

Outline of course topics

The numbers in parentheses denote chapters in the official course text (Schaum's Outline Series book on differential geometry).

- I. **Classical differential geometry of curves**
 0. Partial differentiation (2, 7)
 1. Cross products (1)
 2. Parametrized curves (3)
 3. Arc length and reparametrization (3)
 4. Curvature and torsion (4)
 5. Frenet-Serret Formulas (5, App. I)

- II. **Topics from linear geometry and multivariable calculus**
 1. Differential forms
 2. Smooth mappings (6, 7)
 3. Inverse and implicit function theorems (7)
 4. Congruence of geometric figures (6)

- III. **Surfaces in 3-dimensional space**
 1. Mathematical descriptions of surfaces (8)
 2. Parametrizations of surfaces (8)
 3. Tangent planes (8)
 4. The First Fundamental Form (9)
 5. Surface area (9)
 6. Curves as surface intersections

- IV. **Oriented surfaces**
 1. Normal directions and Gauss maps (9)
 2. The Second Fundamental Form (9)
 3. Quadratic forms and adjoint transformations
 4. Normal, Gaussian and mean curvature (9)
 5. Special classes of surfaces (8, 9)
 6. Map projections

- V. **Further topics**
 1. Compatibility equations and the *Theorema Egregium* (10, 11)
 2. Fundamental Theorem of Local Surface Theory (App. II)
 3. Riemannian metrics and hyperbolic geometry (11)