

Abelian Groups, Rings, Modules, and Homological Algebra

Edited by

Pat Goeters

Auburn University

Alabama, U.S.A.

Overtoun M. G. Jenda

Auburn University

Alabama, U.S.A.



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Contents

Acknowledgment	ix
Biography of Professor Edgar Enochs	xi
Conference Participant List	xxi
Contributor List	xxv
About the Editors	xxix
Preface	xxxix
1 Generalizing Warfield's Hom and Tensor Relations	1
<i>Ulrich Albrecht and Pat Goeters</i>	
1.1 Introduction	1
1.2 Self-Small Modules	1
1.3 Projectivity Properties	3
1.4 The Class \mathcal{M}_A	4
1.5 Domains Which Support Warfield's Results	6
1.6 Replicating Duality for Domains	7
1.7 Duality and Infinite Products	9
1.8 Mixed Groups	10
2 How Far Is An HFD from A UFD?	15
<i>David F. Anderson and Elizabeth V. Mclaughlin</i>	
2.1 Introduction	15
2.2 $\overline{\Lambda}(R)$	16
2.3 Localization	19
2.4 Questions	20
3 A Counter Example for A Question On Pseudo-Valuation Rings	23
<i>Ayman Badawi</i>	
3.1 Introduction	23
3.2 Counter Example	24
4 Co-Local Subgroups of Abelian Groups	29
<i>Joshua Buckner and Manfred Dugas</i>	
4.1 Introduction	29
4.2 Basic Properties	30
4.3 Cotorsion-free Groups as Co-local Subgroups	34
5 Partition Bases and $B^{(1)}$-Groups	39
<i>Immacolata Caruso, Clorinda De Vivo, and Claudia Metelli</i>	

5.1	Introduction	39
5.2	Preliminaries	40
5.3	Partition Bases	42
5.4	Direct Summands	43
5.5	The Domain of $(\mathcal{C}, \mathcal{D})$	44
5.6	Indecomposable Summands	46
5.7	Examples	49
6	Associated Primes of the Local Cohomology Modules	51
	<i>Mohammad T. Dibaei and Siamak Yassemi</i>	
6.1	Introduction	51
6.2	General Case	52
6.3	Special Case	53
6.4	Generalized Local Cohomology	56
7	On Inverse Limits of Bézout Domains	59
	<i>David E. Dobbs and Marco Fontana</i>	
7.1	Introduction	59
7.2	Results	60
8	An Elementary Proof of Grothendieck's Theorem	67
	<i>Edgar Enochs, Sergio Estrada Dominguez, and Blas Torrecillas</i>	
8.1	Introduction	67
8.2	The Main Theorem	68
8.3	Grothendieck's Theorem	70
9	Gorenstein Homological Algebra	75
	<i>Edgar E. Enochs and Overtoun M.G. Jenda</i>	
9.1	Introduction	75
9.2	Tate Homology and Cohomology	76
9.3	Auslander and Gorenstein Rings	77
9.4	The Kaplansky Program	79
9.5	Iwanaga-Gorenstein Rings	79
9.6	Gorenstein Homological Algebra	80
9.7	Generalized Tate Homology and Cohomology	82
9.8	The Avramov-Martsinkovsky Program	82
9.9	Gorenstein Flat Modules	84
9.10	Salce's Cotorsion Theories	85
9.11	Other Possibilities	86
10	Modules and Point Set Topological Spaces	87
	<i>Theodore G. Faticoni</i>	
10.1	The Diagram	87
10.2	Self-Small and Self-Slender Modules	92
10.3	The Construction Function	94
10.4	The Greek Maps	95
10.5	Coherent Modules and Complexes	96
10.6	Complete Sets of Invariants	97
10.7	Unique Decompositions	98
10.8	Homological Dimensions	101
10.9	Miscellaneous	103

