

# Alan Roberto Vazquez-Alcocer

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Date of birth: 18-05-1988, Citizenship: Mexican

Website: <https://alanrvazquez.github.io>

## EDUCATION

### University of Antwerp, Belgium

Ph.D. in Applied Economics

05/2014 - 05/2018

Thesis: Orthogonal Experimental Designs for Screening: Construction and Analysis.

Advisors: Prof. Peter Goos and Dr. Eric Schoen.

### Monterrey Institute of Technology, Mexico

M.S. in Applied Statistics (Honors)

08/2010 - 05/2012

### Autonomous University of Nuevo Leon, Mexico

B.S. in Mathematics

08/2005 - 05/2010

## RESEARCH AREAS

- Statistics: Experimental design, model selection and longitudinal data analysis.
- Operations Research: Heuristic algorithms and mixed integer programming.

## PUBLICATIONS

1. Vazquez, A. R., Schoen, E. D., and Goos, P. (2021). Two-level orthogonal screening designs with 80, 96 and 112 runs, and up to 29 factors. *Journal of Quality Technology*. Published online.
2. Vazquez, A. R., Schoen, E. D., and Goos, P. (2021). A mixed integer optimization approach for model selection in screening experiments. *Journal of Quality Technology*, 53:243-266.
3. Kort R., Schlösser, J., Vazquez, A. R., Atakunda, P., Muhoozi, G. K. M., Wacoo, A. P., Sybesma, W. G. H., Westerberg, A. C., Iversen, P. O., and Schoen E. D. (2021). Model selection reveals the butyrate-producing gut bacterium *Coprococcus eutactus* as predictor for language development in three-year-old rural Ugandan children. *Frontiers in Microbiology, section Systems Microbiology*, 12:1-14.
4. Vazquez, A. R., Goos, P., and Schoen, E. D. (2019). Projections of definitive screening designs by dropping columns: Selection and evaluation. *Technometrics*, 62:37-47.
5. Vazquez, A. R., and Xu, H. (2019). Construction of two-level nonregular designs of strength three with large run sizes. *Technometrics*, 61:341-353.
6. Vazquez, A. R., Goos, P., and Schoen, E. D. (2019). Constructing two-level designs by concatenation of strength-3 orthogonal arrays. *Technometrics*, 61:219-232.
7. Goos, P., Syafitri, U., Sartono, B., and Vazquez, A. R. (2019). A nonlinear multi-dimensional knapsack problem in the optimal design of mixture experiments. *European Journal of Operational Research*. 128:201-221.
8. Trigos, F., Vazquez, A. R., and Cárdenas-Barrón, L. E. (2019). A simulation-based heuristic that promotes business profit while increasing the perceived quality of service industries. *International Journal of Production Economics*, 211:60-70.
9. Eendebak, P. T. and Vazquez, A. R. (2019). OAPackage: A Python package for generation and analysis of orthogonal arrays, optimal designs and conference designs. *Journal of Open Source Software*, 4:1097.
10. Maestroni, B. M., Vazquez, A. R., Avossa, V., Goos, P., Cesio, V., Heinzen, H., Riener, J., Cannavan, A. (2018). Ruggedness testing of an analytical method for pesticide residues in potato. *Accreditation and Quality Assurance*, 23:303-316.

11. Vázquez-Alcocer, A., Garzón, D. L., and Sánchez-Casas, R. M. (2014). LADES: A software for constructing and analyzing longitudinal designs in biomedical research. PLoS ONE 9(7): e100570.

## MANUSCRIPTS

Vazquez, A. R., Wong, W.-K., and Goos, P. (2021). Constructing two-level  $Q_B$ -optimal designs for screening experiments using mixed integer programming and heuristic algorithms. Submitted.

Schoen, E. D., Eendebak P. T., Vazquez, A. R., and Goos, P. (2021). Systematic enumeration of definitive screening designs. Submitted.

Eendebak P. T., Schoen, E. D., Vazquez, A. R., and Goos, P. (2021). Systematic enumeration of two-level even-odd designs. In preparation.

Staes, I., Bäcker, L. E., Simoens, K., De Winter, K., Marolt, G., Cenens, W., Wolput, S., Vazquez, A. R., Goos, P., Lavigne, R., Bernaerts, K., and Aertsens, A. (2021). Superinfection exclusion factors allow for a history-dependent switch from vertical to horizontal phage transmission. In preparation.

## RESEARCH EXPERIENCE

**Department of Statistics,  
University of California, Los Angeles, U.S.A.**

10/2020 - present

Assistant Adjunct Professor

- Work on constructing Latin hypercube designs for computer experiments using integer programming.

