Background on BSD and its statement over number fields:
[Birch1], [Birch2], [Tate-BSD]; Cassels papers on Ш [CasselsIV, CasselsIV] (+ its non-squareness for abelian varieties [PoonenStoll]); ζ- and L-functions [Serre-ZetaL]; l-adic representations [Serre-AbLAdic].

Potential modularity & using Brauer/Solomon induction arguments to reduce to modular curves:
the course followed [DD-Parity] §2; for background and proofs see [Taylor3] proof of Thm. 2.4, [Taylor4] proof of Cor. 2.2 and Wintenberger's appendix to [Nek-SelIV].

BSD for rank ≤ 1:
Gross-Zagier formula [GrossZagier] ([Zhang, TianZhang] over totally real fields) + Kolyvagin's Euler system argument [Kolyvagin] + existence of rank ≤ 1 quadratic twist [BFH], [MurtyMurty], [Waldspurger];

Parity predictions:
Twists of semistable curves [Rohrlich-Root, D-Root]; No local expression for the rank [DD-ModN]; Failure of Goldfeld over number fields [Connell, DD-Evil].

Galois action on the Tate module:
[SerreTate], [Serre-PropGal]; the inertia action for $v \nmid 2, 3$ can be recovered from Tate's algorithm [Tate-alg], for $v|2, 3$ see [Kraus, DD-Isogeny].

Weil-Deligne representations and root numbers:
Definitions, existence of ϵ-factors and main properties [DeligneC, Tate-NThBg]; Frohlich-Queyrut theorem [FrohQuey]; Galois invariance of root numbers [Rohrlich-Inv]; see also summary in [DD-Regconst] Appendix A.

Root numbers of elliptic curves:
[Rohrlich-Root] (all cases except additive reduction at $v|2, 3|$, [Halberstadt] over $\mathbb{Q}$, [Kobayashi] for $v|3$, [DD-Root2, Whitehouse] for $v|2$, alternative formula from the proof of parity [DD-Parity]; for abelian varieties see [Sabitova-PhD, Sabitova-Root].

Finiteness of Ш implies parity:
[Monsky] (over $\mathbb{Q}$), [DD-Squarity] (E semistable at additive $v|2, 3$), [DD-Parity] (all cases).

p-Parity Conjecture proofs:
p-parity over $\mathbb{Q}$: [Birch-Stephens], [Greenberg], [Guo], [Monsky], [Nek-Sel], [BDKim], [DD-Squarity]; p-parity over totally real fields: [Nek-Sel], [Nek-SelIV], [BDKim2], [DD-Parity].

p-Parity Conjecture for curves with a p-isogeny:
[Monsky] (over $\mathbb{Q}$), [DD-Isogeny] (E semistable at p) [CFKS] (Abelian varieties semistable at p), [DD-Parity] (Conj. in all cases + deformation argument for $p \leq 5$); [TrihWuthr] (function fields).

Brauer relations & compatibility of root numbers and Tamagawa numbers:
Regulator constants [DD-Squarity], their compatibility with Tamagawa numbers [DD-Selfduality], their compatibility with root numbers [DD-Regconst], deformation argument [DD-Parity].

p-parity for dihedral twists:
[DD-Squarity] or [DD-Regconst] (E semistable at $v|p$), [DD-Parity] ($p \equiv 3 \mod 4$ using deformation argument), [Rochefoucauld] (all $p \geq 5$ using congruences between root numbers); see also [MR-LocConst, MR-LocConst2] for an alternative approach to the same parity using 'theory of local constants' and [DD-Regconst] §4 to applications for rank growth in p-adic towers.

References

[Birch1] B. J. Birch, Conjectures concerning elliptic curves, Proc. Sympos. Pure Math., Vol. VIII (1965), Amer. Math. Soc., Providence, R.I, 106–112.

[Birch2] B. J. Birch, Elliptic curves, a progress report, Proceedings of the 1969 Summer Institute on Number Theory, Stoney Brook, New York AMS, 1971, 396–400.

[Birch-Stephens] B. J. Birch, N. M. Stephens, The parity of the rank of the Mordell-Weil group, Topology 5 (1966), 295–299.

[BFH] D. Bump, S. Friedberg, and J. Hoffstein, Nonvanishing theorems for L-functions of modular forms and their derivatives, Invent. Math. 102 (1990), 543–618.

[CasselsIV] J. W. S. Cassels, Arithmetic on curves of genus 1, IV, Proof of the Hauptvermutung, J. Reine Angew. Math. 211, (1962), 95–112.

[CasselsIV] J. W. S. Cassels, Arithmetic on curves of genus 1. VIII: On conjectures of Birch and Swinnerton-Dyer, J. Reine Angew. Math. 217 (1965), 180–199 (1965).

[CFKS] J. Coates, T. Fukaya, K. Kato, R. Sujatha, Root numbers, Selmer groups and non-commutative Iwasawa theory, 2007, to appear in J. Algebraic Geom.

