

MOHAMMAD SADEK

MATHEMATICS AND ACTUARIAL SCIENCE DEPARTMENT, AMERICAN UNIVERSITY IN CAIRO
AUC AVENUE, NEW CAIRO, EGYPT

E-mail: mmsadek@aucegypt.edu

Telephone: +2012 24019452

RESEARCH INTERESTS

Computational Number Theory, Arithmetic of Elliptic Curves, Arithmetic of Hyperelliptic Curves, Diophantine Equations

APPOINTMENTS

- 07/2016 - present Associate Professor (tenured), American University in Cairo
08/2010 - 06/2016 Assistant Professor, American University in Cairo

EDUCATION

- 10/2006 - 03/2010 University of Cambridge, U.K.
Ph.D. in Mathematics, thesis: 'Models of Genus One Curves'
10/2005 - 06/2006 University of Cambridge, U.K.
Certificate of Advanced Study in Mathematics
09/2001 - 06/2005 Faculty of Science, Cairo University, Egypt
B.Sc. in Mathematics

Papers in Preparation

1. *On Large F -Diophantine Sets* (with Nermin El-Sissi)
2. *Maximal Orders in Division Fields of Elliptic Curves* (with Tom Fisher and Jafar Miles)

Submitted Papers

1. *Counting Elliptic Curves with Bad Reduction over a Prescribed Set of Primes*
2. *Minimal Regular Models of Quadratic Twists of Hyperelliptic Curves*

PUBLICATIONS

1. *On Rational Triangles via Algebraic Curves* (with Farida Shahata), accepted for publication in *Rocky Mountain Journal of Mathematics*
2. *On Sequences of Consecutive Squares on Elliptic Curves* (with Mohamed Kamel), *Glasnik Matematički Series III*, Volume 52, Number 1 (2017), 45–52
3. *New Hypergeometric Connection Formulae between Fibonacci and Chebyshev Polynomials* (with Waleed M. Abd-Elhameed, Youssri H. Youssri and Nermin El-Sissi), *The Ramanujan Journal*, Volume 42, Number 2 (2017), 347–361
4. *High Rank Quadratic Twists of Pairs of Elliptic Curves* (with Mohamed Alaa), *Journal of Number Theory*, Volume 174 (2017), 436–444
5. *Character Sums, Gaussian Hypergeometric Series, and a Family of Hyperelliptic Curves*, *International Journal of Number Theory*, Volume 12, Number 8 (2016), 2173–2187
6. *On Genus One Curves of Degree 5 with Square-Free Discriminant* (with Tom Fisher), *Journal of the Ramanujan Mathematical Society*, Volume 31, Number 4 (2016), 359–383

7. *Periodic Continued Fractions and Elliptic Curves over Quadratic Fields*, Journal of Symbolic Computation, Volume 76 (2016), 200–218
8. *On Geometric Progressions on Hyperelliptic Curves* (with Mohamed Alaa), Journal of Integer Sequences, Volume 19 (2016), Article 16.6.3.
9. *On Dependence of Rational Points on Elliptic Curves*, C. R. Math. Rep. Acad. Sci. Canada, Volume 38, Number 2 (2016), 75–84
10. *Edwards Curves and Gaussian Hypergeometric Series* (with Nermin El-Sissi), Journal de Théorie des Nombres de Bordeaux, Volume 28, Number 1 (2016), 115–124
11. *Formal Groups and Invariant Differentials of Elliptic Curves*, Bulletin of the Australian Mathematical Society, Volume 92, Number 1 (2015), 44–51
12. *Partitions with Equal Products and Elliptic Curves* (with Nermin El-Sissi), Osaka Journal of Mathematics, Volume 52, Number 2 (2015), 515–525
13. *On Quadratic Twists of Hyperelliptic Curves*, Rocky Mountain Journal of Mathematics, Volume 44, Number 3 (2014), 1015–1026
14. *On Elliptic Curves whose Conductor is a Product of Two Prime Powers*, Mathematics of Computation, Volume 83, Number 285 (2014), 447–460
15. *On the Diophantine Equation $y^l = c \frac{x^p - 1}{x - 1}$* , Publ. Math. Debrecen, Volume 82, Number 2 (2013), 373–378
16. *Minimal Genus One Curves*, Funct. Approx. Comment. Math., Volume 46, Number 1 (2012), 117–131
17. *Counting Models of Genus One Curves*, Math. Proc. Camb. Phil. Soc., Volume 150, Number 3 (2011), 399–417

