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Syllabus
UTK – M435 – Partial Differential Equations
Spring 2007, Jochen Denzler, MWF 01:25–02:15, Ayres 205

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Course Description: Math 435 is an introduction to Partial Differential Equations. It is targeted to cover the most fundamental examples PDEs in Science and Engineering and should be accessible to Engr majors with the appropriate mathematical prerequisites. It is also a useful warm-up for Math majors, even though it is not a prerequisite for the more mathematically oriented sequence 535-536. It should give a decent basic introduction to PDEs for math majors that exit with an undergraduate degree and will not pursue graduate studies.

I believe that the engineering focus in the course will be beneficial to math majors, and that the (small amount) of more mathematically oriented components will benefit the engineering majors, too.

Math 435 does NOT give a representative sample of the area of PDEs, but it gives some basic parts without which any understanding of PDEs would be a doomed attempt.

Paradoxically, 2nd order PDEs seem to be easier to understand for the beginner than 1st order PDEs. The course omits the method of characteristics (except for a very brief and trivial occurrence) for 1st order ODEs and goes right into 2nd order.

Textbook: We officially adopt Zachmanoglu, Thoe as textbook and for reference. However, I will provide my own homework. The choice is made for 2 reasons: (1) 90% of the lecture will be at a slightly more elementary level than the book; the book provides a focus beyond the mere calculational aspects of the area, which allows for a transfer of physical understanding of PDEs even in odd-shaped domains (potatoes, wrenches, bridges) where the calculational techniques taught in the course cease to apply. (2) The book has a student friendly price, and the textbook usury racket must be curtailed.

We'll cover roughly chapters VI–IX. Preceding chapters are NOT needed to understand these; instead they may be viewed as extra material for a (fictitious) course 436, for later reference, or self-study.

Inasmuch as it seems helpful for conceptual coherence and clarity I may add a few more advanced items as fact knowledge withouth proofs or detailed explanations.

A number of students will like very pragmatic outlines of the calculational aspects alone. Zachmanoglu–Thoe does not cater to this desire. Another, equally economic book does, to the extreme. It is by Farlow. Feel free to use this book as an excellent tool for such a limited purpose: but for heavens sake don't let your conceptual understanding be limited by the approach of Farlow. PDEs is the area where the next step of mathematical depth, beyond the calculational examples alone, blends perfectly well with a physical understanding of the model. This mix is an important part of the course, and you'd ignore it at your own peril.

Grade: We'll have two in-class exams and one final exam. The relative weight will be: 1/6 for each in-class exam, 2/6 each for hwk and final; or else 1/5 for each in-class exam and the hwk, and 2/5 for the final, whichever works out better for each individual. In case I do not get a grader for homework, we'll need to change this formula, and we'll know soon whether this happens.

Office hours: Will be scheduled soon. I do accomodate drop-in whenever possible, and you may also schedule appointments. But I intend to reserve Tuesdays free of appointments and drop-in. I try hard to take as much time for you as is needed. But do come with specific questions or attempts (even failed attempts are fine) at a problem.

My office is **Ayres 317 E, phone 4-5325**. Email is **denzler@math.utk.edu**, but I may not read it for half a day or for an entire weekend.

Course website: `http://www.math.utk.edu/~denzler/M435-Sp2007/` (public). I do not use the Blackboard system except for administrative purposes.