

MAT4510 - FALL 2026 - LECTURES

E. F. WOLD

1. OVERVIEW OF THE COURSE

The course will consist of two parts, plane geometry and curvature of surfaces, with extra focus on the second. For the large second part, we will follow the book "Introduction to Differential Geometry" [1], and for the first part we will provide course notes [4] which to a large extent is based on the supplementary literature [3] and [2]. In the course notes, more details about the course will appear as it unfolds.

2. LECTURES

Monday 17/8 Axioms for plane geometry. See [4] Section 2 and 3.

Tuesday 18/8 The hyperbolic disk, [4] Section 4.

Monday 24/8 The hyperbolic disk, [4] Section 4.

Tuesday 25/8 The hyperbolic disk, [4] Section 4.
Manifolds, [1] 1.1-1.4

Monday 31/8–Tuesday 15/9:
Manifolds [1] 1.4-1.5, [5] 1.4-1.5
Lengths and distances [1] 2.1-2.3, [5] 2.1-2.5
Gaussian curvature [5] 3.1-3.6

Monday 21/9–Tuesday 6/10:
More curvature and Theorema Egregium [5] 3.7-3.12
The covariant derivative [1] 4.1-4.1
The Riemann curvature tensor [1] 5.1-5.2

Monday 12/10–Tuesday 13/10:
The Riemann curvature tensor [1] 5.2
Theorema Egregium [1] 5.3

REFERENCES

1. Frøyshov, Kim, Introduction to Differential Geometry, UiO, 2026.
2. Greenberg, M. J.; Euclidean and Non-Euclidean Geometries. Development and History. 1994 W. H. Freeman and Company.
3. Jahren, B.; Geometric Structures in Dimension Two. UiO, 2015.
4. Wold, E. F.; Course notes (I), UiO, 2026.
5. Wold, E. F.; Course notes (II), UiO, 2026.

E. F. WOLD: DEPARTMENT OF MATHEMATICS, UNIVERSITY OF OSLO, POSTBOKS 1053 BLINDERN, NO-0316
OSLO, NORWAY

Email address: `erlendfw@math.uio.no`