Digital Transformation: Advanced Data Science

Training & Certification Guide

itcc

PCC PROFESSIONAL CERTIFICATION COALITION

Pearson | VUE

OnVUE

acclaim

Credly by Pearson

Arcitura® DIGITAL

About the Digital Transformation Professional Academy

The Digital Transformation Professional Academy from Arcitura provides formal education and accreditation programs dedicated to industry-standard Digital Transformation. This extensive program encompasses a number of specialized tracks for IT professionals, each of which addresses a specific skillset for a common profession associated with Digital Transformation projects. Fields of practice covered by the Digital Transformation Professional Academy curriculum include Digital Transformation technology, architecture, data science, security and intelligent automation.

The Digital Transformation Professional Academy curriculum is comprised of 20 course modules and 9 certification tracks. Several of the certification tracks leverage courses in other Arcitura programs. Exams are available worldwide via Pearson VUE testing centers, as well as via Pearson VUE OnVue online proctoring and on-site delivery by Certified Trainers. Achieving a passing grade on required exam(s) achieves a certification for which a digital accreditation certificate is automatically issued by Arcitura and a digital certification badge is issued by Acclaim/Credly.

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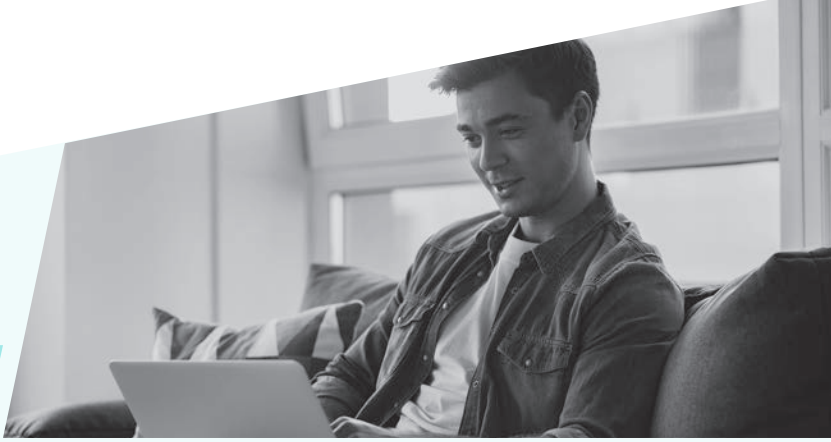
HOW TO TAKE THIS COURSE



ARCITURA eLEARNING OPTIONS

To give you the most flexibility to achieve your learning goals and accommodate your preferences, this course is made available via two Arcitura eLearning solutions: An interactive environment with graded exercises and a graded self-test, as well as a study kit account that supports online/offline access and custom annotations.

To learn more, visit: www.arcitura.com/elearning

To enroll, visit: digital.arcitura.com/courses

ONSITE WORKSHOPS

Private onsite workshops can be delivered by Certified Trainers from Arcitura and authorized training partners for both small and large groups. Each workshop participant can receive access to the full Arcitura Digital eLearning course materials. Each workshop agenda, format and schedule can be tailored to client requirements.

