

Inequalities

July 16, 2019

Winter Term 19/20

DR. F. GMEINER



Seminar Schedule

1 Dates & Venue

The seminar starts on Oct, 07, 2019. It takes places in SR 0.006 (Endenicher Allee 60) on Mondays from 02-04 pm (ct). In case you have any queries, feel free to contact me via e-mail (fgmeined@math.uni-bonn.de).

As arranged during our first meeting, we will meet 4 weeks before your talk for a preliminary discussion (and then by appointment). If your talk is in October, please send me an e-mail to arrange the appointment (I shall be travelling in September).

2 Seminar Schedule

No.	Speaker	Topic	Date
1	Gmeineder	Intro & Recap	Oct, 07, 2019
2	Reintges	HL Maximal Inequality and the FIT	Oct, 14, 2019
3	Thewes	GNS Inequalities	Oct, 21, 2019
4	Seidler	Variants of GNS Inequalities I	Oct, 28, 2019
4a	Mohamed	Variants of GNS Inequalities II	Nov, 04, 2019
5	Blauth	Non-Embeddings	Nov, 11, 2019
6	Steinke	BV-Functions and Isoperimetric Inequality	Nov, 18, 2019
7	A. Ullrich	Isoperimetric Inequality & Brunn-Minkowski	Nov, 25, 2019
8	Kaffine	Isodiametric Inequality	Dec, 02, 2020
9	Wegner	Nash Inequality	Dec, 09, 2019
10	Smith	Diamagnetic Inequality	Dec, 16, 2019
11	C. Ullrich	Calderón-Zygmund	Jan, 06, 2020
12	Busch	Korn & Ornstein	Jan, 13, 2019
13	Stein	Limiting L^1 -estimates I	Jan, 20, 2020
14	Xylander	Limiting L^1 -estimates II	Jan, 27, 2020

3 References

3.1 General references

General references for the seminar are as follows (by alphabetical order):

- ABELS: Pseudodifferential and singular integral operators. De Gruyter, Graduate Lectures.
- ADAMS & HEDBERG: Function spaces and potential theory. Springer Grundlehren Series.
- BREZIS: Functional Analysis, Sobolev Spaces and Partial Differential Equations. Springer Universitext.
- MAZ'YA: Sobolev Spaces (with applications to elliptic partial differential equations). Springer Grundlehren Series.

- LIEB & LOSS: Analysis. AMS Graduate Texts.
- EVANS & GARIEPY: Measure theory and fine properties of functions. CRC Press, Boca Raton.
- LEONI: Sobolev functions – A first course. AMS Graduate Texts.
- KRANTZ & PARKS: Geometric integration theory. Birkhäuser.
- STEIN: Harmonic Analysis. Princeton University Press.

3.2 Specific references

Here is a collection of relevant background references for the single talks (ordered by the above table).

- (a) Talk 2: Adams & Hedberg, Chapter 1.1.4 and Chapter 3.1. Also See Stein, Chapter 1.1.
- (b) Talk 3: Maz'ya, Chapter 1.4.1 – 1.4.3. Specific reference:
- P. Hajlasz, Sobolev inequalities, truncation method, and John domains. (Papers on Analysis: A volume dedicated to Olli Martio on the occasion of his 60th birthday.) Report. Univ. Jyväskylä 83 (2001), 109–126.
- (c) Talk 4: Maz'ya, Chapter 1.4.3, Lieb & Loss, Chapter 8.13 (up from page 224) – 8.14 (p. 226).
- (d) Talk 5: More specific material: Section 1 of
- V. Maz'ya: Lectures on Isoperimetric and Isocapacitary Inequalities in Sobolev Spaces. Available for download here:
<http://users.mai.liu.se/vlama82/pdf/mazya.pdf>
- (e) Talk 6: Evans & Gariepy, Chapter 5.1, 5.2, 5.6.1. Also see Leoni, Chapter 14.
- (f) Talk 7: Evans & Gariepy: Chapter 5.6.1, and more specifically, Section 2 of:
- V. Maz'ya: Lectures on Isoperimetric and Isocapacitary Inequalities in Sobolev Spaces. Available for download here:
<http://users.mai.liu.se/vlama82/pdf/mazya.pdf>
 - T. Tao: Notes on the Brunn-Minkowski inequality, available for download here:
<https://terrytao.wordpress.com/2011/09/16/the-brunn-minkowski-inequality-for-nilpotent-groups/>
- (g) Talk 8: Krantz & Parks, Chapter 1.6 (in particular, for a systematic approach to Steiner symmetrisations) and Evans & Gariepy, Chapter 2.2.
- (h) Talk 9: Lieb & Loss, Chapter 8.12 (up from p. 222 to 224, and 227–237)
- (i) Talk 10: Lieb & Loss, Chapter 7.19–7.22.
- (j) Talk 11: Abels, Chapter 4.1–4.5, also see Stein, Chapter 1.
- (k) Talk 12: Abels, Chapter 4.1–4.5 (from here and the notion of elliptic operators, Korn-type inequalities follow easily). Regarding Ornstein's Non-Inequality, our main reference is
- B. Kirchheim and J. Kristensen, 2016. On rank one convex functions that are homogeneous of degree one. Arch. Ration. Mech. Anal. 221, no. 1, 527-558.
- (l) Talk 13 & 14:

- J. Van Schaftingen: Limiting Sobolev inequalities for vector fields and cancelling linear differential operators. *Journal of the European Mathematical Society*, 15(3), 877-921.
- D. Breit, L. Diening, F. Gmeineder: On the trace operator for functions of bounded Λ -variation. To appear at *Analysis & PDE*.
- F. Gmeineder, B. Raita, J. Van Schaftingen: On limiting trace inequalities for vectorial differential operators. Preprint, 2019.