11	Injective Modules and Prime Ideals of Universal Enveloping Algebras	107
	<i>Jörg Feldvoss</i>	
11.1	Injective Modules and Prime Ideals	109
11.2	Injective Hulls	110
11.3	Locally Finite Submodules of the Coregular Module	113
11.4	Minimal Injective Resolutions	116
12	Commutative Ideal Theory without Finiteness Conditions	121
	<i>Laszlo Fuchs, William Heinzer, and Bruce Olberding</i>	
12.1	Introduction	122
12.2	The Structure of \mathcal{Q} -irreducible Ideals	123
12.3	Completely \mathcal{Q} -Irreducible and m -Canonical Ideals	128
12.4	\mathcal{Q} -irreducibility and Injective Modules	133
12.5	Irredundant Decompositions and Semi-Artinian Modules	134
12.6	Prüfer Domains	138
12.7	Questions	140
12.8	Appendix: Corrections to [17]	141
13	Covers and Relative Purity over Commutative Noetherian Local Rings	147
	<i>Juan Ramon García Rozas, Luis Oyonarte, and Blas Torrecillas</i>	
13.1	Preliminaries	147
13.2	τ_I -Closed Modules	148
13.3	Relative Purity over Local Rings	149
13.4	Relative Purity over Regular Local Rings	150
14	Torsionless Linearly Compact Modules	153
	<i>Rüdiger Göbel and Saharon Shelah</i>	
14.1	Introduction	153
14.2	Proof of the Theorem	155
15	Big Indecomposable Mixed Modules over Hypersurface Singularities	159
	<i>Wolfgang Hassler and Roger Wiegand</i>	
15.1	Introduction	159
15.2	Bimodules	161
15.3	Extensions	162
15.4	Syzygies and Double Branched Covers	164
15.5	Finding a Suitable Finite-Length Module	167
15.6	The Main Application	170
16	Every Endomorphism of a Local Warfield Module is the Sum of Two Automorphisms	175
	<i>Paul Hill, Charles Megibben, and William Ullery</i>	
16.1	Introduction	175
16.2	The Key Lemma	176
16.3	Proof of the Main Theorem	180
17	Wakamatsu Tilting Modules, U-Dominant Dimension, and k-Gorenstein Modules	183
	<i>Zhaoyong Huang</i>	
17.1	Introduction and Main Results	183
17.2	Wakamatsu Tilting Modules	186
17.3	The Proof of Main Results	189
17.4	Exactness of the Double Dual	194
17.5	A Generalization of k -Gorenstein Modules	196

18 Γ-Separated Covers	203
<i>Lawrence S. Levy and Jan Trlifaj</i>	
18.1 Introduction	203
18.2 \mathcal{G} -Covers	204
18.3 Γ -Separated Covers	208
18.4 The Dedekind-Like Case	210
18.5 Open Problems	215
19 The Cotorsion Dimension of Modules and Rings	217
<i>Lixin Mao and Nanqing Ding</i>	
19.1 Introduction	217
19.2 General Results	218
19.3 Cotorsion Dimension under Change of Rings	226
19.4 Applications in Commutative Rings	228
20 Maximal Subrings of Homogeneous Functions	235
<i>Carlton J. Maxson</i>	
20.1 Introduction	235
20.2 The Case of Torsion Groups	236
20.3 The Case of Torsion-Free Groups	237
20.4 Subrings of $M_0(A)$	239
21 Isotype Separable Subgroups of Mixed Abelian Groups	241
<i>Charles Megibben and William Ullery</i>	
21.1 Introduction	241
21.2 Subgroups with κ -covers of Almost Balanced Pure Subgroups	243
21.3 Intersection Closure of Global Warfield Groups	244
21.4 Isotype Separable Subgroups of Global Warfield Groups	247
22 Note on the Generalized Derivation Tower Theorem for Lie Algebras	251
<i>Toukaidine Petit and Fred Van Oystaeyen</i>	
22.1 Introduction	251
22.2 Γ -Decomposition	252
22.3 Derivation Tower of Lie Algebras: Case with Trivial Center	258
22.4 The Derivation Tower of Lie Algebras: General Case	260
23 Quotient Divisible Groups, ω-Groups, and an Example of Fuchs	265
<i>James D. Reid</i>	
23.1 Introduction	265
23.2 On ω -groups	266
23.3 Three Remarks	266
23.4 Parameters	270
23.5 Main Results	271
23.6 Endomorphisms	271
24 When are Almost Perfect Domains Noetherian?	275
<i>Luigi Salce</i>	
24.1 Introduction	275
24.2 Known Results on the Noetherian Condition	276
24.3 A Characterization of Noetherian Almost Perfect Domains	277
24.4 \mathcal{E} -Closed Domains	280

