Summary of examinable material for Differential Topology

De Rham cohomology of smooth manifolds

- Connected-sum construction

- Definition and homotopy invariance of de Rham cohomology

- Mayer-Vietoris sequence

- Compactly supported de Rham cohomology

- Sard's theorem*; degree and its interpretation as count of pre-images

- Graded algebra structure of de Rham cohomology

- De Rham cohomology of $\mathbb{C}P^n$

- Existence of good covers and tubular neighbourhoods*

- Künneth formula

- Poincaré duality

- Signature and Euler characteristic

- Poincaré dual of a submanifold and intersection numbers*

- Poincaré-Hopf index theorem*

Singular (co)homology

- Definition and homotopy invariance* of singular (co)homology

- Hurewicz theorem*

- Mayer-Vietoris sequences*

- Definition of finite cell complexes; computing singular (co)homology via cellular (co)homology*

- Singular (co)homology of $\mathbb{C}P^n$ and $\mathbb{R}P^n$

- Special cases of universal coefficients theorem*

- De Rham theorem

- Graded ring structure of singular cohomology*

- Künneth formula for singular cohomology*

- Orientation and Poincaré duality*

*without proof

Morse theory: not examined

Questions and corrections to `j.nordstrom@imperial.ac.uk`.
April 23, 2012