

**MATH 8702 TOPICS IN APPLIED MATH:
LOCAL AND GLOBAL BIFURCATION THEORETIC METHODS**

Course description. The objective of this course is to give an introduction to bifurcation theoretic methods, particularly as they apply to elliptic PDEs. We will study both local and global theory, but the emphasis will be on the global side. We will give a thorough treatment of the analytic global bifurcation theory of Dancer, and its refinement by Buffoni and Toland. Mathematically, this machinery exploits deep facts from functional analysis and properties of analytic varieties.

Textbook. The main references for the course will be

Bifurcation Theory: An Introduction with Applications to PDEs by H. Kielhöfer
Analytic Theory of Global Bifurcation by J. F. Toland and B. Buffoni.

Another classical reference for local bifurcation theory is *Methods of Bifurcation Theory* by Chow and Hale. My intention is to regularly provide typeset lecture versions of my lecture notes throughout the semester as well.

Prerequisites. A year of graduate analysis. Prior exposure to the material in PDE I is ideal but not required.

Structure of the course. There will be short homework assignments given out periodically. They are intended to help you digest the techniques and ideas presented during the lectures. The assignments will be corrected for feedback, but will not affect your course grade. You are nonetheless strongly encouraged to take them seriously.

In the first two weeks of the semester, you will be given a list of important modern papers that make critical use of bifurcation theoretic techniques. You will be asked to (individually) select one of those papers, which you will then present over the course of two lectures at the end of the semester.

Office hours. I will hold regular office hours on Wednesday and Thursday, 4:30-5:30PM, in MSB 307. If you are not available at this time, we can make a special appointment.

Disabilities. If you need accommodations because of a disability, if you have emergency medical information to share with me, or if you need special arrangements in case the building must be evacuated, please inform me immediately. Please see me privately after class, or at my office. To request academic accommodations (for example, a note taker), students must also register with Disability Services (<http://web.missouri.edu/~accesscm>), AO38 Brady Commons, 882-4696 or 882-8054 TTY. It is the campus office responsible for reviewing documentation provided by students requesting academic accommodations, and for accommodations planning in cooperation with students and instructors, as needed and

consistent with course requirements. Another resource, MU's Adaptive Computing Technology Center (<http://iatservices.missouri.edu/adaptive>), 884-2828, is available to provide computing assistance to students with disabilities. For more information about the rights of people with disabilities, please see ada.missouri.edu or call 884-7278.

Academic Honesty. Academic honesty is fundamental to the activities and principles of a University. Any effort to gain an advantage not given to all students is dishonest whether or not the effort is successful. When in doubt about plagiarism or collaboration, consult the course instructor. The academic community regards academic dishonesty as an extremely serious matter, with serious consequences that range from probation to expulsion. If at any time you have questions about this policy, please ask.

Complaints. If you have communication (or other problems) with your instructor, you can report them to Professor Stephen Montgomery-Smith (Director of Graduate Studies) either by phone (882-4540) or by e-mail (stephen@missouri.edu).