25 Pure Invariance in Torsion-free Abelian Groups	285
<i>Phill Schultz</i>	
25.1 Introduction	285
25.2 Pure Fully Invariant Subgroups	286
25.3 Traces and Kernels of cd Groups	291
26 Compressible and Related Modules	295
<i>Patrick F. Smith</i>	
26.1 Introduction	295
26.2 Prime and Compressible Modules	296
26.3 Monoform Modules	300
26.4 Nonsingular Modules	305
26.5 Fully Bounded Rings	309

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Pat Goeters
Overtoun M.G. Jenda
Department of Mathematics and Statistics
College of Sciences and Mathematics
Auburn University



The 2004 Abelian Groups Rings and Modules Conference Participants and Contributors
Honor

EDGAR EARLE ENOCHS

For his dedicated mentoring and contributions to Algebra

Biography of Professor Edgar Enochs

Edgar Earle Enochs was born on September 13, 1932 in Pike County, Mississippi. He obtained his bachelor's degree in 1958 from Louisiana State University and his Ph.D. degree from the University of Notre Dame, also in 1958, under the supervision of Professor Donald John Lewis. His Ph.D. thesis was titled "Infinite Abelian Groups." In the same year, on June 21, 1958 he married Louise Smith of Baton Rouge, Louisiana. He has seven children: Corinne, Mary Jane, Kathryn, Maureen, Madelaine, Anne, and John, and thirteen grandchildren.

Professor Enochs started his academic career as an instructor at the University of Chicago (1958 - 1960). In 1960, he joined the University of South Carolina as an assistant professor. In 1962 he was promoted to associate professor, and became full professor in 1966. In 1967, he moved to the University of Kentucky, where he has remained since.

Professor Enochs has had an illustrious and prolific career. Having started his research in infinite abelian groups, he has expanded his research interest to a wide range of other areas such as group theory, commutative and non-commutative algebra, modules, category theory, algebraic geometry, homological algebra, and representation theory just to name a few. Most of his papers have resulted in creating and growing new areas of research in Algebra. In particular, his 1963 and 1971 papers on "torsion free covering modules" formed a basis of the work on covers (right approximations) that is still being done today. Another paper that has had a major impact is his 1981 paper on "injective and flat covers and resolvents," which is the foundation of the relative homological algebra research being done today by researchers in the Enochs School. This remarkable paper was followed by the 1985 paper that he co-wrote with one of his students on "balanced functors" that formed a basis for what is now known as Gorenstein relative homological algebra. Professor Enochs has traveled all over the world giving lectures and talks and has continuously hosted research visitors at the University of Kentucky to work on the above research topics (and others) and their connections to commutative and non-commutative algebra, representation theory, sheaves, etc. In many cases, he has single handedly jump-started the visitors' research careers.

Professor Enochs has had a profound impact on mathematics education in the U.S., having supervised over 44 Ph.D. theses, including one of the editors of this book. He is an outstanding teacher and is a recipient of the University of Kentucky's teaching excellence awards: Alumni Association Great Teacher Award and the Sturgill Award for Contributions to Graduate Education.

Even with such stellar accomplishments, Professor Enochs is still the nicest, kindest, and most helpful person, and he is a pure joy to meet and work with.

Publications of Professor Edgar Enochs

1. Gorenstein categories Tate cohomology on projective schemes (with Sergio Estrada and Juan Ramon Garcia Rozas), submitted.
2. The \aleph_1 -product of DG-injective complexes (with Alina Iacob), to appear in Proc. Edinburgh Math. Soc.
3. The structure of compact co-Galois groups (with Sergio Estrada, Juan Ramon Garcia Rozas and Luis Oyonarte), to appear in Houston J. Math.
4. Gorenstein flat covers and cotorsion envelopes (with Sergio Estrada and Blas Torrecillas), to appear in J. Algebras Represent. Theory.
5. Covers and envelopes by V-Gorenstein modules (with Juan Antonio Lopez Ramos and Overtoun M.G. Jenda), to appear in Comm. Algebra.
6. A non-commutative generalization of Auslander's last theorem (with Overtoun M.G. Jenda and Juan Antonio Lopez Ramos), to appear in the International Journal of Math. and Math. Sciences.
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Ph.D. theses under the direction of Professor Edgar Enochs

