# Nepal Algebra Project(NAP)
# Central Department of Mathematics
# Tribhuvan University,Kirtipur, Kathmandu,Nepal
# Fields and Galois Theory- Short Note of Lecture Module 1 - Lecture 1
# Course Instructor: Prof. Michel Waldschmidt

## Summary of NAP: Module -1, Lecture 5, Sunday May 7, 2017

- Factoring a polynomial over $\mathbb{Q}$.
- Gauss Lemma. Proof as follows:
  — Definition of primitive polynomials in $\mathbb{Z}[X]$: the gcd of the coefficients is 1.
  — for any nonzero polynomial $g \in \mathbb{Q}[X]$, there is a unique positive rational number $c(g)$ such that $g = c(g)g_1$ where $g_1 \in \mathbb{Z}[X]$ is primitive. If $g \in \mathbb{Z}[X]$, then $c(g)$ (content of $g$) is the gcd of the coefficients of $g$.
  — The product of two primitive polynomials in $\mathbb{Z}[X]$ is primitive: for $p$ a prime number, use the canonical ring homomorphism $\varphi_p : \mathbb{Z}[X] \to \mathbb{Z}_p[X]$.
  — Deduce $c(fg) = c(f)c(g)$.
  — Proof of Gauss Lemma.
- Eisenstein Criterion.
- Existence of transcendental numbers, gave the proof following Cantor of the existence of transcendental numbers but not the proof by Liouville.
- Algebraically closed fields. Algebraic closure of a field.