To learn more, visit: www.arcitura.com/workshops

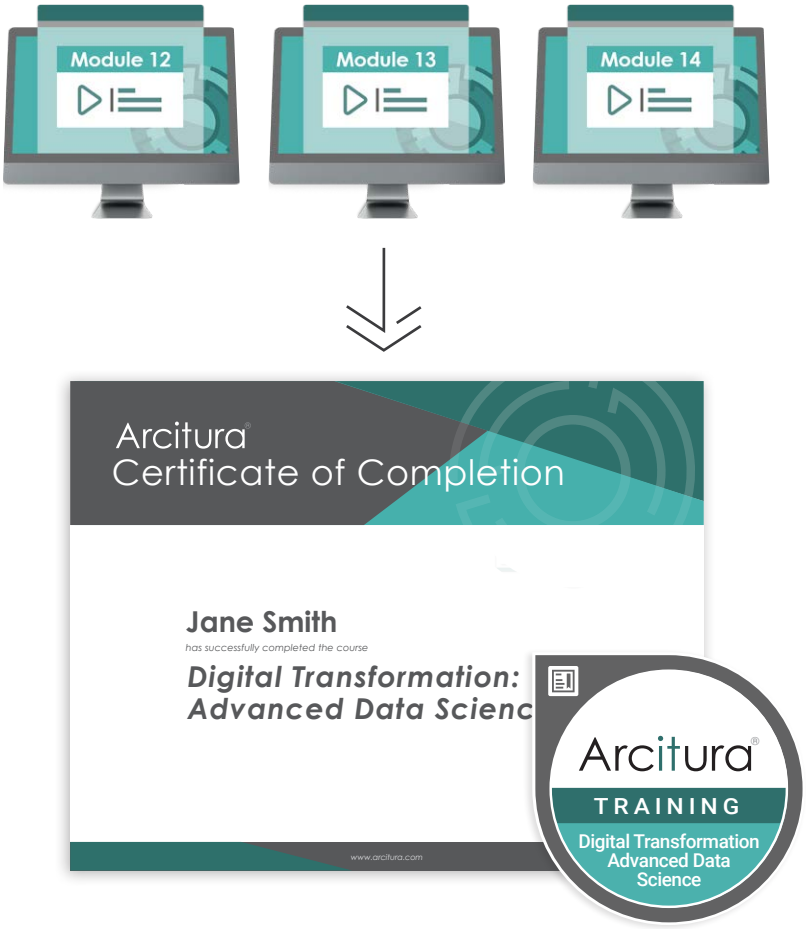
VIRTUAL WORKSHOPS

Private virtual workshops can be delivered by Certified Trainers for small and large groups, as well as individual participants. Workshop participants receive access to the course materials via the Arcitura Digital eLearning platform. Virtual workshop agendas can be tailored with greater flexibility to accommodate more distributed and fragmented training schedules.

To learn more, visit: www.arcitura.com/workshops

Several additional learning and exam preparation products and services are available, including coaching, exam prep kits and digital downloads. See the Training and Exam Preparation Resources page for details.

Arcitura®
TRAINING
Digital Transformation
Advanced Data Science



HOW TO GET STARTED

Welcome to the Digital Transformation: Advanced Data Science course! This course is comprised of a set of modules. Each module has a set of lessons and is further supplemented with exercises to help reinforce your understanding of key topics. Upon completing the course, you can optionally proceed to prepare yourself for the certification exam (as explained on the *How to get Certified* page).

Additional resources are available to assist you with completing this course, including downloadable digital course files, printed course materials, coaching hours and instructor-led training services (as explained on the *Training and Exam Preparation Resources* page.)

PREREQUISITE

The prerequisite for this course is the completion of the Digital Transformation: Fundamental Data Science course. It is recommended that you complete the Digital Transformation: Fundamental Data Science course prior to starting the Digital Transformation: Advanced Data Science course.

MORE INFO

To enroll in this course, visit:
digital.arcitura.com/courses

Arcitura®
CERTIFIED
Digital Transformation Data Scientist

A Certified Digital Transformation Data Scientist has detailed knowledge of modern data science analytics and analysis practices, including those associated with big data, Machine Learning and Artificial Intelligence, and further understands how these practices can be utilized as part of a digital enterprise.

HOW TO GET CERTIFIED

You can become a Certified Digital Transformation Data Scientist! This course can prepare you for the official Digital Transformation Data Scientist Certification exam, which can be taken worldwide at Pearson VUE testing centers, via Pearson VUE online proctoring and/or Arcitura direct proctoring.

Upon attaining a passing grade on the certification exam (and fulfilling any other prerequisite exam requirements) you will achieve the Digital Transformation Data Scientist Certification, after which you will automatically receive an official digital Accreditation Certificate and a digital Certification Badge from Acclaim/Credly with an account that supports the online verification of your certification status. Digital accreditation certificates and badges are free of charge.

Additional resources are available to assist you with preparing for the certification exam, including practice exam questions, downloadable digital course files, printed course materials, coaching hours and instructor-led training services (as explained on the *Training and Exam Preparation Resources* page.)

