

Simplifying Progress



Data Analytics eLearning Courses

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SARTORIUS

Introduction

Sartorius Data Analytics eLearning courses are structured, on-demand programs designed to help scientists and engineers interpret data with confidence and apply statistical methods to real process challenges. The courses provide a flexible opportunity to learn at your own pace, support career and team development, and gain certification.

Covering Design of Experiments (DOE) with MODDE® and multi-variate data analysis (MVDA) with SIMCA®, the series provides a progressive learning path from foundational concepts to advanced applications in process understanding, modeling, and optimization.

DOE

DOE is a statistical technique that supports a rational and cost-effective approach to practical experimentation, enabling scientists to assess the effect of critical process parameters using minimal resources. By extracting valuable information from experimental data, DOE supports efficient process optimization, improved product quality, and reduced development costs.

MVDA

MVDA is used to separate signal from noise in complex datasets with many variables and present the results in a simple graphical format. It is a powerful tool used in research, development, production, and quality control in diverse industries ranging from pharma and biotech to food and beverage, pulp and paper, and chemicals.

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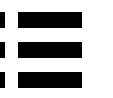
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Level 1 Data Analytics eLearning: DOE and MVDA

Course objective

The Level 1 course teaches scientists and engineers how to interpret complex data, build predictive models, and visualize results with SIMCA®. This comprehensive digital solutions course provides access to both the Level 1 DOE eLearning module and the Level 1 MVDA eLearning module hosted on the Sartorius Learning Center.

Course content

The course addresses data overview, clustering, classification, predictive modeling, and multi-block analysis, helping users convert complex data into interpretable models and plots. It also covers screening, system characterization, optimization, and robustness testing, using MODDE® for demonstrations.

The DOE component focuses on creating efficient experimental designs, analyzing data using statistical principles, applying graphical tools for interpretation and communication of results, employing optimization tools, understanding limitations in constrained situations, and designing follow-up experiments to enhance a DOE protocol.

The MVDA component addresses data import, contextualization, organization, and visualization, as well as working with principal component analysis (PCA), partial least squares (PLS), and orthogonal partial least squares (OPLS®).

Using SIMCA® software for demonstrations, the course covers MVDA modeling, statistics for model assurance, model parameter interpretation, and model creation for real-time process monitoring.

Learning outcomes

Upon completion, participants will be able to:

- Understand the principles of DOE
- Perform data modeling and diagnostics to create a solid basis for decision-making
- Import, organize, contextualize, and visualize different data types
- Understand the basic principles of PCA, PLS, and OPLS® methods
- Interpret models and apply them to process understanding

Who should participate?

This eLearning course is intended for researchers, scientists, and engineers from all sectors of industry and academia. Typical applications include product development, process improvement, optimization, validation, and quality control. No prior knowledge of statistics is assumed.

Language: English

Schedule

This self-paced, on-demand eLearning module is available on the Sartorius Learning Center for three months from the time of activation.

Course material and software

The course material will be provided on the Sartorius Learning Center. Software and training licenses for SIMCA® and MODDE®, used for MVDA and DOE, respectively, will be provided shortly after purchase.

Each participant must ensure the software is installed and activated before starting the relevant course. Each course ends with a final test, which can be taken multiple times. A certificate is awarded after passing each course.

Questions

If you have any questions, please do not hesitate to contact your local sales representative.

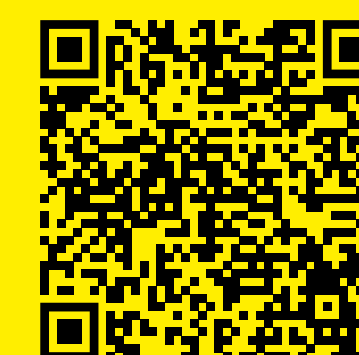
Ordering information

Article number: UT-OC-2495

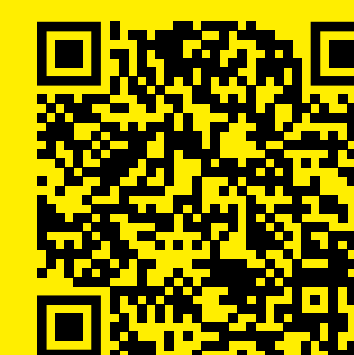
Description: Digital Solution eLearning (Level 1)

Each eLearning course requires separate enrollment and purchase.