INVITED TALKS

- Elliptic curves and continued fractions, TWMA: The First International Mathematical School on Algebraic Geometry in Tunisia, Hammamet, Tunisia, 09/2017
- Elliptic curves: The questions we may ask, Cairo University, Cairo, 12/2015
- Elliptic curves: State of the art, Cairo University, Cairo, 11/2015
- Elliptic curves: A story to tell, Cairo University, Cairo, 11/2015
- Discrete Logarithms and Elliptic Curves, Texas A&M University at Qatar, El-Doha, Qatar, 3/2014
- Elliptic curves and combinatorial objects, Workshop on Algebraic and Analytic Number Theory and Their Applications, Ovidius University, Constanta, Romania, 5/2013
- What do Catalan numbers have to do with elliptic curves?, Workshop in Number Theory, American University of Beirut, Beirut, Lebanon, 4/2013
- Old and new Diophantine problems, 2nd International Conference of Mathematics and Information, Sohag University, Egypt, 9/2011
- Geometry of elliptic curves, Summer School of Cairo University, Cairo University, Cairo, 8/2011
- Old and new problems in number theory, Number Theory Seminar, American University of Beirut, Lebanon, 6/2010

- Counting genus one curves over \mathbb{Q} , Number Theory Seminar, American University of Beirut, Lebanon, 6/2010
- Counting n -coverings of elliptic curves over \mathbb{Q} , Number Theory Seminar, University of Warwick, UK, 5/2010
- Elliptic curves and numbers, Algebra Seminar, Department of Mathematics, Cairo University, Egypt, 4/2010
- Old and new problems in Arithmetic Geometry, Fitzwilliam College Mathematical Society, Cambridge, 3/2010
- Counting genus one curves over the Rationals, DPMMS Number Theory Seminar, Cambridge, 2/2010
- N -coverings of elliptic curves, Department of Mathematics, Faculty of Science, Cairo University, Egypt, 1/2008

CONTRIBUTED TALKS

- Formal groups, elliptic curves, and modular forms, International conference on algebra in honour of Patrick Smith and John Clark's 70th birthdays, Balikesir, Turkey, 8/2013
- On elliptic curves whose conductor is a product of two prime powers, Elementare und Analytische Zahlentheorie, ELAZ-6th Conference, Würzburg University, Germany, 8/2012
- Visualization of elements of order four in the Tate-Shafarevich groups of elliptic curves, 27^{èmes} Journées Arithmétiques, Vilnius, Lithuania, 7/2011
- Models of genus one curves, 26^{èmes} Journées Arithmétiques, Université de Saint-Étienne, France, 7/2009
- Models of binary quartic curves, Beyond Part III Conference, CMS, Cambridge, 4/2009

MASTER'S STUDENTS SUPERVISED

1. Mohamed Kamel, Cairo University, Number Theory, Fall 2015 - Spring 2017
Thesis Title: Sequences of rational points on algebraic curves
2. Mohamed Alaa, Cairo University, Number Theory, Fall 2015 - Spring 2017
Thesis Title: Elliptic Surfaces with positive Mordell-Weil rank and Quadratic twists of elliptic curves

AWARDS

2005 - 2009	Cambridge Overseas Trust Scholarship, University of Cambridge
2006 - 2009	Fitzwilliam College Senior Scholar Award, University of Cambridge
03/2008	Smith-Knight and Rayleigh-Knight Award, University of Cambridge
07/2006	Thatcher Prize, Fitzwilliam College, University of Cambridge
07/2006	1912 Fitzwilliam Senior Scholarship, Fitzwilliam College, University of Cambridge
07/2005	Cairo University Award, Cairo University

TEACHING

American University in Cairo:

- Selected Topics in General Topology, MACT 410/MACT 4930
- Selected Topics in Number Theory, MACT 410/MACT 4930

- Modern Algebra, MACT 403/MACT 4134
- Mathematics of Derivatives Pricing II, MACT 422/MACT 4313
- Calculus IV, MACT 232/MACT 2124
- Calculus III, MACT 231/MACT 2123
- Calculus II, MACT 132/MACT 1122

University of Cambridge:

- Undergraduate Supervisor, 2006-2010

Graduate Courses:

- Introduction to Algebraic Geometry, spring 2014
- Introduction to Elliptic Curves, fall 2014

COMMITTEES

2016-	Evaluation Procedure and Performance Benchmarks for Mathematics and Actuarial Science Department Committee, American University in Cairo
2011-	Committee Member, American University in Cairo Annual Mathematics Competition committee, American University in Cairo
2014-2016	The Common Reading Program Selection Committee, American University in Cairo
2014 - 2016	Budget Committee Member, AUC Senate, American University in Cairo
Fall 2015	Calculus Course Sequence Revision, Departmental Committee, American University in Cairo
Fall 2014	Committee Member, New Declaration Criteria for Mathematics Major, American University in Cairo
Fall 2014	Committee Member, Committee for the Implementation of the Recommendations of the Department External Review Report, American University in Cairo
2011 - 2013	Committee Member, Ad Hoc Assessment Review Committee, American University in Cairo
2011 - 2012	Committee Member, Library Collection Committee, American University in Cairo
Fall 2010	Committee Member, Graduate Studies and Ph.D. Steering Committee, American University in Cairo
2006 - 2009	Senior Member, Fitzwilliam College Mathematical Society, University of Cambridge