Markham Training Course Guide

All the information you need in one place to make an informed training selection.

GE Grid Solutions l Grid Automation Learning & Development

Markham Training Course Guide

Welcome to our integrated learning program, its aim is to provide a flexible learning methodology to learn all about our products, services and protection and control solutions offerings in creating protection and control schemes.

We cover all our protection and automation devices and protection elements including IEC 61850, HardFiber, Cyber Security and much more.

Our objective is not to simply look at specific products, but look more towards integrated systems and so while the program starts off with building product knowledge. This is only done so that we are building a knowledge foundation upon which to build out integrated systems capability.

Learning is done through a blend of e-learning modules, virtual classroom sessions and practical workshops with knowledge testing throughout.

Page numbers at right are clickable hyperlinks to take you to key pages quickly.

Welcome to Learning & Development

Lets Start With Some Useful Information

What is being offered and when? Visit our website.

It is a useful place to find more information about our training offerings including other course guides etc. You can also download our Curriculum Guide from there.

http://www.gegridsolutions.com/multilin/support/training/

Where can I buy a seat? Visit our online store.

Where you can view standard course schedule and purchase a seat/s on a specific course.

http://store.gedigitalenergy.com/TrainingCourses.asp
http://store.gegridsolutions.com/Training/TrainingCourses.aspx

Need to access free learning videos? Visit our YouTube channels.

Did you know that we have a dedicated You Tube channel where you can find e-learning training videos at no cost. Here you can find how2 videos, training webinars and training course modules for self learning.

http://www.youtube.com/GEgridautomationLD

Where do I find resource info? Visit our resources page.

Did you know here you can find a multitude of useful resources to assist your learning about our products services and solutions.

http://www.gegridsolutions.com/resources.htm

Contact Us

Need more information, have questions about our offerings, want to follow up with us on any training related issue, then contact us through our training email.

training.multilin@ge.com

What type of training is offered by GE?

- no cost training videos are available on our youtube channels
- standard schedule courses are available to book on the online store
- on demand courses at your place or ours, email: training.multilin@ge.com
- try our virtual classroom sessions (remote learning)
- try one of our certification programs - visit our online store

Certification Programs offer the greatest learning value!

Need more than a classical classroom session then try one of our programs. Programs are based upon bended learning, combining;

- e-learning modules
- virtual classroom sessions
- assessment and testing
- intense workshop hands on sessions
- programs typically incorporate over 200 hours of training

Grid IQ Learning Center's - *Discover the Difference*

Did you know?

That our Learning Centers have state of the art technology and learning material to allow the student to receive a rich learning experience, using smart boards, hands on workshop equipment, telepresence and digital device technologies.

Smart Board Technology

Virtual Class Technology

Workshop Technology

Learning & Development

Our training courses are constantly evolving. The future is built around learning events with material built to suit a wide range of students and delivery methods whether they be maintenance personnel, engineers or consultants. No matter what your background or depth of understanding or need we can deliver training that works for you. You can take separate learning modules or combine them, it's your choice, or you can take one of our programs such as UR Platform and 8 Series Essentials, which combines learning modules, virtual classroom sessions and practical workshops.

Why are we evolving, training delivery

- Training is only a vehicle to assist learning
- Training is a transactional activity, it does not create expertise alone, attendance at a class simply stimulates the desire to learn and build your expertise.
- Expertise comes through the desire to learn and the quality of the learning experience created through learning resources and delivery methods, the key being practical application of taught principles and concepts.

What are we doing to improve

- Continuously improve the quality of our training content and training delivery methods.
- Seek to build skills through active learning, reinforced with assessment tests as we go.
- Evolve in how we execute training, using flexible blended learning offerings as integrated training programs.
- Use all available technology to improve the learning experience.
- Leverage social media wherever possible.

"I never teach my pupils, I only attempt to provide the conditions in which they can learn".