MVDA



DOE



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Level 2 Data Analytics eLearning: Intermediate MVDA

Course objective

This course is a direct continuation of the Data Analytics Level 1 eLearning course hosted on the Sartorius Learning Center. In Level 1, the basic principles and applications of MVDA were introduced and illustrated using SIMCA®. The objective of the Level 2 MVDA course is to provide a deeper understanding of MVDA and highlight useful functionality available in SIMCA®.

Course content

The course covers key SIMCA® capabilities, including model exploration tools such as What-If, Score Space Explorer, and OPLS® Solver, as well as specific model types, applications, and further theory. Batch evolution models (BEM), batch level models (BLM), multi-block orthogonal components (MOCA) models, and the hierarchical model framework are also covered.

In addition, two lessons examine the principles behind cross-validation and how to handle categorical, non-numeric data (qualitative variables). Cross-validation is an important model validation tool, and the lessons emphasize how it can be used together with other model validation tools to define a model that is not overfitted and can be interpreted reliably.

Learning outcomes

Upon completion, participants will be able to:

- Interrogate MVDA models using What-If, Score Space Explorer, and OPLS® Solver
- Develop a BEM and understand how to interpret it
- Establish a BLM and understand how to interpret it
- Perform MOCA modeling with multi-block data
- Build hierarchical models and understand their interpretation
- Understand the possibilities and limitations of the cross-validation routine
- Create and deploy multivariate calibration models

Who should participate?

This intermediate eLearning course is intended for researchers, scientists, and engineers from all sectors of industry and academia. It is ideally suited to participants who have already completed the Level 1 course.

Participants new to MVDA, or those seeking a knowledge refresher, are encouraged to complete the Level 1 course before starting this Level 2 course.

Language: English

Schedule

This self-paced, on-demand eLearning module is available on the Sartorius Learning Center for three months from the time of activation.

Course material and software

The course material will be provided on the Sartorius Learning Center. Each participant must ensure that SIMCA® software is installed on their own computer and that they have an active license before starting the course. Software and training licenses are not included with this course.

The course ends with a final test, which can be taken multiple times. A certificate for the Level 2 course is awarded after passing the test.

Questions

If you have any questions, please do not hesitate to contact your local sales representative.

Ordering information

Article number: UT-OC-2496

Description: Data Analytics eLearning MVDA (Level 2)

Each eLearning course requires separate enrollment and purchase.



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Course objective

This course is a direct continuation of the Data Analytics Level 1 eLearning course hosted on the Sartorius Learning Center. In Level 1, classical design families, such as full factorial designs, fractional factorial designs, and central composite designs, were explained and illustrated. The objective of the Level 2 DOE course is to provide a deeper understanding of DOE by focusing on more elaborate design protocols and specific application designs supported by MODDE®.

Course content

This course covers key MODDE® capabilities, including D-optimal design and RED-MUP designs. D-optimal design offers broad flexibility for constrained situations and cases with non-standard demands. It is also used in mixture design, a specific application area commonly used in formulation applications where the sum of all constituents in a recipe is 100%. One lesson covers various aspects of mixture design and shows how D-optimal design is often closely linked with this approach.

D-optimal design is also useful when factor ranges need to be restricted or certain experimental combinations must be avoided. This is covered in a dedicated lesson on constraints, including how simple constraints can be defined using the graphical tool in MODDE®.

Another group of Level 2 lessons focuses on specific application designs supported by MODDE®: RED-MUP designs for DOE on microtiter plates, generalized subset design for time-distributed, sequential DOE protocols, and stability testing DOE for ensuring or establishing product shelf life.

Learning outcomes

Upon completion, participants will be able to:

- Apply D-optimal design in applications with non-standard demands
- Define simple constraints specifying disallowed factor combinations
- Create mixture designs for formulation applications
- Use generalized subset design in cases with many multi-level qualitative factors
- Understand how DOE can be adapted for use with microtiter plates using RED-MUP designs
- Perform stability testing to estimate product shelf life
- Work with the MODDE® Optimizer to define and evaluate an extensive design space

Who should participate?

This intermediate eLearning course is intended for researchers, scientists, and engineers from all sectors of industry and academia. It is ideally suited to participants who have already completed the Level 1 course.