1. **B. Hoyte Maddox**, University of South Carolina, 1964, Absolutely Pure Modules
2. **W. W. Leonard**, University of South Carolina, 1964, Superfluous Submodules

3. **Pelham Thomas**, University of South Carolina, 1966, Maximal Spaces
4. **James Pleasant**, University of South Carolina, 1966, Certain Relations between Objects and Morphisms in a Category
5. **Arthur Van De Water**, University of South Carolina, 1967, A Property of Modules over Rings with a Left Field of Quotients
6. **David R. Stone**, University of South Carolina, 1968, Torsion-Free and Divisible Modules over Matrix Rings
7. **James R. Smith**, University of South Carolina, 1968, Local Domains with Topologically T-nilpotent Radical
8. **Joong Ho Kim**, University of South Carolina, 1968, On Complete Local Rings
9. **Conduff Childress**, University of South Carolina, 1969, Quotients of Hom and Torsionness
10. **C. Bruce Myers**, University of Kentucky, 1970, F-Torsionless and F-Reflexive Modules
11. **Ann F. Bowe**, University of Kentucky, 1970, Some Aspects of Small Modules
12. **James J. Bowe**, University of Kentucky, 1970, Neat Homomorphisms
13. **Thomas J. Cheatham**, University of Kentucky, 1971, Finite Dimensional Rings and Torsion Free Covers
14. **Cary H. Webb**, University of Kentucky, 1972 Tensor and Direct Product
15. **Roger D. Warren**, University of Kentucky, 1972, Free A-Rings
16. **Frank D. Cheatham**, University of Kentucky, 1972, F-Absolutely Pure Modules
17. **David D. Berry**, University of Kentucky, 1975, S-Purity
18. **David D. Adams**, University of Kentucky, 1978, Absolutely Pure Modules
19. **James Patterson, III.**, University of Kentucky, 1979, (X,Y)-Divisible Modules Over Commutative Rings
20. **Peter McCoart Joyce**, University of Kentucky, 1979, Dual Numbers and Finite Abelian Groups
21. **Walter P. Gerlach**, University of Kentucky, 1980, Connecting Locally Compact Abelian Groups
22. **Overtoun M.G. Jenda**, University of Kentucky, 1981, On Injective Resolvents
23. **Richard G. Belshoff**, University of Kentucky, 1990, On Matlis Reflexive Modules
24. **Mark A. Goddard**, University of Kentucky, 1990, Minimal Projective Resolutions of Complexes
25. **Frank Branner**, University of Kentucky, 1991, On the Projective Functor
26. **Victor K. A. Akatsa**, University of Kentucky, 1991, Flat Envelopes and Negative Torsion Functors
27. **Sangwon Park**, University of Kentucky, 1991, The Macaulay-Northcott Functor

28. **Vivian Cyrus**, University of Kentucky, 1994, The Category of Monoids
29. **Clayton Brooks**, University of Kentucky, 1994, Homotopy Theory of Modules
30. **Albert Bronstein**, University of Kentucky, 1995, On the Representation of Quivers
31. **Okyeon Yi**, University of Kentucky, 1996 Local Nilpotence of Envelopes and Universal Enveloping Algebras
32. **Jinzhong Xu**, University of Kentucky, 1997, Flat Covers of Modules
33. **Christopher Anthony Aubuchon**, University of Kentucky, 1997, A Natural Functor from the Category of Complexes of Left R-modules to the Category left R (ϵ)-Modules
34. **William Todd Ashby**, University of Kentucky, 1998, The Characterization of Graded Principal Ideal Domains and Graded Torsion Free Covering Modules
35. **David W. Dempsey**, University of Kentucky, 2000, Functors and the Preservation of Covers and Envelopes
36. **Julia Varbalow**, University of Kentucky, 2000, Injective and Projective Representations of Quivers
37. **Makhmud Sagandykov**, University of Kentucky, 2000, On Homological Structures of Transformation Groups
38. **Stephen T. Aldrich**, University of Kentucky, 2000, Exact and Semisimple Differential Graded Algebras and Modules
39. **Naveed Zaman**, University of Kentucky, 2000, Minimal Generators
40. **Chris Bullock**, University of Kentucky, 2001, On Chain Numbers
41. **Molly D. Wesley**, University of Kentucky, 2005, Torsion Free Covers of Graded and Filtered Modules
42. **Katherine R. Pinzon**, University of Kentucky, 2005, Absolutely Pure Modules
43. **Alina C. Jacob**, University of Kentucky, 2005, Generalized Tate Cohomology
44. **Todorka N. Nedeva**, University of Kentucky, 2005, Series in the Binomial Polynomials

