormalized grade of 4.0. Grades in the range from 3.4 to 4.0 will be recorded as A; the range from 2.5 to 3.4 corresponds to B.

Homework Policy:

The acceptance of homework handed in after the due date is strictly at the discretion and convenience of the Teaching Assistant. Should any problems be discussed in class, grades of 0 will be assigned if those problems are handed in afterwards.

Reading:

“Sets and mappings”

Problems:

“Sets and mappings”, problems 2.2.1, 2.2.2, 2.2.5, 2.2.7, 2.2.8

The above problems are due September 10, 1996.