MORE INFO

To learn more about this certification and exam, visit:
www.arcitura.com/certifications

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TRAINING
Digital Transformation
Advanced Data Science

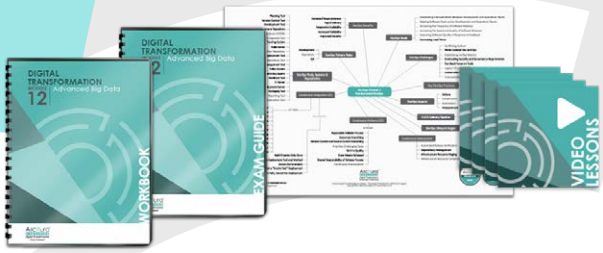
The Digital Transformation: Advanced Data Science course delves into the practical application of contemporary data science techniques and algorithms.

COURSE MODULE OUTLINES

The Digital Transformation: Advanced Data Science course is comprised of the following course modules. Outlines for these course modules are provided on the subsequent pages.

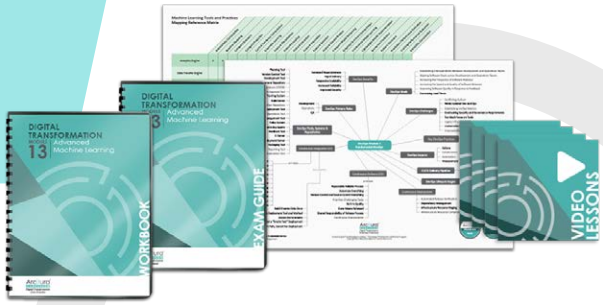
MODULE 12

Advanced Big Data Analysis & Analytics



MODULE 13

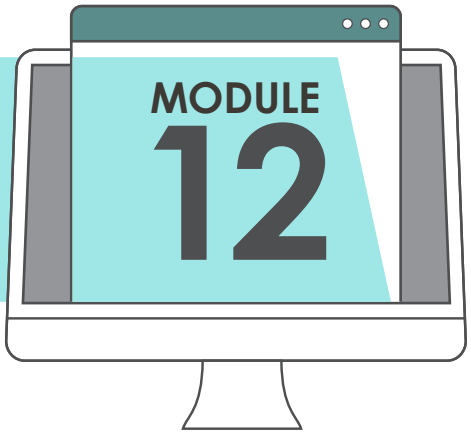
Advanced Machine Learning



MODULE 14

Advanced AI

Advanced Big Data Analysis & Analytics

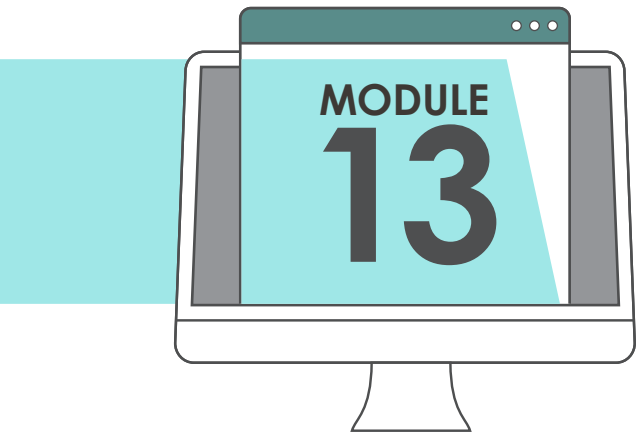


This course module provides an in-depth overview of essential and advanced topic areas pertaining to data science and analysis techniques relevant and unique to Big Data with an emphasis on how analysis and analytics need to be carried out individually and collectively in support of the distinct characteristics, requirements and challenges associated with Big Data datasets.

