

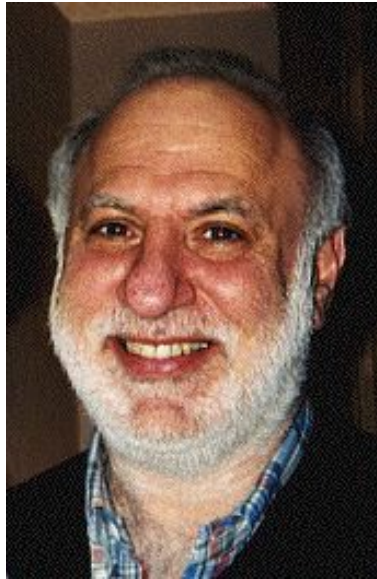
Atlantic Association for Research in Mathematical Sciences
Memorial University of Newfoundland

ATLANTIC ALGEBRA CENTRE

AAC Mini Course

The Semiprimitivity Problem for Group
Rings

will be given by



Professor Donald S. Passman

University of Wisconsin-Madison, USA

*visiting Atlantic Algebra Centre
March 28 - April 3, 2010*

Professor Donald S. Passman is a world famous algebraist, whose important contributions to Group Theory, Ring Theory, Group Rings, Hopf Algebras and Lie Algebras are widely recognized. He is an author of six books and about 175 other publications. He obtained his Ph D degree in 1964 from Harvard University and taught at University of California - Los Angeles, Yale University and since 1969 at University of Wisconsin - Madison, where he currently serves as Richard Brauer Professor of Mathematics, named for his supervisor at Harvard. Professor Passman directed the dissertation of many doctoral students. He was a plenary speaker at the meetings of mathematical societies of Canada, United Kingdom and USA. He has received numerous awards for his teaching and his writing, in particular the Lester R. Ford Award from American Mathematical Society for his 1976 paper "What is a group ring", and the Deborah and Franklin Tepper Haimo Award for the Distinguished University teaching from Mathematical Association of America in 2000.

Abstract of Mini Course

If K is a field and G is a multiplicative group, then the group ring $K[G]$ is an easily defined, rather attractive algebraic object. As the name implies, its study is a meeting place for two essentially different algebraic disciplines. Indeed, group ring results frequently require a blend of group theoretic and ring theoretic techniques. A natural, but surprisingly elusive, group ring problem concerns the semiprimitivity of $K[G]$. Specifically, we wish to find necessary and sufficient conditions on the group G for its group algebra to have Jacobson radical equal to zero. More generally, we wish to determine the structure of the ideal $JK[G]$. In the case of infinite groups, this problem has been studied with reasonable success since 1950, and our goal here is to survey what is known. In particular, we discuss several more recent results on locally finite groups and indicate how they fit into the general scheme. The main results on the semiprimitivity problem for group algebras $K[G]$ of locally finite groups are the outcome of a series of papers starting in 1974. The final installment, published in 1997, achieves the goal of describing the Jacobson radical $JK[G]$ in terms of the radicals $JK[A]$ of the group algebras of the locally subnormal subgroups A of G . More precisely, it shows that if $\text{char } K = p > 0$ and if G has no nontrivial normal p -subgroup, then the controller of $JK[G]$ is the characteristic subgroup generated by those locally subnormal

subgroups A of G which have no nontrivial p' -quotients. In particular, it verifies a conjecture proposed more than twenty years earlier and, in so doing, it essentially solves one half of the group ring semiprimitivity problem for arbitrary groups. The remaining half is the more difficult case of finitely generated groups. We remark that the proof of this theorem ultimately depends upon results which require the Classification of the Finite Simple Groups.

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Everybody is invited! Some limited support is available for the mathematics students in Atlantic Canada. Please provide a recommendation letter from your supervisor. Send applications to `aac` at `mun.ca`.