[Connell] I. Connell, Good reduction of elliptic curves in abelian extensions, J. Reine Angew. Math. 436 (1993), 155–175.

[DeligneC] P. Deligne, Les constantes des équations fonctionnelles, Seminaire Delange-Pisot-Poitou (Théorie des Nombres) 11e année, 1969/70, n^o 19 bis, Secrétariat Mathématique, Paris, 1970.

[DeligneV] P. Deligne, Valeur de fonctions L et périodes d'intégrales, in: Automorphic forms, representations and L-functions, Part 2 (ed. A. Borel and W. Casselman), Proc. Symp. in Pure Math. 33 (AMS, Providence, RI, 1979) 313–346.

[DD-Cubic] T. Dokchitser, Ranks of elliptic curves in cubic extensions, Acta Arith. 126 (2007), 357–360.

[DD-Evil] T. Dokchitser, V. Dokchitser, Elliptic curves with all quadratic twists of positive rank, Acta Arith. 137 (2009), 193–197.

[DD-Isogeny] T. Dokchitser, V. Dokchitser, Parity of ranks for elliptic curves with a cyclic isogeny, J. Number Theory 128 (2008), 662–679.

[DD-Squarity] T. Dokchitser, V. Dokchitser, On the Birch–Swinnerton-Dyer quotients modulo squares, 2006, arxiv: math.NT/0610290, to appear in Annals of Math.

[DD-Selfduality] T. Dokchitser, V. Dokchitser, Self-duality of Selmer groups, Math. Proc. Cam. Phil. Soc. 146 (2009), 257–267.

[DD-Regconst] T. Dokchitser, V. Dokchitser, Regulator constants and the parity conjecture, Invent. Math. 178, no. 1 (2009), 23–71.

[DD-Root2] T. Dokchitser, V. Dokchitser, Root numbers of elliptic curves in residue characteristic 2, Bull. London Math. Soc. 40 (2008), 516–524.

[DD-Parity] T. Dokchitser, V. Dokchitser, Root numbers and parity of ranks of elliptic curves, 2009, arxiv: 0906.1815.

[DD-ModN] T. Dokchitser, V. Dokchitser, A note on the Mordell-Weil rank modulo n, 2009, arxiv: 0910.4588.

[D-Root] V. Dokchitser, Root numbers of non-abelian twists of elliptic curves, with an appendix by T. Fisher, Proc. London Math. Soc. (3) 91 (2005), 300–324.

[FrohQuey] A. Fröhlich, J. Queyrut, On the functional equation of the Artin L-function for characters of real representations, Invent. Math. 20 (1973), 125–138.

[Goldfeld] D. Goldfeld, Conjectures on elliptic curves over quadratic fields, Springer Lect. Notes 751 (1979), 108–118.

[Greenberg] R. Greenberg, On the Birch and Swinnerton-Dyer conjecture, Invent. Math. 72, no. 2 (1983), 241–265.

[GrossZagier] B. H. Gross, D. Zagier, Heegner points and derivatives of L-series, Invent. Math. 84, no. 2 (1986), 225–320.

[Guo] L. Guo, General Selmer groups and critical values of Hecke L-functions, Math. Ann. 297, no. 2 (1993), 221–233.

[Halberstadt] E. Halberstadt, Signes locaux des courbes elliptiques en 2 et 3, C. R. Acad. Sci. Paris Série I Math. 326 (1998), no. 9, 1047–1052.

[BDKim] B. D. Kim, The Parity Theorem of Elliptic Curves at Primes with Supersingular Reduction, Compos. Math. 143 (2007) 47–72.

[BDKim2] B. D. Kim, The parity conjecture over totally real fields for elliptic curves at supersingular reduction primes, preprint, 2007.

[Kobayashi] S. Kobayashi, The local root number of elliptic curves with wild ramification, Math. Ann. 323 (2002), 609–623.

[Kolyvagin] V. A. Kolyvagin, Euler systems, The Grothendieck Festschrift, Prog. in Math., Boston, Birkhauser (1990).

[Kraus] A. Kraus, Sur le défaut de semi-stabilité des courbes elliptiques à réduction additive, Manuscripta Math. 69 (1990), no. 4, 353–385.

[MR-LocConst] B. Mazur, K. Rubin, Finding large Selmer ranks via an arithmetic theory of local constants, Annals of Math. 166 (2), 2007, 579–612.

[MR-LocConst2] B. Mazur, K. Rubin, Growth of Selmer rank in nonabelian extensions of number fields, Duke Math. J. 143 (2008) 437–461.

[MR-Hilbert10] B. Mazur, K. Rubin, Ranks of twists of elliptic curves and Hilbert's tenth problem, preprint, 2009, arxiv: 0904.3709.

[Milne-AAV] J. S. Milne, On the arithmetic of abelian varieties, Invent. Math. 17 (1972), 177–190.

[Milne-ADT] J. S. Milne, Arithmetic duality theorems, Perspectives in Mathematics, No. 1, Academic Press, 1986.