"everything should be made as simple as possible, but not simpler."
Albert Einstein

Improving the Learning Experience

Self-Paced

Accommodates a self-study approach to training for individuals who prefer to learn at their own pace and without the presence of an instructor.

eLearning
Training content comprising of how2 videos, recorded webinars and training e-modules

Instructor Led

Designed for those who prefer attending courses in a classroom or similar environment facilitated by an experienced instructor while learning amongst a group of peers who share the same goal.

Webinars
Designed for those who are interested in gaining further knowledge regarding our products and theory based modules, our live webinars offers students the opportunity of attending our online sessions to discuss specific topics with a live instructor.

Virtual Classroom
Stay seated and connect with your peers through our virtual class room sessions. These sessions are facilitated by a live instructor, allowing you the opportunity of reaching out throughout your learning.

Classroom
Whether you are interested in attending classes at our GE Learning Centers, or preferred location of your choice, our facilitators provide a learning experience like no other. Students are able to expand their knowledge in an environment conducive to learning.

Rethinking how education is delivered

Redefining how learning is achieved

Virtual Courses

How It Works

Each **Virtual Course** uses e-learning self paced course work, virtual class sessions and on-line testing of what you have learned. These courses are prerequisites for attending any of our workshop sessions that we offer.

Course Structure

Virtual Classroom

- getting started and setting expectation session

eLearning

- student complete self pace course work
- uses e-learn playlist

Test

- course work testing of knowledge

Virtual Classroom

- interactive learning
- walk through e-learn content
- demonstration activities
- group discussions
- practical exercises

Test

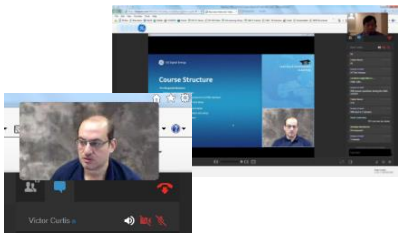
- final program testing
- course certificate

Course Tools

To aid learning we provide access to various tools:

Virtual Classroom

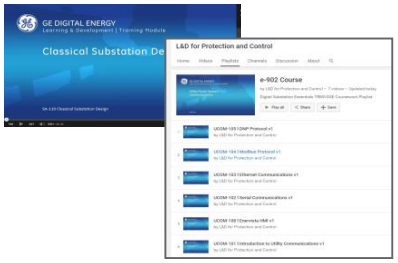
Classes can be run for a minimum of 8 persons and subject to content can be run for groups up to 25.



These are interactive sessions using GE video conferencing technology. All you need is a good internet connection, computer, web cam and microphone.

eLearning

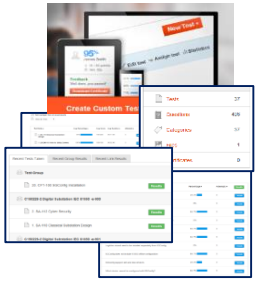
e-learning modules are video based learning they are compiled into playlists for courses with links provided.



Watch and learn as we take you on a step by step journey through the subject. All that is needed is an internet connection.

Testing

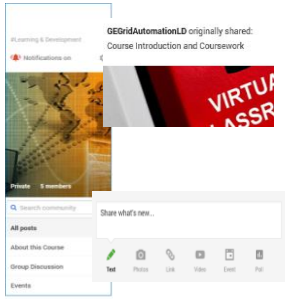
All our paid courses offer student assessment and testing.



Successful completion leads to issuance of a certificate that provides course abstract, level of attainment and number of learning hours.

Collaboration

Enter our course collaboration tool, communicate with your instructor and your peers.



Have a question... ask!
See a question you know the answer… share!.

The goal is to learn together.

Learning Programs

Learning programs, blend together e-learning, virtual classroom sessions and face to face workshops. All elements have on-line assessment testing. To attend you must have completed all the prerequisites needed.

Course Structure

Virtual Class #1
getting started & setting expectation session

elearning & **Testing**
student complete self pace course work and knowledge testing

Virtual Class #2
discuss progress, Q&A session & plan for workshop

Workshop
3-5 days Hands on workshop

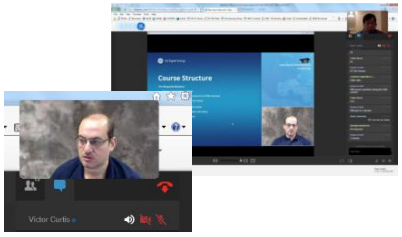
Testing
coursework testing final program test

Virtual Class #3
wrap up final Q&A etc.

