

# Alp Bassa

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## CONTACT INFORMATION

Boğaziçi University  
Faculty of Arts and Sciences  
Department of Mathematics  
34342 Bebek, Istanbul - Turkey

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## RESEARCH INTERESTS

Number Theory and Algebraic Geometry, Algebraic Curves (over Finite Fields), Modular Curves, Arithmetic of Function Fields, Algebraic Surfaces and Line Arrangements, Applications to Coding Theory and Cryptography

## EDUCATION

**Universität Duisburg–Essen**, Essen, Germany

Ph.D., Mathematics, February 2007

Thesis Title: Towers of Function Fields over Cubic Fields

Thesis Advisor: Prof. Dr. Henning Stichtenoth

*magna cum laude*

**Middle East Technical University**, Ankara, Turkey

B.Sc., Mathematics, June 2004

*high honour*

B.Sc., Computer Engineering, June 2004

*high honour*

## ACADEMIC EXPERIENCE

**April 2016 to present** *Associate Professor at*

**Boğaziçi University**,  
Department of Mathematics,  
Istanbul, Turkey.

**July 2014 to April 2016** *Assistant Professor at*

**Boğaziçi University**  
Department of Mathematics,  
Istanbul, Turkey.

**September 2011 to July 2014** *Assistant Professor at*

**Sabancı University**,  
Faculty of Engineering and Natural Sciences,  
Istanbul, Turkey.

**February 2011 to June 2011** *Postdoctoral Researcher at*

**Nanyang Technological University**,  
Singapore, Singapore,  
Coding and Cryptography Research Group (Head: Prof. Dr. Chaoping Xing)

**February 2009 to February 2011** *Postdoctoral Researcher at*

**Center for Mathematics and Computer Science**,  
Amsterdam, The Netherlands,  
Cryptology Research Group (Head: Prof. Dr. Ronald Cramer)

AND

**University of Leiden, Department of Mathematics,**  
Leiden, The Netherlands

**September 2007 to February 2009** *Postdoctoral Researcher at*

**École Polytechnique Fédérale de Lausanne,**  
Lausanne, Switzerland,  
Chaire de structures algébriques et géométriques (Head: Prof. Dr. Eva Bayer-Fluckiger)

**February 2007 to September 2007** *Postdoctoral Researcher at*

**Sabancı University,** Istanbul, Turkey,  
Faculty of Engineering and Natural Sciences

RESEARCH  
GRANTS AND  
AWARDS

- Parlar Vakfı Akademik Teşvik Ödülü, 2021.
- TÜBİTAK - PHC Bosphore France project project entitled “Curves over finite fields, their Jacobians and abelian varieties”, April 2018 - April 2020.
- Scientific officer at CIMPA for the Middle East and West Asia.
- West Asia Mathematical Schools Committee.
- Young Scientists Award (BAGEP), Academy of Sciences, 2016.
- Masatoshi Gündüz İkedâ Research Award, Mathematics Foundation of Turkey, 2015.
- BÜVAK Akademik Teşvik Ödülü (Academic Incentive Award), 2014.
- “Associate Professor” title, granted by the Turkish Council of Higher Education (YÖK), September 2014.
- TÜBİTAK Career Grant for project entitled “Drinfeld modular curves, varieties and their applications”, 2012-2014.
- University Courses Teaching Award, Sabancı University, 2011-2012 Academic year.

PUBLICATIONS

- Bassa, A., Stichtenoth, H., *A simplified proof for the limit of a tower over a cubic finite field*, Journal of Number Theory 123 (2007), no. 1, 154–169.
- Bassa, A., Garcia, A., Stichtenoth, H., *A new tower over cubic finite fields*, Moscow Mathematical Journal 8 (2008), no. 3, 401–418.
- Bassa, A., Beelen, P., *On the construction of Galois towers*, Contemporary Mathematics 487 (2009), 9–20.
- Bassa, A., Beelen, P., *The Hasse–Witt invariant in some towers of function fields over finite fields*, Bulletin of the Brazilian Mathematical Society 41 (2010), no. 4, 567–582.
- Ünel, M., Soldea, O., Özgür, E., Bassa, A., *3D object recognition using invariants of 2D projection curves*, Pattern Analysis and Applications 13 (2010), 451–468.

