

## Index

- admissible measures, 32
- affinoid  $\mathcal{K}$ -algebras, 260
- arithmetic points, 73
- bi-extension classes, 202
- Birch and Swinnerton–Dyer, 22
  - conjecture, 23
  - $p$ -adic conjecture, 34
- canonical liftings, 205
- Cassels’ isogeny theorem, 24
- character group, 84
- Chern classes, 45
- Coleman’s exact sequence, 57
  - $\Lambda$ -adic version, 136
- cotangent space, 36
- covolume
  - half-twisted, 180
  - vertical, 173
- cuspidal forms, 27
  - $\Lambda$ -adic, 73
- defect of  $\rho_{\infty, E}$ , 214
- degeneration maps, 28
- dual exponential map, 36
  - big version, 100
- dualities (compact and discrete), 90
- elliptic curves
  - definition, 8
  - modularity, 30
  - universal, 26
- Euler characteristic (over  $\Lambda$ ), 166
- Euler systems
  - $\Lambda$ -adic, 109
  - cyclotomic, 56
  - $p$ -adic, 59
- exceptional zero phenomenon, 33
- exponential map, 36
  - big version, 97
- families of local points, 105
- fundamental exact sequence, 96
- Galois representations, 29
  - half-twisted, 145
  - pseudo-geometric, 102
  - universal  $p$ -ordinary, 71
- Greenberg’s conjecture, 146
- Greenberg–Stevens formula, 83
- Hasse’s theorem, 13
- Hecke algebra, 28
  - abstract, 71
  - $p$ -adic, 73
- Hecke operators, 27
- height pairings
  - formal  $p$ -adic, 230
  - Néron–Tate, 20
- Herbrand quotients, 217
- Hida families, 73
- isogenies, 9
- Iwasawa algebra, 37
- Kato–Beilinson elements, 44
- Kato’s theorem, 48
- Kronecker–Weber theorem, 17
- Kummer map, 36
- $L$ -functions
  - elliptic curves, 15
  - improved  $p$ -adic, 82
  - modular forms, 29
  - one-variable  $p$ -adic, 33
  - two-variable  $p$ -adic, 80
- $\mathcal{L}$ -invariants, 34
- Main Conjectures
  - two-variable, 245
  - vertical and half-twisted, 243
- Mazur–Tate–Teitelbaum conjecture, 34
- Mellin transform ( $p$ -adic), 75
- modular forms, 26
- modular symbols, 50
  - algebraic, 52
  - $p$ -adic, 76
  - the twist operator, 63
  - universal  $\Lambda$ -adic, 78
- Mordell–Weil theorem, 18
- $\mu$ -invariants, 159
  - generic, 246

- non-vanishing of  $L$ -values, 65
- period rings, 35
- periods
  - $\Lambda$ -adic, 79
  - complex, 52
- Perrin–Riou’s interpolation theorem, 38
  - $\Lambda$ -adic version, 128
- $p$ -finiteness condition, 87
- $(\varphi, \Gamma)$ -modules, 42
- Poitou–Tate exact sequence, 192
- pseudo-isomorphisms, 228
- $p$ -stabilisation, 39
- $Q$ -continuity, 53
- realisation map
  - $\Lambda$ -adic, 113
  - $p$ -adic, 47
- Selmer groups
  - elliptic curves, 19
  - half-twisted, 146
  - refined, 206
  - vertical, 142
- semi-simplicity (at zero), 163
- Shimura–Taniyama conjecture, 30
- symbol interpolation theorem
  - $p$ -adic, 60
  - $\Lambda$ -adic, 118
- Tamagawa factors
  - $\Lambda$ -adic, 169
  - elliptic curves, 14
  - half-twisted, 180
  - vertical, 173
- Tamagawa ideal, 231
- Tamagawa measure, 184
- tangent space, 36
- Tate modules, 10
- Tate–Shafarevich groups, 19
- Tate–Shafarevich series, 159
- universal norms, 180
- universal path vector, 113
- volume form ( $\Lambda$ -adic), 186
- weight pairings ( $p$ -adic), 207
- weight space, 81
- weight-variable control theorem, 274
- Weil pairing, 11
- Yoneda pairing, 269
- zeta-elements
  - $\Lambda$ -adic, 110
  - $K$ -theoretic, 44
  - $p$ -adic, 47
  - primitive, 58