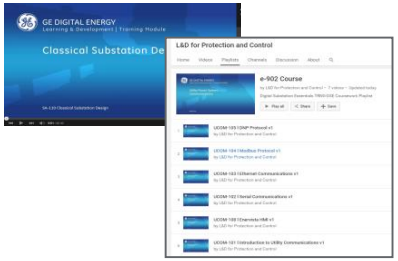
Course Tools

All used in virtual classroom sessions

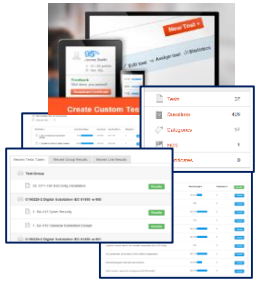
Virtual Classroom



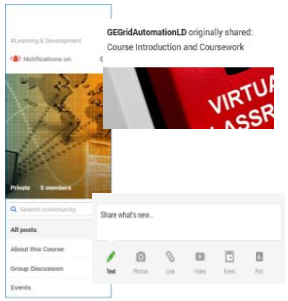
eLearning



Test



Collaboration



Key Attributes

The UR and 8Series course programs build on the content learned in the virtual class offerings and move into system integration of GE products to create customer solution.

The students will practice the basic configurations of the relays in the first two days or four days, then in the last day will create one capstone project to use the knowledges learnt in previous exercises.

At the end of each course the student will have a greater understanding on the programming and operation of the UR and 8Series relays. Application Labs will allow the students to apply and hone their skills on these relays.

Both courses starts with e-learning coursework and testing, and then a hands-on face to face workshop.

Throughout the course students are encouraged to collaborate with the instructor and their peers through the collaboration tool.

Its all about learning, it is much more than a training course!

Course Code | TRNG-UR8S - Universal Relay and 8 Series Essentials

note 1: timeline is generic may vary dependent on scheduling logistics

who should attend

Engineering Staff within electrical utility, industrials & system integrators who need to design protection and control systems using GE products in non- 61850 and 61850 configurations.

learning outcome

Build a knowledge and understanding of UR and 8 Series hardware, software and configuration and its application within the smart grid.

Application Labs will give the students an opportunity to apply their knowledge.

prerequisites

TRNG-FMPRV course is highly recommended or with certain UR & 8 Series working experiences.

workshop hardware needs

All equipment is provided as part of the workshop.

what's covered

- Hardware
- Enervista software
- Diagnostic Tools
- I/O Configuration
- Protection Elements
- FlexLogic
- IEC61850
- Capstone project

learning contact hours

E-learn: (playlist e-954)	6 hours
Workshop:	40 hours
Testing:	2 hours
Total :	**48 hours**

Learning contact hours quoted are our estimate of time to complete, actual is very much dependent on students prior knowledge.

timeline note 1

Registration Deadline

8 weeks prior to workshop

course notices sent out

7 weeks prior to workshop

virtual class 1

6 weeks prior to workshop

complete: e-learning

2 week prior to workshop

Virtual Class 2

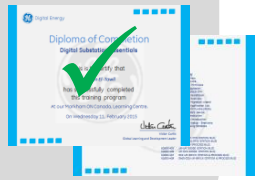
1 week prior to workshop

Workshop

week zero

Virtual Class 3

2 weeks after workshop



e-learning playlist | e-952 & e-953

Module	Name	Module	Name
UR-100	UR Platform Overview	8SP-100	8 Series Relay Overview
UR-101	UR Platform Hardware	8SP-101	8 Series Hardware
UR-102	UR Platform Software	8SP-102	8 Series Software Inteface
UR-103	UR Platform FlexLogic	8SP-103	S Series Software Setpoints
UR-104	UR Platform Protection	8SP-104	8 Series Protections
UR-107	UR Platform IEC61850 ed2	8SP-105	8 Series Control & Monitoring
UR-110	UR Platform AC Input Configuration	8SP-106	8 Series FlexLogic
UR-118	Graphical Front Panel	8SP-107	8 Series IEC61850 Configurator
UR-140	UR7.0 Release Introduction		
UR-141	UR7.3 Release Introduction		

TRNG-UR8S Essentials | Practical Workshop

Workshop

Prerequisites

Students **MUST** complete all course work and successfully pass the prerequisite assessment test for each course module assigned.