- Bassa, A., Beelen, P., *The Galois closure of Drinfeld modular towers*, Journal of Number Theory 131 (2011), 561–577.
- Bassa, A., Beelen, P., *A proof of a conjecture by Schweizer on the Drinfeld modular polynomial  $\Phi_T(X, Y)$* , Journal of Number Theory 131 (2011), 1276–1285.
- Bassa, A., Beelen, P., *A closed form expression for the Drinfeld modular polynomial  $\Phi_T(X, Y)$* , Archiv der Mathematik 99 (2012), 237–245.
- Bassa, A., Ma, L., Xing, C., Yeo, S. L., *Towards a characterization of subfields of the Deligne–Lusztig function fields*, Journal of Combinatorial Theory, Series A 120 (2013), 1351–1371.
- Bassa, A., Beelen, P., Nguyen, N., *Good Towers of Function Fields*, to appear in Algebraic Curves and Finite Fields: Codes, Cryptography, and other Emergent Applications (H. Niederreiter, A. Ostafe, D. Panario, and A. Winterhof, eds.), de Gruyter, Berlin.
- Bassa, A., Beelen, P., Garcia, A., Stichtenoth, H., *Galois Towers over Non-prime Finite Fields*, Acta Arithmetica, 164 (2014), 163–179.
- Bassa, A., Beelen, P., Garcia, A., Stichtenoth, H., *An Improvement of the Gilbert–Varshamov Bound over Non-prime Fields*, IEEE Transactions on Information Theory, Vol. 60(7) (2014), 3859–3861.
- Bassa, A., Beelen, P., Garcia, A., Stichtenoth, H., *Towers of Function Fields over Non-prime Finite Fields*, Moscow Mathematical Journal, Vol. 15(1), (2015), 1–29.
- Bassa, A., Beelen, P., Nguyen, N., *Good families of Drinfeld modular curves*, LMS Journal of Computation and Mathematics, 18 (1) (2015), 699–712.
- Anbar, N., Bassa, A., Beelen, P., *A modular interpretation of various cubic towers*, Journal of Number Theory, 171 (2017) 341–357.
- Anbar, N., Bassa, A., Beelen, P., *A complete characterization of Galois subfields of the generalized Giulietti–Korchmáros function field*, Finite Fields and their Applications, 48 (2017), 318–330.
- Bassa, A., Beelen, P., *On the Deuring Polynomial for Drinfeld Modules in Legendre Form*, Acta Arithmetica 186 (2018), 179–190.
- Bassa, A., Stichtenoth, H., *Self-Dual Codes better than the Gilbert–Varshamov bound*, Designs, Codes and Cryptograph (2019) 87:173–182.
- Bassa, A., Tutaş, N., *Extending self-orthogonal codes*, Turkish Journal of Mathematics, (2019) 43: 2177 – 2182.
- Bassa, A., Menares, R., *Enumeration of a special class of irreducible polynomials in characteristic 2*, Acta Arithmetica 194 (2020), 51–57.
- Bassa, A., Ritzenthaler, C., *Good recursive towers over prime fields exist*, Mathematische Annalen 378 (2020) 599–604.

### Preprints

- Bassa, A., Beelen, P., *Explicit equations for Drinfeld modular towers*, arXiv: 1110.6076v1.
- Bassa, A., Menares, R., *The R-transform as a power map and its generalisations to higher degree*, arXiv:1909.02608.
- Bassa, A., Girgin, N., Yilmaz E. S., *Variations of the Q-transform and a result of Alizadeh and Mehrabi*.

