

Meeting: 1003, Atlanta, Georgia, MAA CP J1, MAA Session on Projects and Demonstrations that Enhance a Differential Equations Course

1003-J1-252 **Ronald Mickens*** (rohrrs@math.gatech.edu), Clark Atlanta University, Box 172 - Physics Department, Atlanta, GA 30314. *A “Research Literature” Based Differential Equation Course.*

Over the past several decades I have taught a course on differential equations (d.e.) for the Physics Department. An interesting feature of the course is the emphasis on applying results from the theory of d.e.’s to the analysis and (sometimes) explicit construction of solutions to linear and nonlinear equations arising from the mathematical modeling of nontrivial phenomena in the natural and engineering sciences. The equations studied come from the current research literature and allows students to clearly see the need for mathematical modeling in theorems of d.e.’s. The course is centered on the study and application of “qualitative methods” to the determination of the essential general mathematical properties of the solutions to the d.e.’s. With this knowledge students can proceed to construct analytical approximations and apply elementary numerical integration techniques. In particular, it is shown why numerical solutions can provide important information on the system dynamics and, further, why these methods should be done last and not at the beginning of the investigation. This course not only allows students to connect their theoretical work to “real world” problems, but also introduces them to the interdisciplinary nature of mathematics and its applications. (Received September 03, 2004)