Syllabus for MTG 4302 Topology, Course Number 20549, Spring 2019

Book: J. B. Conway A Course in Point Set Topology (ISBN 978-3-319-02367-0)

Synopsis: This is a standard beginners course on the concept of nearness of points for sets. It is designed to prepare the students for courses in Algebraic Topology, Differential Topology, Functional Analysis, Differential Geometry, and all graduate level Analysis courses.

The course is split, following the chapters of the book above, into three parts. The first studies quite thoroughly metric spaces. Such spaces , for their nature and usefulness, are widely used in different branches of mathematics and sciences. The concepts of limits and continuity of functions are naturally defined for such spaces. Compact metric spaces, introduced here, are particularly nice to work with. Geometric properties such as connectedness are also naturally defined, and are studied. Different ways of constructing new spaces out of given ones are discussed in this part of the course as well.

Turns out the concepts of limit, continuity, compactness, connectedness and other can be defined for more general spaces, called topological spaces. This is methodologically done in the second part of the course.

Metric spaces are a very particular example of topological spaces, but they are so useful that there was a question of characterizing the topological spaces which are actually metric spaces, or metrizable (what the latter means is explained in the course). Turns out, a characterization in terms of continuous real-valued functions on the topological space in question is possible. Such functions are instrumental when describing other important properties of the topological space as well. All this is addressed in the third part of the course,. It is here where an extremely important generalization of the concept of compact spaces ,the so called paracompact spaces, is discussed as well. Turns out, every metric space is paracompact. The part ends with brief discussion of metrizability theorems.

The progress of the students in the class will be assessed based on three Turn-in Homework Assignments, a comprehensive Final Exam, and the work in class. Each these five components will contribute 20% of the overall grade.

The Instructor reserves the right to make changes in the above for reasonable pedagogical or academical reasons,