Genealogy of Professor Edgar Enochs

- **Karl Theodor Wilhelm Weierstrass** (1815-1897), University of Konigsberg, Honorary Doctor's Degree in 1854
- **Ferdinand Georg Frobenius** (1849-1917), Universitat Berlin, 1870
- **Issai Schur** (1875-1941), Universitat Berlin, 1901
- **Richard Dagobert Brauer** (1901-1977), Universitat Berlin, 1925
- **Donald J. Lewis**, Ph.D., University of Michigan, 1950
- **Edgar Earle Enochs**, Ph.D., University of Notre Dame, 1958

Conference Participant List

Ulrich Albrecht, Department of Mathematics and Statistics, Auburn University, Alabama 36849, USA www.math.auburn.edu

David Anderson, Department of Mathematics, The University of Tennessee, Knoxville, Tennessee 37996, USA www.math.utk.edu

David Arnold, Department of Mathematics, Baylor University, Waco, Texas 76798, USA www3.baylor.edu/Math

Richard Belshoff, Department of Mathematics, Southwest Missouri State University, Springfield, Missouri 65804, USA www.math.smsu.edu

Gary Birkenmeier, Department of Mathematics, University of Louisiana at Lafayette, Lafayette, Louisiana 70504, USA www.louisiana.edu/Academic/Sciences/MATH

David Dobbs, Department of Mathematics, The University of Tennessee, Knoxville, Tennessee 37996, USA www.math.utk.edu

Sergio Estrada Dominguez, Department of Algebra and Mathematical Analysis, Universidad de Almería, Almería, Spain www.ual.es/Universidad/Depar/AlgeAnal

Manfred Dugas, Department of Mathematics, Baylor University, Waco, Texas 76798, USA www3.baylor.edu/Math

Edgar E. Enochs, Department of Mathematics, University of Kentucky, Lexington, Kentucky 40506, USA www.ms.uky.edu

Theodore Faticoni, Department of Mathematics, Fordham University, Bronx, New York 10458, USA www.fordham.edu/mathematics

Buzz Fay, Department of Mathematics, The University of Southern Mississippi, Hattiesburg, MS 39406-0001 www.usm.edu/math/index.htm

Joerg Feldvoss, Department of Mathematics and Statistics, University of South Alabama, Mobile, Alabama 36688, USA www.southalabama.edu/mathstat

Laszlo Fuchs, Department of Mathematics, Tulane University, New Orleans, Louisiana 70118, USA www.math.tulane.edu

Jim Gillespie, Department of Mathematics, Penn State University, University Park, State College, Pennsylvania 16802, USA www.math.psu.edu

Anthony Giovannatti, Department of Mathematics, State University of West Georgia, Carrollton, Georgia 30118, USA www.westga.edu/math

Pat Goeters, Department of Mathematics and Statistics, Auburn University, Alabama 36849, USA www.math.auburn.edu

Paul Hill, Department of Mathematics, Western Kentucky University, Bowling Green, Kentucky 42101, USA www.wku.edu/Dept/Academic/Ogden/Math

Randall Holmes, Department of Mathematics and Statistics, Auburn University, Alabama 36849, USA www.math.auburn.edu

Alina Iacob, Department of Mathematics, University of Kentucky, Lexington, Kentucky 40506, USA www.ms.uky.edu

Overtoun Jenda, Department of Mathematics and Statistics, Auburn University, Alabama 36849, USA www.math.auburn.edu

Daniel Kiteck, Department of Mathematics, University of Kentucky, Lexington, Kentucky 40506, USA www.ms.uky.edu

