BOOK REVIEWS

Advanced Courses in Mathematical Analysis, I, A. Aizpuru-Tomas and F. Leon-Saavedra (Editors), World Scientific Publishers, London - Singapore 2004, vii+155 pp, ISBN: 981-256-060-2

The volume contains the written versions of the lectures delivered at the First International Course of Mathematical Analysis in Andalucia, organized by the University of Cadiz from 23 to 27 September, 2005. The aim of the course was to bring together different research groups working in mathematical analysis and to provide the young researchers of these groups with access to the most advanced lines of research. A second course took place in September 2004 in Granada.

There are included five survey papers: 1. Y. Benyamini, *Introduction to uniform classification of Banach spaces* ; 2. M. Gonzáles, *An introduction to local duality for Banach spaces* ; 3. V. Müller, *Orbits of operators* ; 4. E. Matouškova, S. Reich and A. J. Zaslavski, *Genericity in nonexpansive mapping theory* ; 5. A. R. Palacios, *Absolute-valued algebras, and absolute-valuable Banach spaces.*

The first paper is the only updated survey on the classification of Banach spaces under uniformly continuous mappings. Its aim is to introduce the reader to this area and to present some results and open questions, a complete presentation of these problems and of other related ones being given in the recent treatise of Y. Beniaminy and J. Lindenstrauss, *Nonlinear Geometric Functional Analysis,* I., AMS, 2000.

The local duality for Banach spaces is a tool recently developed by the author of the second paper and some co-workers, which turned to be very useful in the study Banach spaces, mainly in the case when the dual of a Banach space is too large.

V. Müller emphasizes in the third paper the relevance of the orbit method and of Scott Brown's technique in the study of invariant subspaces.

It is known that nonexpansive mappings could note have fixed points, but, as it was shown by F. S. De Blasi and J. Myjak in 1976, most of them (in the sense of Baire category) do have. The fourth paper surveys various category and porosity results concerning the well-posedness of the fixed point problem for nonexpansive mappings, most of them being obtained recently by the authors.

An absolute-valued algebra is a normed algebra A such that $\|xy\| = \|x\|\|y\|$, for all $x, y \in A$. As it is well-known, if A is associative and commutative then it agrees with $\mathbb{R}$ or $\mathbb{C}$, and with the quaternion field $\mathbb{H}$ if A is only associative. Therefore, the interesting case is that of non-associative absolute-valued algebras, presented in the last paper of the book. The results are presented from historical perspective to the frontier of current research in the field.

The book contains surveys of some topics of interest in the current research in functional analysis, written by leading experts in the area. It can be used as an introductory material for young researchers, as a guide to more advanced books or research papers.

S. Cobzaş

I. Kleiner, ***A History of Abstract Algebra***, xvi+168 pp, Birkhäuser, Boston - Basel - Berlin, 2007, ISBN: 978-0-8176-4684-4

The book gives an original and well–documented account of the history of abstract algebra. If for the usual history of facts the chronological order seems to be of a great importance, we could say that for the history of sciences the thematic order is most significant. The main themes of abstract algebra are groups, rings, fields and vector spaces. Them are devoted four chapter of the book, namely chapters 2–5, preceded by an introductory chapter, focusing on the roots coming from classical algebra. The book continues with a presentation of Emmy Noether's influential work. The seventh chapter of the book is thought as a *Course in Abstract Algebra inspired by History*, and it is devoted to some problems which are rich sources of ideas in this area. The last chapter contains biographies of some great mathematicians, whose work is related with crucial developments in algebra: Arthur Cayley, Richard Dedekind, Evariste Galois, Carl Friedrich Gauss, William Rowan Hamilton and Emmy Noether.

In conclusion the book offers a proof how the knowledge of the history of a scientific domain, may be useful for understanding, study and research in this area. It is therefore useful for teachers, students and anyone having interests in (history of) abstract algebra.

George Ciprian Modoi

Stephen I. Campbell and Richard Haberman, ***Introduction to differential equations with dynamical systems***, Princeton University Press, 430 pp., Princeton and Oxford 2008, ISBN 13: 978-0-691-12474-2

This is a textbook for undergraduate students which contains the standard topics for differential equations. The book emphasizes linear constant coefficients equations and applications. The authors describe applications in populations growth, mixing problem, mechanical vibrations and electrical circuits.

The book is structured in 6 chapters.

Chapter 1 is concerned with first order differential equations and their applications and contains 12 sections. Section 1.7 describes the elementary methods to solve first order differential equations with constant coefficients and constant input. First order differential equations have many important applications, sections 1.8-1.9 discuss population growth, radioactive decay, Newton's law of cooling and mixture problem.

Chapter 2 covers linear second and higher order differential equations. The reader can easy follow this chapter since in section 2.1 the authors introduce the idea of linearity, the general solution is the sum of a particular solution and a linear combination of homogeneous solutions. The applications of second order linear differential equations are given in Newton's law, mechanical vibrations with no dumping, three cases of damped mechanical vibrations and forced vibrations including a very detailed oriented discussion of mechanical resonance.

Chapter 3 presents the method of solving differential equations using Laplace Transforms. More in depth discussion of second order differential equations is possible in the cases of discontinuous forcing with Heaviside function, periodic forcing and impulsive forcing using delta function.

Chapter 4-6 contain an introduction to dynamical systems generated by differential equations and systems of differential equations. Chapter 4 describes linear systems of two differential equations, methods to solve linear systems with constant coefficients and how to construct their phase plane.

Chapter 5 is dedicated to nonlinear autonomous differential equations. There are presented the notions of equilibrium points, stability and one-dimensional phase line.

Chapter 6 discusses equilibrium, linear stability and phase plane of nonlinear planar systems of differential equations.

Marcel-Adrian Şerban