The following primary topics are covered:

- Exploratory Data Analysis, Essential Statistics, including Variable Categories and Relevant Mathematics
- Statistics Analysis, including Descriptive, Inferential, Covariance, Hypothesis Testing, etc.
- Measures of Variation or Dispersion, Interquartile Range & Outliers, Z-Score, etc.
- Probability, Frequency, Statistical Estimators, Confidence Interval, etc.
- Variables and Basic Mathematical Notations, Statistical Measures and Statistical Inference
- Confirmatory Data Analysis (CDA)
- Data Discretization, Binning and Clustering
- Visualization Techniques, including Bar Graph, Line Graph, Histogram, Frequency Polygons, etc.
- Prediction Linear Regression, Mean Squared Error and Coefficient of Determination R2, etc.
- Numerical Summaries, Modeling, Model Evaluation, Model Fitting and Model Overfitting
- Statistical Models, Model Evaluation Measures
- Cross-Validation, Bias-Variance, Confusion Matrix and F-Score
- Association Rules and Apriori Algorithm
- Data Reduction, Dimensionality Feature Selection
- Feature Extraction, Data Discretization (Binning and Clustering)
- Parametric vs. Non-Parametric, Clustering vs. Non-Clustering
- Distance-Based, Supervised vs. Semi-Supervised
- Linear Regression and Logistic Regression for Big Data
- Logistics Regression, Naïve Bayes, Laplace Smoothing, etc.
- Decision Trees for Big Data
- Pattern Identification, Association Rules, Apriori Algorithm
- Time Series Analysis, Trend, Seasonality, K Nearest Neighbor (kNN), K-means
- Text Analytics for Big Data and Outlier Detection for Big Data
- Statistical, Distance-Based, Supervised and Semi-Supervised Techniques

Advanced Machine Learning

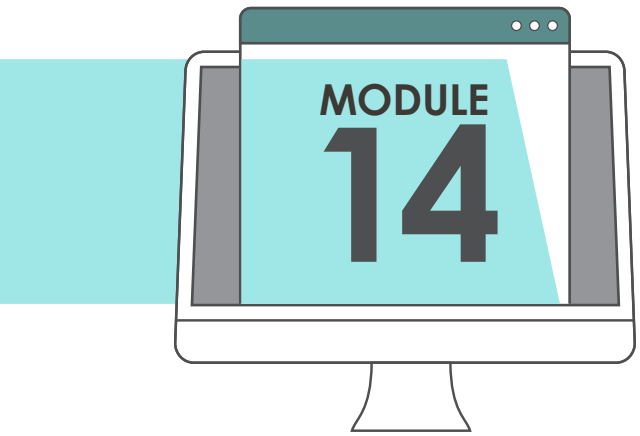


This course module delves into the many algorithms, methods and models of contemporary machine learning practices to explore how a range of different business problems can be solved by utilizing and combining proven machine learning techniques.

The following primary topics are covered:

- Data Exploration Patterns
- Central Tendency Computation, Variability Computation
- Associativity Computation, Graphical Summary Computation
- Data Reduction Patterns
- Feature Selection, Feature Extraction
- Data Wrangling Patterns
- Feature Imputation, Feature Encoding
- Feature Discretization, Feature Standardization
- Supervised Learning Patterns
- Numerical Prediction, Category Prediction
- Unsupervised Learning Patterns
- Category Discovery, Pattern Discovery
- Model Evaluation Patterns, Baseline Modeling
- Training Performance Evaluation, Prediction Performance Evaluation
- Model Optimization Patterns
- Ensemble Learning, Frequent Model Retraining
- Lightweight Model Implementation, Incremental Model Learning

Advanced AI



This course module covers a series of practices for preparing and working with data for training and running contemporary AI systems and neural networks. It further provides techniques for designing and optimizing neural networks, including approaches for measuring and tuning neural network model performance. The practices and techniques are documented as design patterns that can be applied individually or in different combinations to address a range of common AI system problems and requirements. The patterns are further mapped to the learning approaches, functional areas and neural network types that were introduced in Module 11: Fundamental Artificial Intelligence.