Doug Leonard, Department of Mathematics and Statistics, Auburn University, Alabama 36849, USA www.math.auburn.edu

Carl Maxson, Department of Mathematics, Texas A&M University, College Station, Texas 77843, USA www.math.tamu.edu

Claudia Metelli, Università degli Studi di Napoli “Federico II”, Via Cintia, Monte S. Angelo, Napoli, Italy www.dma.unina.it/inglese/Home/informazioni-en.php

Todorka Nedeva, Department of Mathematics, University of Kentucky, Lexington, Kentucky 40506, USA www.ms.uky.edu

Bruce Olberding, New Mexico State University, Department of Mathematical Sciences, Las Cruces, New Mexico 88003, USA www.math.nmsu.edu

Luis Oyonarte, Department of Algebra and Mathematical Analysis, Universidad de Almería, Almería, Spain www.ual.es/Universidad/Depar/AlgeAnal

Fred Van Oystaeyen, Department of Mathematics & Computer Science, University of Antwerp, Antwerp, Belgium www.ua.ac.be

Cornelius Pillen, Department of Mathematics and Statistics, University of South Alabama, Mobile, Alabama 36688, USA www.southalabama.edu/mathstat

Kathy Pinzon, Department of Mathematics, University of Kentucky, Lexington, Kentucky 40506, USA www.ms.uky.edu

James Reid, Department of Mathematics & Computer Science, Wesleyan University, Middletown, Connecticut 06459, USA www.math.wesleyan.edu

Luigi Salce, Dipartimento di Matematica Pura e Applicata, Via Belzoni 7, 35131 Padova, Italy www.math.unipd.it

Jack Schmidt, Department of Mathematics, University of Kentucky, Lexington, Kentucky 40506, USA www.ms.uky.edu

Tin Yau Tam, Department of Mathematics and Statistics, Auburn University, Alabama 36849, USA www.math.auburn.edu

Jan Trlifaj, Department of Algebra, Charles University, Prague, Czech Republic
www.karlin.mff.cuni.cz/katedry/ka/ka.htm

Bill Ullery, Department of Mathematics and Statistics, Auburn University, Alabama 36849, USA www.math.auburn.edu

Charles Vinsonhaler, Department of Mathematics, University of Connecticut, Storrs, Connecticut 06269, USA www.math.uconn.edu

Gary Walls, Department of MPSET, West Texas A&M University, Canyon, Texas 79016, USA www.wtamu.edu/academic/anns/mps

William Wickless, Department of Mathematics, University of Connecticut, Storrs, Connecticut 06269, USA www.math.uconn.edu



2004 Abelian Groups, Rings, and Modules Conference Participants

Contributor List

Ulrich Albrecht, Department of Mathematics and Statistics, Auburn University, Alabama 36849, USA www.math.auburn.edu

David Anderson, Department of Mathematics, The University of Tennessee, Knoxville, Tennessee 37996, USA www.math.utk.edu

Ayman Badawi, Department of Mathematics and Statistics, American University of Sharjah, P.O. Box 26666, Sharjah, United Arab Emirates www.aus.edu

Joshua Buckner, Department of Mathematics, Baylor University, Waco, Texas 76798, USA www.baylor.edu

Immacolata Caruso, Dipartimento di Matematica e Applicazioni, Università Federico II di Napoli, 80100 Napoli, Italy www.dma.unina.it/inglese/Home/informazioni-en.php

Mohammad T. Dibaei, Department of Mathematics, Teacher Training University, Iran, and Institute for Studies in Theoretical Physics and Mathematics www.ipm.ir

Nanqing Ding, Department of Mathematics, Nanjing University, Nanjing 210093, People's Republic of China www.nju.edu.cn

David Dobbs, Department of Mathematics, The University of Tennessee, Knoxville, Tennessee 37996, USA www.math.utk.edu

Sergio Estrada Dominguez, Department of Algebra and Mathematical Analysis, Universidad de Almería, Almería, Spain www.ual.es/Universidad/Depar/AlgeAnal

Manfred Dugas, Department of Mathematics, Baylor University, Waco, Texas 76798, USA www3.baylor.edu/Math

Edgar Enochs, Department of Mathematics, University of Kentucky, Lexington, Kentucky 40506, USA www.ms.uky.edu