Participants new to DOE, or those seeking a knowledge refresher, are encouraged to complete the Level 1 course before starting this Level 2 course.

Language: English

Schedule

This self-paced, on-demand eLearning module is available on the Sartorius Learning Center for three months from the time of activation.

Course material and software

The course material will be provided on the Sartorius Learning Center. Each participant must ensure that MODDE® software is installed on their own computer and that they have an active license before starting the course. Software and training licenses are not included with this course.

The course ends with a final test, which can be taken multiple times. A certificate for the Level 2 course is awarded after passing the test.

Questions

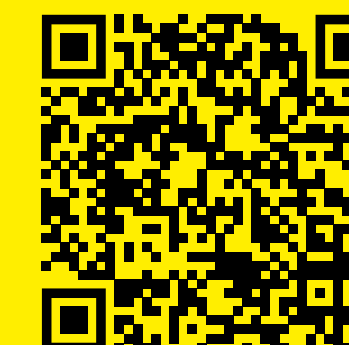
If you have any questions, please do not hesitate to contact your local sales representative.

Ordering information

Article number: UT-OC-2497

Description: Data Analytics eLearning DOE (Level 2)

Each eLearning course requires separate enrollment and purchase.



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Course objective

This Level 3 advanced eLearning course builds on the Level 1 and Level 2 MVDA courses hosted on the Sartorius Learning Center. The objective of the Level 3 MVDA course is to provide a deeper theoretical understanding of MVDA.

Course content

This course addresses advanced topics such as tools for cluster analysis, wavelet analysis, and other spectral filters, non-linear modeling, control charting of time series data, and special cases of batch process modeling. It also provides a deep dive into cross-validation and the adjustable parameters that influence cross-validation outcomes.

The first lessons focus on modeling and monitoring continuous, batch, and hybrid processes. This includes exploring various methods for visualizing process states using different types of control charts. The course also covers functionality in SIMCA® for managing batches divided into multiple phases, sub-phases, recurring phases, and combinations of batch and steady-state phases.

The course provides dedicated lessons on handling data complexities, such as segmenting data into rational clusters and managing non-linear and non-contiguous structures among observations. These lessons cover hierarchical cluster analysis, PLS-Tree, and non-linear modeling.

Later sessions cover advanced multivariate calibration techniques. A lesson on wavelet analysis examines how this method can be used to smooth and compress spectral data and form chained filters, where two or more spectral filters are applied sequentially. Many wavelet-related functions are accessible through the calibration wizard in SIMCA®. The final lesson covers the calibration transfer wizard in SIMCA®, which supports the transfer of multivariate calibration models, for example, from one spectrometer to another.

Some Level 3 lessons build on Level 2 material, and these connections are clearly stated in the relevant lesson descriptions.

Learning outcomes

Upon completion, participants will be able to:

- Select appropriate control charts for process state visualization
- Work with Phase ID and handle batch processes divided into multiple phases
- Handle Phase Iteration ID and apply it to batches with sub-phases
- Develop mixed models using Adaptive Process Mode
- Master advanced cross-validation through working with adjustable parameters
- Perform advanced cluster analysis and interpret the results
- Create, deploy, and transfer advanced multivariate calibration models

Who should participate?

This advanced eLearning course is intended for researchers, scientists, and engineers from all sectors of industry and academia. It is ideally suited to participants who have already completed the Level 1 and Level 2 MVDA eLearning courses.

Participants new to MVDA, or those seeking a knowledge refresher, are encouraged to complete the Level 1 and Level 2 MVDA courses before starting this Level 3 course.

Language: English

Schedule

This self-paced, on-demand eLearning module is available on the Sartorius Learning Center for three months from the time of activation.

Course material and software

The course material will be provided on the Sartorius Learning Center. Each participant must ensure that SIMCA® software is installed on their own computer and that they have an active license before starting the course. Software and training licenses are not included with this course.

The course ends with a final test, which can be taken multiple times. A certificate for the Level 3 course is awarded after passing the test.

Questions

If you have any questions, please do not hesitate to contact your local sales representative.

Ordering information

Article number: UT-OC-2498

Description: Data Analytics eLearning MVDA (Level 3)

Each eLearning course requires separate enrollment and purchase.