**Department of Biosystems, University of Leuven,  
Belgium**

06/2018 - 09/2020

Postdoctoral Researcher

- Worked on constructing optimal designs for screening and mixture experiments using mixed integer linear and nonlinear programming.
- During my second post-doc year, I earned a Junior Postdoctoral Fellowship from the Belgian Science Foundation (FWO). The fellowship is from 1 October, 2019 until 31 August, 2022, but I suspended it for 2 years to join UCLA.

**Department of Mathematics, Statistics and Computer Science,  
University of Illinois at Chicago, Chicago, U.S.A.**

03/2020

Visiting Researcher

- Started a research project on subdata selection methods for big data under a hierarchical mixtures of experts model.
- Collaborator: Prof. Min Yang.

**Department of Statistics,  
University of California, Los Angeles, U.S.A.**

03/2017 - 06/2017

Visiting Graduate Researcher

- Developed theory and algorithms for constructing large two-level experimental designs.
- Advisor: Prof. Hongquan Xu.

**Department of Engineering Management,  
University of Antwerp, Belgium**

05/2014 - 05/2018

Ph.D. Researcher

- Constructed orthogonal experimental designs for screening.

	<ul style="list-style-type: none"> <li>• Applied optimization methods to analyze experimental designs.</li> <li>• Used Definitive Screening Designs for process optimization in the International Atomic Energy Agency in Vienna, Austria.</li> </ul>	
	<b>Mathematics Research Center CIMAT, Mexico</b> Research Assistant	07/2012 - 01/2014
	<ul style="list-style-type: none"> <li>• Designed and analyzed longitudinal studies for the Animal Experimental Unit of the Research and Development Center in Health Sciences, Autonomous University of Nuevo Leon.</li> <li>• Author of LADES, a software for designing and analyzing longitudinal experiments involving animal models.</li> </ul>	
	<b>EGADE Business School, Mexico</b> Research Assistant	01/2012 - 05/2012
	<ul style="list-style-type: none"> <li>• Designed a bank teller roster for reducing the waiting times of clients in a major bank in Mexico.</li> </ul>	
TEACHING EXPERIENCE	<b>College of Physical Sciences, University of California, Los Angeles, U.S.A.</b>	
	<ul style="list-style-type: none"> <li>• STATS101B - Introduction to Design and Analysis of Experiments</li> </ul>	03/2021 - 06/2021
	<ul style="list-style-type: none"> <li>• STATS101C - Introduction to Statistical Models and Data Mining</li> </ul>	10/2020 - 12/2020
	<b>Faculty of Bioscience Engineering, University of Leuven, Belgium</b>	
	<ul style="list-style-type: none"> <li>• I0R00A - Experimental Planning and Data Modelling</li> </ul>	09/2019 - 01/2020
	<ul style="list-style-type: none"> <li>• I0R00A - Mathematical Planning and Advanced Statistics</li> </ul>	09/2018 - 01/2019
	<ul style="list-style-type: none"> <li>• G0B68A - Experimental Design*</li> </ul>	10/2016 - 11/2016
	*: Gave two lectures about optimal designs, factorial experiments and split-plot experiments. The course is part of the Master of Food Technology program.	
	<b>JMP School on Statistics, Belgium</b>	
	<ul style="list-style-type: none"> <li>• Multivariate Statistics*</li> </ul>	09/2018
	*: Replaced Dr. Bart De Ketelaere during the afternoon session. The school involves statistical training for practitioners in business and industry.	
	<b>Metropolitan University of Monterrey, Mexico</b>	
	<ul style="list-style-type: none"> <li>• Instructor of Algebra, Geometry and Analytic Geometry.</li> </ul>	01/2010 - 07/2010
THESIS DIRECTED	<b>Faculty of Bioscience Engineering, University of Leuven, Belgium</b> Adityavarna Dehaleesan M.S. in Statistics Thesis: Construction of Large Orthogonal Designs by Concatenating Smaller Designs With Different Numbers of Runs. Co-advisor: Prof. Peter Goos.	10/2019 - 09/2020
	<b>Faculty of Bioscience Engineering, University of Leuven, Belgium</b>	09/2018 - 06/2020

Cristina Tapia  
M.S. in Statistics  
Thesis: I-optimal Designs with Blocks of Size Two.  
Co-advisor: Prof. Peter Goos.

**Faculty of Business and Economics,  
University of Antwerp, Belgium**

10/2016 - 07/2017

Hajar Hamidouche  
M.S. in Business Engineering  
Thesis: Conference-Design-Based Definitive Screening Designs.  
Co-advisor: Prof. Peter Goos.