The following primary topics are covered:

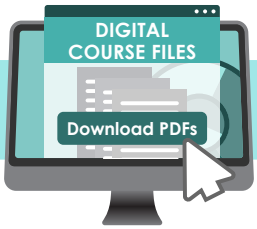
- Data Wrangling Patterns for Preparing Data for Neural Network Input
- Feature Encoding for Converting Categorical Features
- Feature Imputation for Inferring Feature Values
- Feature Scaling for Training Datasets with Broad Features
- Text Representation for Converting Data while Preserving Semantic and Syntactic Properties
- Dimensionality Reduction to Reduce Feature Space for Neural Network Input
- Supervised Learning Patterns for Training Neural Network Models
- Supervised Network Configuration for Establishing the Number of Neurons in Network Layers
- Image Identification for using a Convolutional Neural Network
- Sequence Identification for using a Long Short Term Memory Neural Network
- Unsupervised Learning Patterns for Training Neural Network Models
- Pattern Identification for Visually Identifying Patterns via a Self Organizing Map
- Content Filtering for Generating Recommendations
- Model Evaluation Patterns for Measuring Neural Network Performance
- Training Performance Evaluation for Assessing Neural Network Performance
- Prediction Performance Evaluation for Predicting Neural Network Performance in Production
- Baseline Modeling for Assessing and Comparing Complex Neural Networks
- Model Optimization Patterns for Refining and Adapting Neural Networks
- Overfitting Avoidance for Tuning a Neural Network
- Frequent Model Retraining for Keeping a Neural Network in Synch with Current Data
- Transfer Learning for Accelerating Neural Network Training

TRAINING AND EXAM PREPARATION RESOURCES

You can supplement this course with a number of available resources to assist with both learning and exam preparation. Contact info@arcitura.com with any questions.

Certification Exam Prep Kit

A set of additional practice questions is available to support exam preparation.



Digital Course Files

For each course you can order a set of downloadable digital course materials comprised of printable, watermarked workbook and poster PDF files.

Printed Course Materials

The printed workbooks and posters for each course can be ordered in B&W and full-color, and can be shipped worldwide.

One-on-One Coaching

Certified Trainers are available to provide online coaching on an hourly basis and in all time zones.

Instructor-Led Training

Certified Trainers are available to provide virtual and onsite training workshops for this and other Arcitura courses.

DIGITAL TRANSFORMATION PROFESSIONAL ACADEMY

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COURSES	Digital Transformation	Digital Transformation: Fundamental Technology	Digital Transformation: Advanced Technology & Architecture	Digital Transformation: Fundamental Data Science	Digital Transformation: Advanced Data Science	Digital Transformation: Fundamental Security	Digital Transformation: Advanced Security	Digital Transformation: Fundamental Intelligent Automation	Digital Transformation: Advanced Intelligent Automation
CERTIFICATIONS	**Digital Transformation Specialist**	**Digital Transformation Technology Professional**	**Digital Transformation Technology Architect**	**Digital Transformation Data Science Professional**	**Digital Transformation Data Scientist**	**Digital Transformation Security Professional**	**Digital Transformation Security Specialist**	**Digital Transformation Intelligent Automation Professional**	**Digital Transformation Intelligent Automation Specialist**
MODULE 01 Fundamental Digital Transformation	●	○	○	○	○	○	○	○	○
MODULE 02 Digital Transformation in Practice	●	○	○	○	○	○	○	○	○
MODULE 03 Fundamental Cloud Computing		●	○						
MODULE 04 Fundamental Blockchain		●	○			●	○		
MODULE 05 Fundamental IoT		●	○						
MODULE 06 Cloud Architecture			●						
MODULE 07 Blockchain Architecture			●				●		
MODULE 08 IoT Architecture			●						
MODULE 09 Fundamental Big Data Analysis & Analytics				●	○				
MODULE 10 Fundamental Machine Learning				●	○				
MODULE 11 Fundamental AI				●	○				
MODULE 12 Advanced Big Data Analysis & Analytics					●				
MODULE 13 Advanced Machine Learning					●				
MODULE 14 Advanced AI					●				
MODULE 15 Fundamental Cybersecurity						●	○		
MODULE 16 Advanced Cybersecurity							●		
MODULE 17 Fundamental RPA								●	○
MODULE 18 Advanced RPA & Intelligent Automation									●
MODULE 19 Fundamental AI Decisioning								●	○
MODULE 20 Advanced AI Decisioning									●

Gray circles indicate prerequisite modules.

