1 List of talks

There are various references for the topics, but unfortunately there is not a book containing all of the material (at least I'm not aware of such a book). For most of the talks, one can follow the notes from last years singularity category seminar (`http://e-shinder.staff.shef.ac.uk/singularity-seminar.htm`), but I also wrote down the main literature for each talk.

1.1 Introduction Neb (16/04/18)

- Short introduction/motivation to the Singularity category
- ADE singularities
- Main goals/theorems of this seminar

1.2 ADE singularities Eoin (23/04/18)

- Definition of geometric quotients and main properties
- Equations of ADE singularities
- Classical McKay correspondence
- G is an SL_2 action on $\mathbb{C}^2$ if and only if $\mathbb{C}^2/G$ is Gorenstein

Literature:

Mustata's notes about finite group quotients;
`http://www.math.lsa.umich.edu/~mmustata/appendix.pdf` (first 2 pages)

Miles Reid's notes;
`https://homepages.warwick.ac.uk/~masda/surf/more/DuVal.pdf` (first chapter contains a table of equations and a lot of calculations/examples)

`https://arxiv.org/pdf/math/9911165.pdf` (first 2 pages)

1.3 The singularity category I Luca (30/04/18)

- Definition and basic properties
- Knörrer periodicity
- An example: The singularity category of $\{xy = 0\} \subset \mathbb{A}^2$

- (If time permits) Relation to matrix factorizations

Literature:

Orlov's paper (A more geometric point of view);
`http://www.mi.ras.ru/~orlov/papers/trsing.pdf` (subchapter 1.2 and chapter 2)

as well as Buchweitz's preprint (a more algebraic and maybe topological approach):
`https://tspace.library.utoronto.ca/bitstream/1807/16682/1/maximal_cohen-macaulay_modules_1986.pdf` (chapter 1, 2 and 3)

1.4 The singularity category II Neb (09/05/18)

- Gorenstein schemes and maximal Cohen-Macaulay modules/sheaves
- The singularity category of Gorenstein schemes, particularly of affine Gorenstein schemes (Buchweitz's main result in his preprint)
- The singularity category of A_n-singularities

Literature:

Orlov's paper;
`http://www.mi.ras.ru/~orlov/papers/trsing.pdf` (subchapter 1.3 and 3.3)

as well as Buchweitz's preprint:
`https://tspace.library.utoronto.ca/bitstream/1807/16682/1/maximal_cohen-macaulay_modules_1986.pdf` (chapter 4)

1.5 AR quivers Ed (14/05/18)

- Definition, properties
- AR quiver of finite representation type
- AR quiver of $\mathbb{C}^2/G$ and relation to the Dynkin quiver
- Relation to objects of the singularity category of $\mathbb{C}^2/G$

Literature:

Yoshino's book: *Cohen-Macaulay Modules over Cohen-Macaulay Rings* (Parts from chapter 5 and parts from chapter 10).

1.6 The graded singularity category Caitlin (21/05/18)

- Definitions, properties
- The singularity category of Gorenstein algebras
- (if time permits) Graded matrix factorizations
- (optional and if time permits) Relation between the graded and the ungraded singularity category

Literature:

Orlov's second paper;
`http://www.mi.ras.ru/~orlov/papers/CYLG.pdf` (subchapter 1.2 and 2.2)

See Keller, Murfet and Van den Bergh (for the optional point);
`https://arxiv.org/pdf/0803.0720.pdf`

1.7 Graded matrix factorizations of ADE singularities Giovanni (30/05/18)

- Define (or recall) graded matrix factorizations
- Describe the path algebra of the Dynkin Quiver $\mathbb{C}\overrightarrow{\Delta}$
- $HMF^{\mathrm{gr}}(f) \cong D^b(\mathrm{mod} - \mathbb{C}\overrightarrow{\Delta})$, where $f \in \mathbb{C}[x, y, z]$ is of ADE type

Literature:

Kajiura, Saito and Takahashi's paper:
`https://ac.els-cdn.com/S0001870806003136/1-s2.0-S0001870806003136-main.pdf?_tid=c3519465-3cc0-4057-9ae9-5754683bb29f&acdnat=1522675328_ec6a7141aabc22fec8b67961fb52db6b`