- Bassa, A., Kızısel, A. U. Ö., *The Only Complex 4-Net Is the Hesse Configuration*, arXiv:2002.02660.
- Bassa, A., Bisson, G., Oyono, R., *Isogenies of Elliptic Curves and Irreducible Polynomials*.

### Edited Books

- *Arithmetic, Geometry, Cryptography and Coding Theory*, edited by Alp Bassa, Alain Couvreur and David Kohel, AMS Contemporary Mathematics, 686, 2017.
- *Rational Points on Curves over Finite Fields*, by Jean-Pierre Serre, edited by Alp Bassa, Elisa Lorenzo García, René Schoof, Christophe Ritzenthaler, Documents Mathématiques, Société Mathématique de France, 2020.
- *Curves over Finite Fields: Past, Present and Future*, edited by Alp Bassa, Elisa Lorenzo García, Christophe Ritzenthaler.

### TEACHING EXPERIENCE

#### Boğaziçi University

- Introduction to Mathematical Structures, Fall 2018
- Calculus II, Fall 2014, Fall 2015, Spring 2018, Spring 2019, Spring 2021, Fall 2021
- Number Theory, Fall 2014
- Differential Equations, Spring 2015, Fall 2015, Spring 2016, Fall 2016, Spring 2017, Fall 2019, Spring 2022
- Algebraic Curves, Fall 2019, Fall 2021
- Algebra II (graduate), Spring 2015
- Algebraic Number Theory (graduate), Spring 2019, Spring 2022
- Elliptic Curves, Spring 2021
- Rings, Fields & Galois Theory, Fall 2016
- Complex Analysis I (graduate), Spring 2017
- Complex Analysis I, Fall 2015
- Riemann Surfaces, Elliptic Curves and Modular Forms, Fall 2016

#### Sabancı University

- Linear Algebra, Summer 2006
- Functions: Discrete and Continuous I, Spring 2007
- Calculus I, Fall 2011, Fall 2012, Fall 2013
- Calculus II, Spring 2012, Spring 2013, Spring 2014
- Drinfeld Modules, Fall 2012
- Introduction to Algebraic Geometry, Fall 2013
- Topics in Algebraic Geometry, Spring 2014

#### École Polytechnique Fédérale de Lausanne

- Algebra, Fall 08/09

#### University of Utrecht (Mastermath course)

- Algebraic Geometry in Cryptology, Spring 2010

THESIS  
SUPERVISION

- *Coding Theory and Hyperplane Arrangements*, Olcayto Alp Külünkoğlu (M.Sc., 2021)
- *Uniformization of Elliptic Curves*, Özge Ülkem (M.Sc., 2015)
- *A Drinfeld modular interpretation of an asymptotically optimal tower of curves over finite fields*, Türkü Özlüm Çelik (M.Sc., 2014)
- *On a link between group theory and towers of function fields*, Yujia Qiu, Eindhoven University of Technology, (M.Sc., 2010)
- *Galois Theory*, Jennifer Andreotti, École Polytechnique Fédérale de Lausanne, undergraduate thesis
- *On elliptic curves over finite fields and the Riemann hypothesis*, Phillip Egger, École Polytechnique Fédérale de Lausanne, undergraduate thesis

*Current Students:*

- Neslihan Girgin (Ph.D.)

LANGUAGES

Turkish (native), German (native), English (fluent), French (intermediate)

SERVICE AND  
MEMBERSHIP

- Member of the Executive Team of CIMPA (Centre International de Mathématiques Pures et Appliquées)
- Member of the Asian and European Schools in Mathematics Committee.
- Member of the executive committee of the Istanbul Center for Mathematical Sciences (IMBM).
- Academic advisor for double major students, Department of Mathematics, Boğaziçi University.
- Former member of the editorial board of the popular mathematics magazine *Matematik Dünyası*.