Nepal Algebra Project(NAP)
Central Department of Mathematics
Tribhuvan University,Kirtipur, Kathmandu,Nepal
Fields and Galois Theory

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Summary of NAP: Module 5 - Lecture 4

- Normal basis in case of a finite Galois extension was defined with some interesting examples. Then proved the 'normal basis theorem' as an application of 'Dedekind's theorem on independence of characters'. The theorem was proved in case of infinite fields with some discussion in the case of finite fields.

- Crossed homomorphisms and principal crossed homomorphisms were defined and $H^1(G, M)$, the first cohomology group where M is a G-module, was introduced. Then it was shown that in case of finite Galois extensions every crossed homomorphisms are in fact principal crossed homomorphisms, i.e. , $H^1(G, E^*)$, where G is the Galois group of an extension E over F, is in fact trivial. This was proved again as an application of the Dedekind's theorem on independence of characters. In the next lecture 'Hilbert Theorem 90' will be deduced as a corollary of this result.