Theodore Faticoni, Department of Mathematics, Fordham University, Bronx, New York 10458, USA www.fordham.edu/mathematics

Joerg Feldvoss, Department of Mathematics and Statistics, University of South Alabama, Mobile, Alabama 36688, USA www.southalabama.edu/mathstat

Marco Fontana, Università degli Studi "Roma Tre", Dipartimento di Matematica, 00146 Roma, Italy www.mat.uniroma3.it

Laszlo Fuchs, Department of Mathematics, Tulane University, New Orleans, Louisiana 70118, USA www.math.tulane.edu

J.R. Garcia Rozas, Dept. Algebra y Analisis Matematico, Universidad de Almería 04071 Almería, Spain www.ual.es/Universidad/Depar/AlgeAnal

Rüdiger Göbel, FB 6, Mathematik, Universität Duisburg Essen, 45117 Essen, Germany
www.uni-duisburg-essen.de/mathematik

Pat Goeters, Department of Mathematics and Statistics, Auburn University, Alabama 36849, USA
www.math.auburn.edu

Wolfgang Hassler, Institut für Mathematik, Karl-Franzens Universität Graz, Heinrichstr. 36, A-8010 Graz, Austria
www.math.uni-graz.at

William Heinzer, Department of Mathematics, Purdue University, West Lafayette, Indiana 47907, USA
www.math.purdue.edu

Paul Hill, Department of Mathematics, Western Kentucky University, Bowling Green, Kentucky 42101, USA
www.wku.edu/Dept/Academic/Ogden/Math

Zhaoyong Huang, Department of Mathematics, Nanjing University, Nanjing 210093, People's Republic of China
www.nju.edu.cn

Overtoun Jenda, Department of Mathematics and Statistics, Auburn University, Alabama 36849, USA
www.math.auburn.edu

Lawrence S. Levy, Department of Mathematics, University of Nebraska, Lincoln, Nebraska 68588-0130, USA
www.math.wisc.edu

Lixin Mao, Department of Basic Courses, Nanjing Institute of Technology, Nanjing 210013, People's Republic of China
www.nju.edu.cn

Carl Maxson, Department of Mathematics, Texas A&M University, College Station, Texas 77843, USA
www.math.tamu.edu

Elizabeth V. McLaughlin, Department of Mathematics, University of Maryland, College Park, Maryland 20742-4015, USA
www.math.umd.edu

Charles Megibben, Department of Mathematics, Vanderbilt University, Nashville, Tennessee 37240, USA
www.math.vanderbilt.edu

Claudia Metelli, Università degli Studi di Napoli "Federico II," Via Cintia, Monte S. Angelo, Napoli, Italy
www.dma.unina.it/inglese/Home/informazioni-en.php

Bruce Olberding, New Mexico State University, Department of Mathematical Sciences, Las Cruces, New Mexico 88003, USA
www.math.nmsu.edu

Luis Oyonarte, Department of Algebra and Mathematical Analysis, Universidad de Almería, Almería, Spain
www.ual.es/Universidad/Depar/AlgeAnal

Fred Van Oystaeyen, Department Wiskunde en Informatica, Universiteit Antwerpen, B-2020, Belgium
www.ua.ac.be

Toukaidine Petit, Department Wiskunde en Informatica, Universiteit Antwerpen, B-2020, Belgium
www.ua.ac.be

James Reid, Department of Mathematics and Computer Science, Wesleyan University, Middletown, Connecticut 06459, USA
www.math.wesleyan.edu

Luigi Salce, Dipartimento di Matematica Pura e Applicata, Via Belzoni 7, 35131 Padova, Italy
www.math.unipd.it

Phill Schultz, School of Mathematics and Statistics, The University of Western Australia, Nedlands, Australia 6009 www.maths.uwa.edu.au

Saharon Shelah, Institute of Mathematics, Hebrew University, Jerusalem, Israel and Rutgers University, New Brunswick, NJ, USA www.math.huji.ac.il

Patrick F. Smith, Department of Mathematics, University of Glasgow, Glasgow G12 8QW, Scotland UK www.maths.gla.ac.uk

Blas Torrecillas, Departamento de Algebra y Analisis Matematico, Universidad de Almeria 04071, Almeria, Spain www.ual.es/Universidad/Depar/AlgeAnal

