Southwest Center
for Arithmetic Geometry

ARIZONA WINTER SCHOOL 2018

Department of Mathematics
The University of Arizona®

Deadline to apply for funding:
November 10, 2017

http://swc.math.arizona.edu

IWASAWA THEORY

John Coates
Classical algebraic Iwasawa theory

David Loeffler and Sarah Zerbes
Euler systems

Romyar Sharifi
Modular curves and cyclotomic fields

Christopher Skinner
Iwasawa theory, modular forms, and elliptic curves

TUCSON, MARCH 3-7, 2018

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University of Arizona

Arizona Winter School 2018
Iwasawa Theory

Notes By: Caleb McWhorter

March 2018

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Part I
Talk Notes

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1.1 Lecture 1

1.1.1 Lecture Name

$[F : \mathbb{Q}] < \infty$, F_∞/F, $\Gamma = (F_\infty/F)$
$\Gamma \xrightarrow{\sim} \mathbb{Z}_p$, $\Gamma_n \xrightarrow{\sim} p^n\mathbb{Z}_p$,
$F_\infty^{\Gamma_n} = F_n$, $(F_n/F) = \mathbb{Z}/p^n\mathbb{Z}$
$F = F_0 \subset F_1 \subset \cdots \subset F_n \subset \cdots F_\infty = \cup F_n$
Facet 1. F_∞/F
Classical Iwasawa Theory: p-adic behavior of ideal class groups and units in F_∞/F, and interpretation via global class field theory.
$\zeta(s) = \prod_p (1 - p^{-s})^{-1}$

(a) Complex zeros of $\zeta(s) \leftrightarrow$ distribution of prime numbers.

(b) $\zeta(1 - n) \in \mathbb{Q}(n = 2, 4, 6, \ldots)$

Kummer $\leftrightarrow$ class number of $\mathbb{Q}(\mu_p)^+$
Leopoldt-Kubota: p-adic analogue of $\zeta(s)$.
Iwasawa: zeroes of p-adic analogue of $\zeta(s) \leftrightarrow$ classical Iwasawa Theory of $\mathbb{Q}(\mu_p^\infty)^+/\mathbb{Q}(\mu_p)^+$.

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Part II

Course/Project Outlines & Lecture Notes