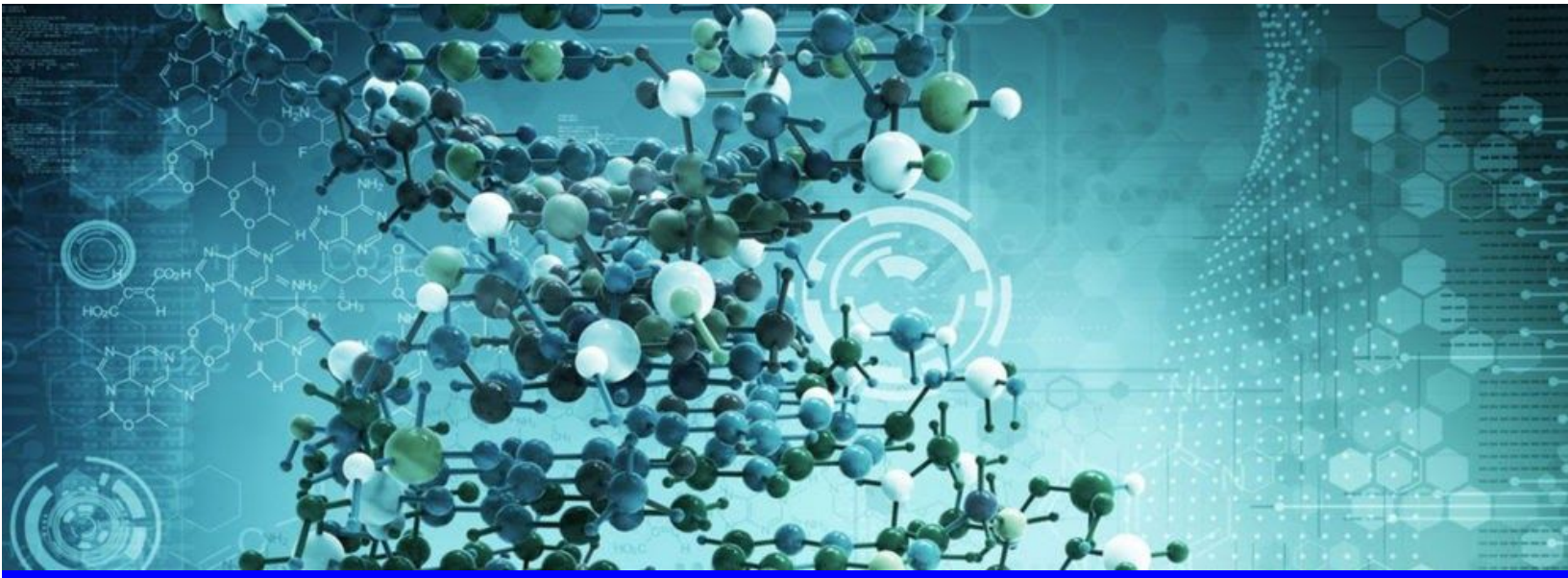
TZC **THE ZLOTA COMPANY, LLC**

RAPID PROCESS SCALE-UP and ROBUST PROCESS DEVELOPMENT



QbD Elements (B): Effective Statistical Design of Experiments (DoE) and Risk Analysis

COURSE INSTRUCTOR:

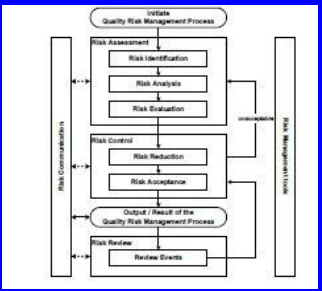
Dr. Andrei A. Zlota

info@thezlotacompany.com

www.thezlotacompany.com

"Dr Zlota provided an outstanding seminar. The material was well referenced, and presented in an engaging manner. I would highly recommend the course to anyone involved in developing a chemical process."

QbD Elements (B): Effective Statistical Design of Experiments (DoE) and Risk Analysis



For webcourse fee please inquire at: info@thezlotacompany.com.