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Course objective

This advanced eLearning course on DOE builds on the Level 1 and Level 2 courses hosted on the Sartorius Learning Center. The objective of the Level 3 DOE eLearning course is to provide a deeper theoretical understanding of DOE.

Course content

This course addresses advanced topics, including the theory of fractional factorial design, accomplishing advanced constraints, and modifying the desirability function. It also provides a deep dive into additional design families that are useful in screening and optimization.

One lesson introduces the concept of combinatorial DOE, where two precursor designs are combined to create a design architecture that is better suited to the problem at hand, with a review of situations where combinatorial DOE may be useful. Additional lessons provide an overview of definitive screening design and supersaturated design.

Some Level 3 lessons build on Level 2 material, and these connections are clearly stated in the relevant lesson descriptions.

Learning outcomes

Upon completion, participants will be able to:

- Define advanced constraints involving weighted sum boundaries and fractions
- Modify generators to select alternative fractions in fractional factorial design
- Understand definitive screening designs and how to use them
- Work with supersaturated designs, including PLS for data analysis
- Create and evaluate Plackett – Burman, Rechtschaffner, and L-designs for screening
- Create and evaluate Doehlert, Box – Behnken, and three-level full factorial designs for response surface methodology
- Modify the desirability function to support different optimization scenarios

Who should participate?

This advanced eLearning course is intended for researchers, scientists, and engineers from all sectors of industry and academia. It is ideally suited to participants who have already completed the Level 1 and Level 2 DOE eLearning courses.

Participants new to DOE, or those seeking a knowledge refresher, are encouraged to complete the Level 1 and Level 2 DOE courses before starting this Level 3 course.



Language: English

Schedule

This self-paced, on-demand eLearning module is available on the Sartorius Learning Center for three months from the time of activation.

Course material and software

The course material will be provided on the Sartorius Learning Center. Each participant must ensure that MODDE® software is installed on their own computer and that they have an active license before starting the course. Software and training licenses are not included with this course.

The course ends with a final test, which can be taken multiple times. A certificate for the Level 3 course is awarded after passing the test.

Questions

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Ordering information

Article number: UT-OC-2499
Description: Data Analytics eLearning DOE (Level 3)

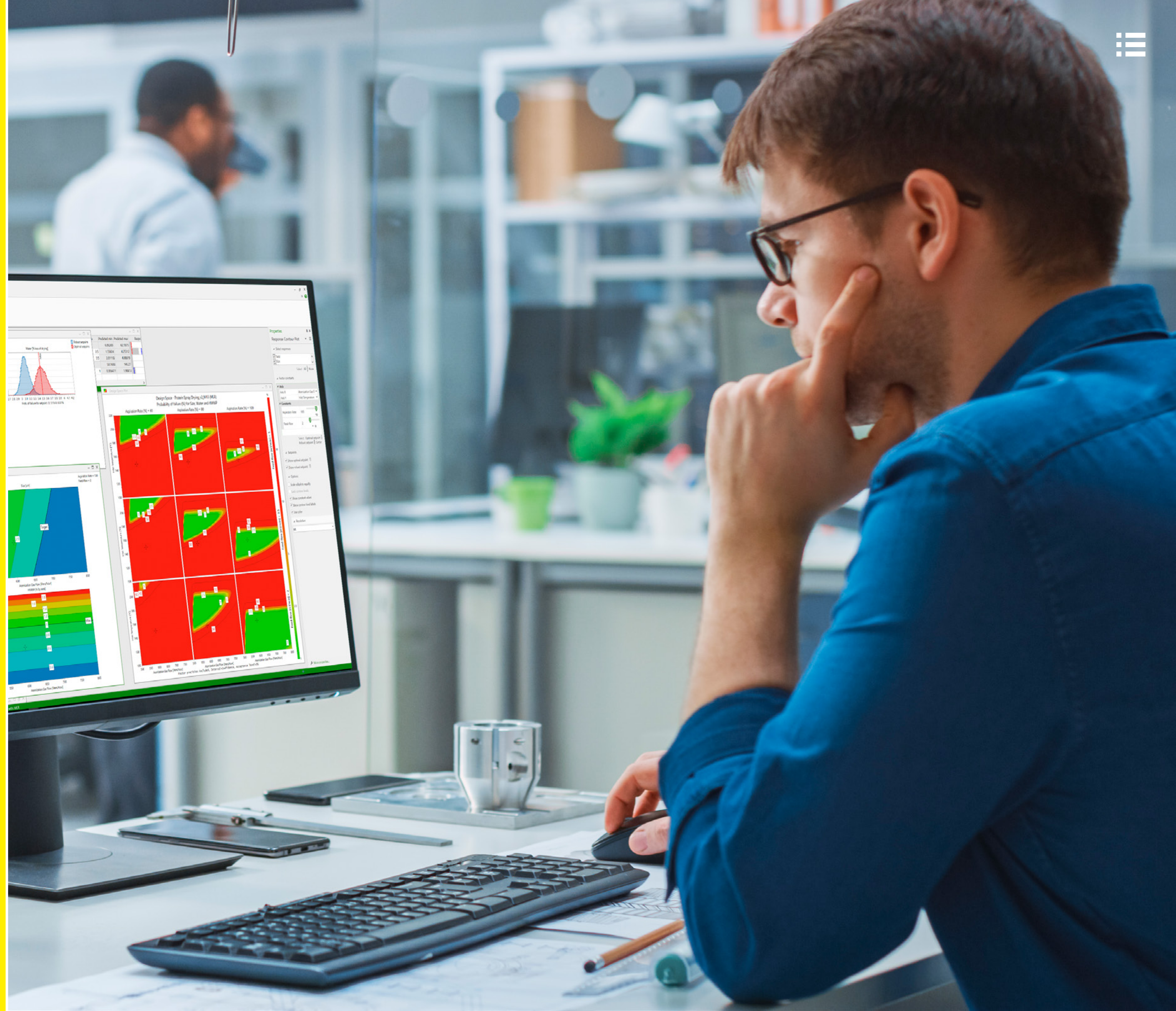
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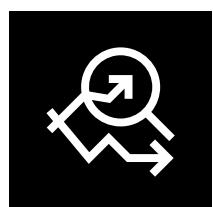


