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Seminar on Graph Theory

in the FSS 2020

The seminar will be held in english. It will follow the book

[HR90] Nora Hartsfield, Gerhard Ringel: Pearls in Graph Theory. Academic Press, Inc., 1990.

Graph theory is a beautiful branch of mathematics. It has strong interactions with combinatorics and important applications in optimization and computer science.

The book above is ideal for a seminar. The material can be taken for seminar talks as it is. The book introduces into graph theory in a playful, but concise way. As the title claims, the material has been chosen very well. The proofs are the most beautiful ones. There are notions, theorems, exercises and pictures, pictures, pictures.

The seminar will take place as a **block seminar,**

on 2-3 Saturdays, possibly March 14 + 21 (+28 if needed)

There will be ≤ 13 talks. The talks can be held alone or shared by up to two people.

The seminar aims at students in the bachelor or Master *Mathematics in Business and Economics* and in the bachelor or Master *Education Mathematics*.

There will be a

Preparation and information meeting with distribution of talks,

Thursday, 13.02.2020, 15:30-16:30, B6, A???.

If you are interested, you are also very welcome to contact me before the preparation meeting, mmase@mail.uni-mannheim.de .

03.12.2019

The seminar has several aims.
(1) One is that the participants give a good talk and during preparation learn, how to achieve this. This means that one has to digest the material well, to choose well what to tell in detail and what not, and how to tell it. The talks shall take 90 minutes. Longer is forbidden absolutely, but much shorter is also bad. There is definitely for each talk enough material to fill 90 minutes (if the material in the main part should not be enough, one could add material from some exercises).
(2) All participants shall learn from all talks (not only their own one). It is good to prepare also for the other talks, by reading the relevant chapter. Doing that one could note some good questions which one can then pose during the talk if they are not answered anyway in the talk. The second aim requires presence at all talks.
(3) The book presents the material in a way, which is almost ready for seminar talks. The seminar shall cover (almost) all material in the book.

14.02.2018, **Talk 1:**
Basic Graph Theory. Chapter 1.

21.02.2018, **Talk 2:**
Colorings of Graphs. Subchapters 2.1 and 2.2.

28.02.2018, **Talk 3:**
Hamilton Cycles. Subchapters 2.3 and 2.4.

07.03.2018, **Talk 4:**
Circuits and Cycles. Chapter 3.

14.03.2018, **Talk 5:**
Extremal Problems. Chapter 4.

21.03.2018, **Talk 6:**
Counting. Chapter 5.

28.03.2018, **Talk 7:**
Labeling Graphs. Chapter 6.

04.04.2018, **Talk 8:**
Planar Graphs. Subchapters 8.1 and 8.2.

11.04.2018, **Talk 9:**
The Five Color Theorem. Subchapters 8.3 and 8.4.

02.05.2018, **Talk 10:**
Measurements of Closeness to Planarity. Chapter 9.

09.05.2018, **Talk 11:**
Rotations of Graphs and Planar Graphs Revisited. Subchapters 10.1 and 10.2.

16.05.2018, **Talk 12:**
The Genus of a Graph. Subchapter 10.3.

23.05.2018, **Talk 13:**
Applications and Algorithms. Chapter 7.