Quadratic Forms (Math 520/620/702) Fall 2011

Suggested topics for presentations

I. Topics in Lam

Generation of the orthogonal group by reflections (I.7)
Classification of small Witt rings (II.5)
Coverings of orthogonal groups (III.3)
Linkage of quaternion algebras (III.4)
Hasse invariant of quadratic spaces (V.3)
Clifford algebras over $\mathbb{R}$ (V.4)
Composition of quadratic forms (V.5)
K-theory and I^2/I^3 (V.6)
Witt rings of non-real fields with four square classes (Appendix to VI.2)
Formally real fields (VIII.1)
Real-closed fields (VIII.2)
Pythagorean fields (VIII.4)
Pfister forms (Chap. X)
Higher K-theory and I^n/I^{n+1} (X.6)
Level of a field (XI.2)
Height of a field (XI.5)
Pythagoras number of a field (XI.5)
u-invariant of a field (XI.6)
u-invariant of $\mathbb{C}((x,y))$ and property C_i (XIII.1)
General (Elman-Lam) u-invariant (Appendix to XI.6; also pp.112-115 of Pfister; see also Lam VIII Theorem 3.2)

II. Other topics

Quadratic forms in characteristic two (Grove, Chapters 12-14)
Binary quadratic forms over $\mathbb{Q}$ and $\mathbb{Z}$ (Buchmann and Vollmer)
Proof of Wedderburn's theorem on finite division rings (various books, e.g. Herstein algebra or Herstein non-commutative rings)
Quasi-algebraically closed fields and C_i-fields (Shatz, IV.3; or Serre, Chapter II, sections 3.1, 3.2, 4.5)

References

J. Buchmann and U. Vollmer, Binary quadratic forms.
L. Grove, Classical groups and geometric algebra.
I.N. Herstein, Topics in algebra.
I.N. Herstein, Non-commutative rings.
A. Pfister, Quadratic forms with applications to algebraic geometry and topology.
J.-P. Serre, Galois cohomology.
S.S. Shatz, Profinite groups, arithmetic, and geometry.