Learning Objective

On completion of the Practical Workshop students should be able to identify, assemble, integrate and operate configure UR and 8 series relays where they can then hone their skills through further applications.

In addition to the exercise each module comes with an assessment test.

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
UR-401 | Initial Setup	UR-405 | Protection Summary	8SP-401 | Hardware Setup	8SP-405 | Controls and Monitoring	Capstone Project Examples : Interlock Scheme Breaker Simulator with 50BF Auto Reclose Scheme Breaker Fail Transfer Trip Main Tie Main Bus Scheme
UR-402 | Diagnostic Setup	UR-406 | FlexLogic	8SP-402 | Software Interface	8SP-406 | FlexLogic	
UR-403 | Inputs & Outputs	UR-408 | v7.2-IEC61850 or UR-414 | IEC61850 Ed 2	8SP-403 | Generic Settings	8SP-407 | IEC61850	
UR-404 | Metering	61850-420 l UR-8S GOOSE	8SP-404 | Protection Functions	8SP-408 | SLD Editor	

legend

practical exercise

classroom taught

Course Note

Workshop activities are a mix of video based, written and demonstration instruction, followed by student hands on activities.

The detailed content of each module is introduced on page 24-26.

Learning content is provided on a digital device.

Protection & Control

Course Delivery Offerings | Workshop

Course Code | TRNG-UR - Universal Relay Essentials

note 1: timeline is generic may vary dependent on scheduling logistics

who should attend

Engineering Staff within electrical utility, industrials & system integrators who need to design protection and control systems using GE products in non- 61850 and 61850 configurations.

learning outcome

Build a knowledge and understanding of the UR hardware, software and configuration and its application within the smart grid.

Application Labs will give the students an opportunity to apply their knowledge.

prerequisites

TRNG-FMPRV virtual course is highly recommended or with certain UR working experiences.

workshop hardware needs

All equipment is provided as part of the workshop.

what's covered

- Diagnostic Tools
- I/O Configuration
- Protection Elements
- FlexLogic
- IEC61850
- Application design
- Integration

learning contact hours

E-learn: (playlist e-952)	6 hours
Workshop:	24 hours
Testing:	2 hours
Total :	**32 hours**

Learning contact hours quoted are our estimate of time to complete, actual is very much dependent on students prior knowledge.

timeline note 1

Registration Deadline

8 weeks prior to workshop

course notices sent out

7 weeks prior to workshop

virtual class 1

6 weeks prior to workshop

complete: e-learning

2 week prior to workshop

Virtual Class 2

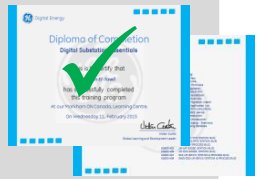
1 week prior to workshop

Workshop

week zero

Virtual Class 3

2 weeks after workshop



e-learning playlist | e-952

Module	Name
UR-100	UR Platform Overview
UR-101	UR Platform Hardware
UR-102	UR Platform Software
UR-103	UR Platform FlexLogic
UR-104	UR Platform Protection
UR-107	UR Platform IEC61850 ed2
UR-110	UR Platform AC Input Configuration
UR-118	Graphical Front Panel
UR-140	UR7.0 Release Introduction
UR-141	UR7.3 Release Introduction

TRNG-UR Essentials | Practical Workshop

Prerequisites

Students **MUST** complete all course work and successfully pass the prerequisite assessment test for each course module assigned.

Learning Objective

On completion of the Practical Workshop students should be able to identify, assemble, integrate and operate configure UR relays where they can then hone their skills through further applications.