BONUS: each course participant is entitled to a free of charge webcourse ($1,300 value):

"QbD Elements (C): Process Analytical Technology, Continuous Manufacturing and QbD Regulatory Guidance Documents"

COURSE OVERVIEW

- Two critical Quality by Design (QbD) elements are meaningfully discussed: Statistical Design of Experiments (DoE) and Quality Risk Analysis
- A practical approach for effective, fit-for-purpose risk analysis
- Efficient strategies for screening and optimization DoEs
- Demonstrates the valuable synergy between DoE and risk analysis
- Practical learning: two hands-on workshops (DoE and risk analysis) and several interactive discussions based on real-life examples
- A balanced approach between the theory and practice of statistical design of experiments and risk analysis
- Facilitation by a chemist and chemical engineer with over 25 years of experience in QbD and process R&D, offering realistic advice for robust process development

WHO SHOULD ATTEND

Chemists, engineers, project managers and supervisors who seek to learn about scientifically meaningful and cost effective approaches to statistical design of experiments and risk analysis. Typical attendees include process chemists, process engineers, analytical chemists, regulatory scientists, and manufacturing engineers.

COURSE SYLLABUS

1. Introduction
- Robust processes development using QbD methodology, low technology transfer risk
- DoE vs. One-Variable-at-A-Time experimentation, the power of statistics when used in conjunction with chemical knowledge
- The structure of a DoE experiment
- Commercially available DoE platforms

2. Screening DoEs
- Strategies for effective screening DoEs; risk analysis and pre-DoE experimentation; responses, factor types, and their ranges
- Categorical variables
- Factorial, definitive screening, and Plackett-Burman designs, confounding
- Frequently investigated factors in reaction and crystallization screening
- The quality of a screening DoE; randomization, replication, blocking
- Fit-for-purpose screening DoE data analysis; balancing practical and statistical significance; model quality, model manipulation, Analysis of Variance (ANOVA)
- Key DoE statistical concepts and the power of data visualization
- Design augmentation
- Case studies: chemical reaction, crystallization process

3. Optimization DoEs
- The structure of Response Surface Methodology (RSM) DoEs
- Central Composite & Box-Behnken designs
- RSM DoE data analysis, model verification
- Optimizing multiple responses
- Sweet spot, design and control space
- Critical Process Parameters
- Robustness assessment, probabilistic risk calculations, process capability
- Case studies: chemical reaction, crystallization process

4. Hands-on DoE workshop (group work)

5. Quality Risk Assessment: Introductory Concepts
- Quality Risk Analysis objectives in Quality by Design implementation
- Practical cause-and-effects analysis
- Methodology: Failure Mode and Effects Analysis (FMEA) and Kepner-Tregoe ®
- Quantitative and semi-quantitative risk analysis
- Regulatory guidelines: ICH, FDA, EMA
- Ranking guidelines
- Risk communication, experimental design, potential critical process parameters
- Effective risk analysis in sponsor-CRO/CDMO partnerships

6. Fit-for-purpose risk analysis; early and late development projects
- Early development, chemical reaction risk analysis
- Early development, crystallization process risk analysis
- Late development, chemical reaction risk analysis, risk reduction and acceptance
- Late development, crystallization process risk analysis, risk reduction and acceptance
- Manufacturing process risk analysis
- Synergy between DoE and Risk Analysis, process robustness

7. Hands-on risk analysis workshop (group work)

8. Review, Questions and Answers, References

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"An excellent course delivered by an expert in the field. Very worthwhile."

COURSE INSTRUCTOR

Dr. Andrei A. Zlota

Dr. Zlota is the President and Chief Chemical Engineer at The Zlota Company which he founded in 2006. During this time Andrei provided consulting for risk analysis, statistical design of experiments (DoE), chemical process scale-up, crystallization process development, and process analytical technology (PAT) for more than 36 pharmaceutical companies. Andrei also trained 2,500 scientists from 200 companies worldwide on QbD methodology. Previously, Andrei worked for Sepracor, Gillette, Monsanto and Biopharm. Dr. Zlota obtained his PhD in Chemistry from the Weizmann Institute of Science, his MSc in Chemistry from the Technion and his MSc in Chemical Engineering from the Bucharest Polytechnic Institute.

