List of talks

We will mainly follow the book by Fulton [1] and all the page numbers refer to this book. However, there is another book by Cox, Little and Schenk [2], if you don't like the literature by Fulton. There are also good lecture notes on toric varieties:
`http://math.mit.edu/~mckernan/Teaching/11-12/Spring/18.726/lectures.html`

Motivation Toric varieties provide an elementary source of examples in algebraic geometry. Their invariants are relatively easy to compute and usually every calculation just boils down to some combinatorics on the cones/ fans. In this sense, they can be compared to simplicial complexes in topology, where everything is concrete and computable. Although they are very special and they cannot be considered as a substitute for other sources of examples (curves, surfaces,...), they still appear as quite good testing ground for general theories.

Cones and affine toric varieties, Ed Week 7

- Cones, faces, monoids (p. 8-15)
- Affine toric varieties (p. 15-20)
- Examples (p. 15-20, or the introduction-subchapter has some as well)

Fans and toric varieties, Evgeny Week 8

- Fans, toric varieties and examples (p. 20-23)
- Polytopes (p. 23-27)
- Examples

Singularities of toric varieties, George Week 9

- Local properties of toric varieties (p.28-31)
- Toric surfaces and its singularities (p. 31-36)
- Examples

Compactness/ properness, nonsingular surfaces and resolution of singularities, Neb Week 10

- Criterion for compactness (p. 39-42)

- Nonsingular surfaces (p. 42-44)
- Resolution of singularities (p.45-50)

Orbits and fundamental groups, Igor Week 11

- Orbits (p. 53-56)
- Fundamental groups, singular cohomology and Euler char. (p. 56-60)
- Cohomology of line bundles (p. 73-77, but potentially needs also bits from subsections 3.3, 3.4)

Differentials, tangent bundle and Serre duality, Caitlin Week 12

- Canonical bundle and tangent bundle (p.85-87)
- Serre duality (p. 87-91)
- Betti numbers (p. 91-95)

Derived categories of Toric varieties, Neb Week 13

- Paper by Yujiro Kawamata: Derived categories of Toric varieties.

Mirror Symmetry of Toric varieties, Giovanni (after Christmas?)

- Suggestion: Chapter 7 of the book *Mirror Symmetry* by K. Hori, S. Katz, A Klemm, R. Pandharipande, R. Thomas, C. Vafa, R. Vakil and E Zaslow.

References

[1] W. Fulton, *Introduction to Toric Varieties*, (AM-131). Princeton University Press, 1993.

[2] D. A. Cox, J. B. Little and H. Schenk *Toric varieties*, graduate studies in mathematics, Am. Math. Soc. 124, 2011.