[Monsky] P. Monsky, Generalizing the Birch–Stephens theorem. I: Modular curves, Math. Z., 221 (1996), 415–420.

[MurtyMurty] M. R. Murty and V. K. Murty, Mean values of derivatives of modular L-series, Annals of Math. 133 (1991), 447–475.

[Nek-Sel] J. Nekovář, Selmer complexes, Astérisque 310 (2006).

[Nek-SelIV] J. Nekovář, On the parity of ranks of Selmer groups IV, with an appendix by J.-P. Wintenberger, to appear in Compos. Math.

[PoonenStoll] B. Poonen, M. Stoll, The Cassels–Tate pairing on polarized abelian varieties, Annals of Math. 150 (1999), 1109–1149.

[Pop] F. Pop, Embedding problems over large fields, Annals of Math. (2) 144 (1996), no. 1, 1–34.

[Rochefoucauld] T. de la Rochefoucauld, paper in preparation.

[Rohrlich-Root] D. Rohrlich, Galois Theory, elliptic curves, and root numbers, Compos. Math. 100 (1996), 311–349.

[Rohrlich-Inv] D. Rohrlich, Galois invariance of local root numbers, preprint, 2008.

[Sabitova-PhD] M. Sabitova, Root numbers of abelian varieties and representations of the Weil-Deligne group, Ph. D. thesis, Univ. of Pennsylvania, 2005.

[Sabitova-Root] M. Sabitova, Root numbers of abelian varieties, Trans. Amer. Math. Soc. 359 (2007), no. 9, 4259–4284.

[Serre-ZetaL] J.-P. Serre, Zeta and L-functions, in: Arithmetical Algebraic Geometry, Proc. Conf. Purdue 1963 (1965), 82–92.

[Serre-PropGal] J.-P. Serre, Propriétés galoisiennes des points d'ordre fini des courbes elliptiques, Invent. Math. 15 (1972), no. 4, 259–331.

[Serre-AbLAdic] J.-P. Serre, Abelian l-adic Representations and Elliptic Curves, Addison-Wesley 1989.

[SerreTate] J.-P. Serre, J. Tate, Good reduction of abelian varieties, Annals of Math. 68 (1968), 492–517.

[Silverman1] J. H. Silverman, The Arithmetic of Elliptic Curves, GTM 106, Springer-Verlag 1986.

[Silverman2] J. H. Silverman, Advanced Topics in the Arithmetic of Elliptic Curves, GTM 151, Springer-Verlag, New York, 1994.

[Tate-Duality] J. Tate, Duality theorems in Galois cohomology over number fields, Proc. ICM Stockholm 1962, 234–241.

[Tate-BSD] J. Tate, On the conjectures of Birch and Swinnerton-Dyer and a geometric analog, Séminaire Bourbaki, 18e année, 1965/66, no. 306.

[Tate-thesis] J. Tate, Fourier analysis in number fields and Hecke's zeta functions, Algebraic Number Theory (J. W. S. Cassels and A. Fröhlich, eds.), Academic Press (London) 1967, 305–347.

[Tate-alg] J. Tate, Algorithm for determining the type of a singular fiber in an elliptic pencil, in: Modular Functions of One Variable IV, Lect. Notes in Math. 476, B. J. Birch and W. Kuyk, eds., Springer-Verlag, Berlin, 1975, 33–52.

[Tate-NThBg] J. Tate, Number theoretic background, in: Automorphic forms, representations and L-functions, Part 2 (ed. A. Borel and W. Casselman), Proc. Symp. in Pure Math. 33 (AMS, Providence, RI, 1979) 3-26.

[Taylor1] R. Taylor, On Galois representations associated to Hilbert modular forms, Invent. Math. 98(2), 1989, 265–280.

[Taylor2] R. Taylor, Galois Representations, Annales de la Faculté des Sciences de Toulouse, Série 6, XIII (1), 2004, 73–119.

[Taylor3] R. Taylor, On icosahedral Artin representations II, American Journal of Mathematics 125 (2003), 549–566.

[Taylor4] R. Taylor, Remarks on the conjecture of Fontaine and Mazur, J. Inst. Math. Jussieu 1, 2002, 1–19.

[TianZhang] Y. Tian, S. Zhang, Euler system of CM-points on Shimura curves, book, in preparation.

[TrihWuthr] F. Trihan, C. Wuthrich, Parity conjectures for elliptic curves over global fields of positive characteristic, preprint.

[Waldspurger] J.-L. Waldspurger, Correspondences de Shimura et quaternions, Forum Math. 3 (1991), 219–307.

[Whitehouse] D. Whitehouse, Root numbers of elliptic curves over 2-adic fields, preprint, 2006, http://www-math.mit.edu/~dw/maths/elliptic2.pdf.

[Zhang] S. Zhang, Heights of Heegner points on Shimura curves, Annals of Math. 153 (2001), 27–147.