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	COURSES	DevOps	Blockchain Architecture	IoT Architecture	Cybersecurity	Robotic Process Automation	Digital Business Technology	Containerization Architecture	Quantum Computing
	CERTIFICATIONS	DevOps Specialist	Blockchain Architect	IoT Architect	Cybersecurity Specialist	RPA Specialist	Digital Business Technology Professional	Containerization Architect	Quantum Computing Specialist
DevOps	MODULE 01 Fundamental DevOps	●							
	MODULE 02 DevOps in Practice	●							
	MODULE 03 DevOps Lab	●							
Blockchain	MODULE 01 Fundamental Blockchain		●						
	MODULE 02 Blockchain Technology & Architecture		●						
	MODULE 03 Blockchain Technology & Architecture Lab		●						
Internet of Things	MODULE 01 Fundamental IoT			●					
	MODULE 02 IoT Technology & Architecture			●					
	MODULE 03 IoT Technology & Architecture Lab			●					
Cybersecurity	MODULE 01 Fundamental Cybersecurity				●				
	MODULE 02 Advanced Cybersecurity				●				
	MODULE 03 Cybersecurity Lab				●				
Robotic Process Automation	MODULE 01 Fundamental RPA					●			
	MODULE 02 Advanced RPA & Intelligent Automation					●			
	MODULE 03 RPA Lab					●			
Digital Business Technology	MODULE 01 Business Automation Technology Overview						●		
	MODULE 02 Data Science Technology Overview						●		
	MODULE 03 Digital & Security Technology Overview						●		
Containerization	MODULE 01 Fundamental Containerization							●	
	MODULE 02 Containerization Technology & Architecture							●	
	MODULE 03 Containerization Technology & Architecture Lab							●	
Quantum Computing	MODULE 01 Fundamental Quantum Computing								●
	MODULE 02 Advanced Quantum Computing								●
	MODULE 03 Quantum Computing Lab								●

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NEXT-GEN DATA SCIENCE ACADEMY

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COURSES	Big Data Analytics & Fundamental Data Science	Big Data Analysis & Advanced Data Science	Data Science Professional Consulting	Machine Learning	Artificial Intelligence	Big Data Engineering	Big Data Architecture	Data Science Governance	AI Decisioning
CERTIFICATIONS	**Big Data Science Professional**	**Big Data Scientist**	**Data Science Consultant**	**Machine Learning Specialist**	**Artificial Intelligence Specialist**	**Big Data Engineer**	**Big Data Architect**	**Data Science Governance Specialist**	**AI Decisioning Specialist**
MODULE 01 Fundamental Big Data Science & Analytics	●	○	○			○	○	○	○
MODULE 02 Big Data Analysis & Technology Concepts	●	○	○			○	○	○	○
MODULE 03 Big Data Analysis & Technology Lab	●		○						
MODULE 04 Big Data Analysis & Science		●							
MODULE 05 Advanced Big Data Analysis & Science		●							
MODULE 06 Big Data Analysis & Science Lab		●							
MODULE 07 Fundamental Machine Learning			●	●					
MODULE 08 Advanced Machine Learning				●					
MODULE 09 Machine Learning Lab				●					
MODULE 10 Fundamental Artificial Intelligence			●		●				
MODULE 11 Advanced Artificial Intelligence					●				
MODULE 12 Artificial Intelligence Lab					●				
MODULE 13 Fundamental Big Data Engineering						●			
MODULE 14 Advanced Big Data Engineering						●			
MODULE 15 Big Data Engineering Lab						●			
MODULE 16 Fundamental Big Data Architecture							●		
MODULE 17 Advanced Big Data Architecture							●		
MODULE 18 Big Data Architecture Lab							●		
MODULE 19 Fundamental Data Science Governance for Big Data, Machine Learning & AI								●	
MODULE 20 Advanced Data Science Governance for Big Data, Machine Learning & AI								●	
MODULE 21 Data Science Governance Lab for Big Data, Machine Learning & AI								●	
MODULE 22 Fundamental AI Decisioning									●
MODULE 23 Advanced AI Decisioning									●
MODULE 24 AI Decisioning Lab									●

Gray circles indicate prerequisite modules.