AWARDS  
AND  
GRANTS

- Belgian Science Foundation (FWO) Grant for a Short Research Stay Abroad. 01/2020
- Junior Postdoctoral Fellowship from the Belgian Science Foundation (FWO). 06/2019
- Travel Grant for the International Conference on Design of Experiments 2019. 05/2019
- European Network for Business and Industrial Statistics (ENBIS) Knowledge Fund for Participation in the ENBIS-2019 Conference. 04/2019
- Belgian Science Foundation (FWO) Grant for Participation in a Conference Abroad. 10/2018
- Travel Grant for the Design and Analysis of Experiments Conference 2017. 10/2017
- Belgian Science Foundation (FWO) Grant for a Long Research Stay Abroad. 12/2016
- Monterrey Institute of Technology Ph.D. Degree Scholarship. 05/2012
- Mexican Science Foundation Master Degree Scholarship. 08/2010

CONFERENCE  
PRESENTATIONS  
AND  
SEMINARS  
(†: INVITED)

†Two-level orthogonal designs for intensive screening experiments: Construction and evaluation (in Spanish). Conference in Honor of Guadalupe Evaristo Cedillo-Garza, Autonomous University of Nuevo Leon. San Nicolas de los Garza, Mexico. August, 2021.

†Two-level orthogonal screening designs with 80, 96 and 112 runs: Construction and evaluation. *Quality and Productivity Research Conference 2021*. Tallahassee, U.S.A. July, 2021.

†Constructing optimal screening designs for effective experimentation using metaheuristics. *Metaheuristic Optimization, Machine Learning and AI – Virtual Workshop*. Hosted by The Statistical and Applied Mathematical Sciences Institute (SAMSI). March, 2021. A recording of my presentation is available on the following link: <https://vimeo.com/522352717>.

†A mixed integer optimization approach for model selection in screening experiments. *Invited seminar at GlaxoSmithKline (GSK)*. Rixensart, Belgium. October, 2019.

A mixed integer optimization approach for model selection in screening experiments. *Meeting of the European Network for Business and Industrial Statistics 2019 (ENBIS 2019)*. Budapest, Hungary. September, 2019.

<sup>†</sup>A mixed integer optimization approach for model selection in screening experiments. *European Conference on Operational Research (EURO-2019)*. Dublin, Ireland. June, 2019.

<sup>†</sup>Construction of large two-level nonregular designs of strength three. *International Conference on Design of Experiments 2019 (ICODOE 2019)*. Memphis, U.S.A. May, 2019.

<sup>†</sup>A mixed integer optimization approach for model selection in screening experiments. *Conference on Experimental Design and Analysis 2018 (CEDA 2018)*. Hsinchu, Taiwan. December, 2018.

Two-Level Designs Constructed by Concatenating Orthogonal Arrays of Strength Three. Poster presented at *The Design and Analysis of Experiments Conference 2017 (DAE 2017)*. Los Angeles, U.S.A. October, 2017.

<sup>†</sup>Extending the Definitive Screening Designs (in Spanish). Faculty of Physical and Mathematical Sciences Seminar, Autonomous University of Nuevo Leon. San Nicolas de los Garza, Mexico. June, 2017.

Dropping Columns from Definitive Screening Designs. *Doctoral Day 2016*. Antwerp, Belgium. November, 2016.

<sup>†</sup>Extending Definitive Screening Designs by Concatenation. *International Symposium on Business and Industrial Statistics 2016 (ISBIS-2016)*. Barcelona, Spain. June, 2016.

Fractional Factorial Designs by Combining Two-Level Designs. *Meeting of the European Network for Business and Industrial Statistics 2015 (ENBIS 2015)*. Prague, Czech Republic. September, 2015.

Fractional Factorial Designs by Combining Two-Level Designs. *Belgian Statistical Society Meeting 2015 (BSS 2015)*. Antwerp, Belgium. October, 2015.

The Construction of Large Two-Level Designs from Two Orthogonal Arrays of Strength Two. Poster presented at the *Leuven Statistics Day 2014*. Leuven, Belgium. December, 2014.

## REFeree SERVICE

Australian & New Zealand Journal of Statistics (1); Metrika (2); Journal of Computational Statistics and Data Analysis (1); Journal of Statistical Planning and Inference (1); Journal of Statistical Theory and Practice (1); STATISTICA (1); Statistics and Probability Letters (1); Statistica Sinica (1).

## ADDITIONAL SKILLS

### Computing:

- Programming languages: R, Python, Matlab.
- Statistical Software: JMP, Minitab.
- Optimization Software: Gurobi, SCIP, GAMS.
- Other: Cluster computing.

**Languages:** Spanish (native), English (professional).

GITHUB

<https://github.com/alanrvazquez>

*Last update: August 27, 2021.*