Jan Trlifaj, Department of Algebra, Charles University, Prague, Czech Republic
www.karlin.mff.cuni.cz/katedry/ka/ka.htm

Bill Ullery, Department of Mathematics and Statistics, Auburn University, Alabama 36849, USA www.math.auburn.edu

Charles Vinsonhaler, Department of Mathematics, University of Connecticut, Storrs, Connecticut 06269, USA www.math.uconn.edu

Clorinda De Vivo, Dipartimento di Matematica e Applicazioni, Università Federico II di Napoli, 80100 Napoli, Italy www.dma.unina.it/inglese/Home/informazioni-en.php

Roger Wiegand, Department of Mathematics, University of Nebraska, Lincoln, Nebraska 68588-0130, USA www.math.unl.edu

Siamak Yassemi, Department of Mathematics, University of Tehran, Tehran, Iran, and Institute for Studies in Theoretical Physics and Mathematics www.ipm.ac.ir

About the Editors

H. PAT GOETERS was born in Houston, Texas, and at age 11 moved with his family to South Bend, Indiana and a year later to New Haven, Connecticut, following his father's academic career. In 1980, Pat finished his undergraduate studies in mathematics and computer science at Southern Connecticut State University in New Haven, and went to University of Connecticut to pursue a Ph.D. which was completed in 1984 under the supervision of William J. Wickless. After spending one year in a post-doctoral position in Middletown under the tutelage of James D. Reid, Goeters was invited for a tenure track position in Auburn by Ulrich F. Albrecht. Soon after, William Ullery and Overtoun Jenda were hired, and so began a lively algebra group.

OVERTOUN M. G. JENDA was born in Malawi and graduated from Chancellor College, University of Malawi with a bachelor's degree in mathematics. Upon graduation, he worked at Chancellor College as an associate lecturer for a year before moving to the U.S. in 1977 for his graduate studies at University of Kentucky. He obtained his Ph.D. in 1981 under the supervision of Professor Edgar Enochs. He then moved back to Chancellor College where he was a lecturer (assistant professor) for three years. In 1984, he moved to University of Botswana for another three year stint as a lecturer before moving back to University of Kentucky as a visiting assistant professor in 1987. In 1988, he joined a lively algebra research group at Auburn University. In addition to traveling within the U.S., he has been to Belgium, Canada, Czech Republic, Iran, Japan, Russia, South Korea, Spain, and several countries in southern Africa visiting mathematics departments and attending conferences. As a result, he has made long-lasting friends from all over the world that have had a great impact on his mathematics career. Overtoun Jenda is married to Claudine and has two children, Emily and Overtoun, Jr.

Preface

On the occasion of Edgar Earle Enochs' 72nd birthday, many top researchers in algebra gathered at Auburn University on September 9-11, 2004 to honor Ed, exchange ideas, and renew friendships. This book is a collection of refereed papers by the researchers involved in the talks as well as those who were not able to make it to the conference, and represents most of the current research topics in abelian groups, commutative algebra, commutative rings, group theory, homological algebra, lie algebras, and module theory.

We are excited that many of the veteran researchers in algebra took time from their busy schedules to honor Professor Enochs, and present us with their latest research ideas. The book gives the reader access to the current ideas and techniques of leading researchers. We must add that, according to the master of first order, Laszlo Fuchs, the conference was one of the most comfortable he has ever attended; we concur and attribute this to the participants; their devotion to algebra is evident in the articles submitted.

A rarity compared to some proceeding volumes is that due to Edgar Enochs' venerable contributions to a wide range of topics in algebra, we have in this volume a large collection of high-quality papers, as attested by referees' reports, from many high-level algebraists discussing today's hot research topics. Though steeped in veteran techniques, articles in this volume involve topics that are accessible to the beginning mathematician. Also, in many articles, suggestions of problems and programs for future study are made - it is always nice when one can improve on a master's result (or perhaps knock oneself out trying).

This collection of papers is therefore an excellent addition to the literature and will serve as an invaluable handbook for beginning researchers in algebra as well as specialists. This book is indeed a superb way of honoring a legend in algebra, Edgar Enochs.

HPG
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