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COURSES	Cloud Computing	Cloud Computing Professional Consulting	Cloud Architecture	Cloud Security	Cloud Governance	Cloud Storage	Cloud Virtualization
CERTIFICATIONS	Cloud Technology Professional	Cloud Computing Consultant	Cloud Architect	Cloud Security Specialist	Cloud Governance Specialist	Cloud Storage Specialist	Cloud Virtualization Specialist
MODULE 01 Fundamental Cloud Computing	●	○	○	○	○	○	○
MODULE 02 Cloud Technology Concepts	●	○	○	○	○	○	○
MODULE 03 Cloud Technology Lab	●	○					
MODULE 04 Fundamental Cloud Architecture		●	●				
MODULE 05 Advanced Cloud Architecture			●				
MODULE 06 Cloud Architecture Lab			●				
MODULE 07 Fundamental Cloud Security		●		●			
MODULE 08 Advanced Cloud Security				●			
MODULE 09 Cloud Security Lab				●			
MODULE 10 Fundamental Cloud Governance					●		
MODULE 11 Advanced Cloud Governance					●		
MODULE 12 Cloud Governance Lab					●		
MODULE 13 Fundamental Cloud Storage						●	
MODULE 14 Advanced Cloud Storage						●	
MODULE 15 Cloud Storage Lab						●	
MODULE 16 Fundamental Cloud Virtualization							●
MODULE 17 Advanced Cloud Virtualization							●
MODULE 18 Cloud Virtualization Lab							●

Gray circles indicate prerequisite modules.

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SERVICE TECHNOLOGY SCHOOL

Arcitura DIGITAL

COURSES	Fundamental Microservices & Service Technology	Fundamental SOA Design with Services & Microservices	SOA Analysis & Modeling with Services & Microservices	SOA Design & Architecture with Services & Microservices	Microservice Design & Architecture	Microservice Professional Consulting	Service API Design & Management	Service Governance & Project Delivery	Security for Microservices & SOA
CERTIFICATIONS	**Microservice Professional**	**SOA Professional**	**SOA Analyst**	**SOA Architect**	**Microservice Architect**	**Microservice Consultant**	**Service API Specialist**	**Service Governance Specialist**	**Service Security Specialist**
MODULE 01 Fundamental SOA, Services & Microservices	●	●	○	○	○	○	○	○	○
MODULE 02 Microservice Technology Concepts	●			○	○	○	○		○
MODULE 03 Design & Architecture with SOA, Services & Microservices		●	○	●				○	
MODULE 04 Fundamental SOA Analysis & Modeling with Services & Microservices			●						
MODULE 05 Advanced SOA Analysis & Modeling with Services & Microservices			●						
MODULE 06 SOA Analysis & Modeling Lab with Services & Microservices			●						
MODULE 07 Advanced SOA Design & Architecture with Services & Microservices				●					
MODULE 08 SOA Design & Architecture Lab with Services & Microservices				●					
MODULE 09 Fundamental Microservice Architecture & Containerization					●	●			
MODULE 10 Advanced Microservice Architecture & Containerization					●				
MODULE 11 Microservice Architecture & Containerization Lab					●				
MODULE 12 Fundamental Service API Design & Management						●	●		
MODULE 13 Advanced Service API Design & Management							●		
MODULE 14 Service API Design & Management Lab							●		
MODULE 15 Fundamental Service Governance & Project Delivery								●	
MODULE 16 Advanced Service Governance & Project Delivery								●	
MODULE 17 Service Governance & Project Delivery Lab								●	
MODULE 18 Fundamental Security for Services, Microservices & SOA						●			●
MODULE 19 Advanced Security for Services, Microservices & SOA									●
MODULE 20 Security Lab for Services, Microservices & SOA									●

Gray circles indicate prerequisite modules.

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