Note: *Andrei's full bio is available at www.thezlotacompany.com*

COURSE OBJECTIVES

Upon completion, the course participants will be able to:

- Rapidly execute fit-for-purpose Quality Risk Analysis
- Make important experimental decisions based on purposeful risk analysis
- Design meaningful screening DoEs to identify statistically significant factors using the minimum number of experiments
- Design practical optimization DoEs for the development of a robust process, for the definition of a scaleable design space, and for a robust control strategy
- Use tips for rapid robust process development, and for the determination of critical process parameters

IN-HOUSE COURSES

For groups larger than five participants a customized webcourse can be offered. For groups larger than eight participants, a customized course can be delivered in-house, please inquire: info@thezlotacompany.com.

REGISTRATION

Please e-mail the pdf scan of the form below to: info@thezlotacompany.com.

Upon confirmation of registration an invoice shall be e-mailed to the registrant for payment by electronic bank transfer.

CANCELLATION POLICY

Cancellations must be made in writing at **info@thezlotacompany.com**, and they are subject to a $390 cancellation fee. If cancellation is made more than thirty (30) days prior to the course, a refund equal to the fee paid minus the $390 cancellation fee shall be issued. If cancellations are made less than thirty (30) days prior to the course, a voucher for the value of the fee paid minus $390 cancellation fee will be issued for use towards the fee of another course offered by The Zlota Co., either by the same registrant, or by anyone else in the same company. If a registrant fails to attend but has not cancelled the registration, neither a refund nor a voucher shall be issued. Requests for substitutions must be made in writing to: **info@thezlotacompany.com**. Hotel cancellations are the responsibility of the registrant.

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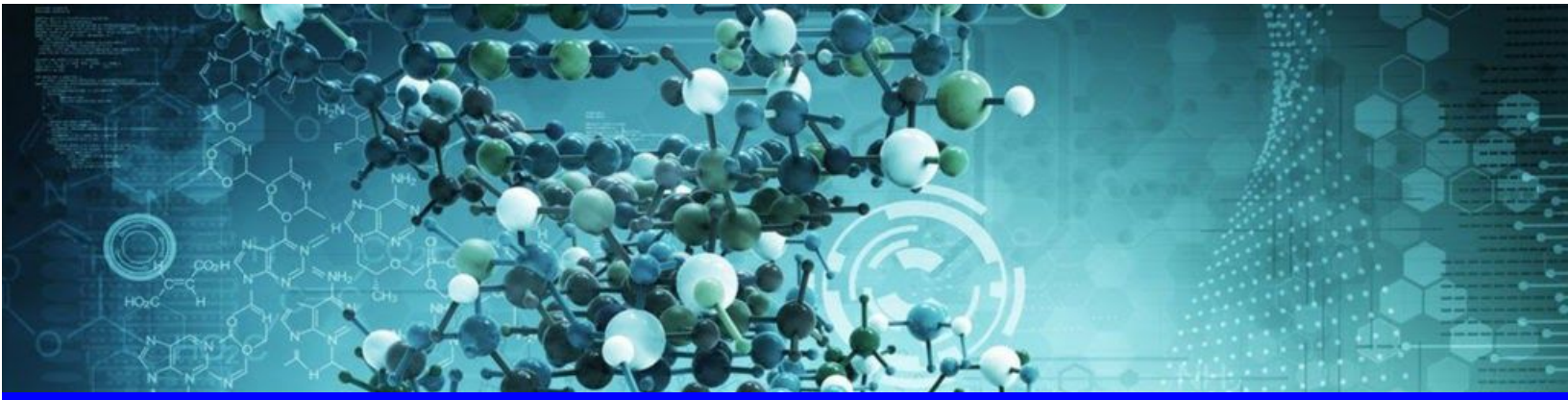

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REGISTRATION FORM

Go to **thezlotacompany.com** and register on-line, or e-mail the pdf scan of the form below to: **info@thezlotacompany.com**. Upon confirmation of registration an invoice shall be e-mailed to the registrant for payment by electronic bank transfer.

Company Name	
Title (Dr/Mr/Ms)	
First Name	
Last Name	
Job Title	
Street Address	
City	
Post/Zip Code	
Country	
e-Mail Address	
Office telephone number	
Mobile telephone number	

I agree with the cancellation policy described above, please initial here: _____

We will store your contact information securely, and use it for the purpose of communicating course updates, sharing it only with participants of the same course for which you registered. Additional details regarding our privacy policy can be found at **http://www.thezlotacompany.com**.

If you agree to have your contact information shared with third parties, please initial here: _____