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Complimentary Data Analytics eLearning Courses

These complimentary eLearning courses, available on the Sartorius Learning Center, introduce practical data analytics approaches for process monitoring, process intensification, and improved understanding of complex bioprocess data.





SIMCA®-online Operator Training Course

Course objective and learning outcomes

This self-paced eLearning course is designed to help SIMCA®-online operators use MVDA models for real-time process monitoring. The lessons demonstrate how SIMCA®-online can reduce the complexity of traditional process monitoring by providing clear, actionable insights when and where they are needed. Participants will learn about typical use cases for real-time monitoring, including how SIMCA®-online can support end-to-end process visibility, endpoint prediction, forecasting, early fault detection, and warning of process deviations.

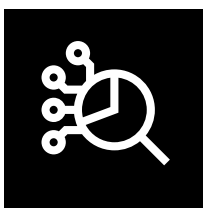
Who should participate?

This course is intended for operators of SIMCA®-online. Basic knowledge of MVDA is recommended but not required. There is no course fee to access this training.

To find out more about SIMCA®-online, please contact your local Sartorius sales representative.



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Advanced Data Analytics in Process Intensification

Course objective

This eLearning course focuses on the role of advanced data analytics in implementing process intensification strategies. Process intensification is used to maximize bioprocess productivity, resulting in reduced costs, a smaller footprint, and shorter timelines. Insights from advanced analytics are essential for ensuring intensified bioprocesses are optimized, tightly controlled, and scalable.

Using real-world examples, this course demonstrates the benefits of integrating advanced analytics into workflows to support efficient operations and inform mid- to long-term bioprocessing strategies.

Learning outcomes

During the course, participants will:

- Gain insights into AI- and data-driven approaches that are transforming the bioprocessing landscape
- Understand the role of DOE in optimizing resource utilization and extracting valuable information from experimental data
- Examine how machine learning, in the form of MVDA, separates signal from noise in complex datasets and presents results in simple graphical formats
- See how mechanistic modeling uses mathematical and computational approaches to understand and predict system behavior
- Recognize how DOE, machine learning, and mechanistic modeling can be applied to enable continuous and hybrid processing and the development of digital twins

Who should participate?

This self-paced introductory eLearning course is intended for researchers, scientists, and engineers working with bioprocess data collection and interpretation. No prior knowledge of statistics is assumed or required. There is no course fee to access this training.



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