In addition to the exercise each module comes with an assessment test and final exam on the last day.

MONDAY	TUESDAY	WEDNESDAY
UR-401 | Initial Setup	UR-405 | Protection Summary	Capstone Project Examples : Interlock Scheme Breaker Simulator with 50BF Auto Reclose Scheme Breaker Fail Transfer Trip
UR-402 | Diagnostic Setup	UR-406 | FlexLogic	
UR-403 | Inputs & Outputs	UR-408 | v7.2-IEC61850 or UR-414 | IEC61850 Ed 2	
UR-404 | Metering		

Legend

practical exercise

classroom taught

Course Note

Workshop activities are a mix of video based, written and demonstration instruction, followed by student hands on activities.

The detailed content of each module is introduced on page 24.

Learning content is provided on a digital device.

Protection & Control

Course Code | TRNG-8S - 8 Series Essentials

Course Delivery Offerings | Workshop

note 1: timeline is generic may vary dependent on scheduling logistics

who should attend

Engineering Staff within electrical utility, industrials & system integrators who need to design protection and control systems using GE products in non- 61850 and 61850 configurations.

learning outcome

Build a knowledge and understanding of the product hardware, software and configuration and its application within the smart grid.

Application Labs will give the students an opportunity to apply their knowledge.

prerequisites

TRNG-FMPRV virtual course is highly recommended or with certain 8 Series relay working experiences.

workshop hardware needs

All equipment is provided as part of the workshop.

what's covered

- Diagnostic Tools
- I/O Configuration
- Protection Elements
- FlexLogic
- IEC61850
- Application design
- Integration

learning contact hours

E-learn: (playlist e-953)	6 hours
Workshop:	24 hours
Testing:	2 hours
Total:	**32 hours**

Learning contact hours quoted are our estimate of time to complete, actual is very much dependent on students prior knowledge.

timeline note 1

Registration Deadline

8 weeks prior to workshop

course notices sent out

7 weeks prior to workshop

virtual class 1

6 weeks prior to workshop

complete: e-learning

2 week prior to workshop

Virtual Class 2

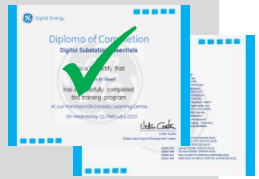
1 week prior to workshop

Workshop

week zero

Virtual Class 3

2 weeks after workshop



e-learning playlist | e-953

Module	Name
8SP-100	8 Series Relay Overview
8SP-101	8 Series Hardware
8SP-102	8 Series Software Inteface
8SP-103	S Series Software Setpoints
8SP-104	8 Series Protections
8SP-105	8 Series Control & Monitoring
8SP-106	8 Series FlexLogic
8SP-107	8 Series IEC61850 Configurator

Prerequisites

Students **MUST** complete all course work and successfully pass the prerequisite assessment test for each course module assigned.

Learning Objective

On completion of the Practical Workshop students should be able to identify, assemble, integrate and operate configure 8 series relays where they can then hone their skills through further applications.

In addition to the exercise each module comes with an assessment test and final exam on the last day.

MONDAY	TUESDAY	WEDNESDAY
8SP-401 | Hardware Setup	8SP-405 | Controls and Monitoring	Capstone Project Examples : Interlock Scheme Breaker Simulator with 50BF Auto Reclose Scheme Breaker Fail Transfer Trip Main Tie Main Bus Scheme
8SP-402 | Software Interface	8SP-406 | FlexLogic	
8SP-403 | Generic Settings	8SP-407 | IEC61850	
8SP-404 | Protection Functions	8SP-408 | SLD Editor	

Legend

practical exercise

classroom taught

Course Note

Workshop activities are a mix of video based, written and demonstration instruction, followed by student hands on activities.

The detailed content of each module is introduced on page 26.

Learning content is provided on a digital device.

Protection & Control

Course Delivery Offerings | Workshop

note 1: timeline is generic may vary dependent on scheduling logistics

Course Code | TRNG-MTDT - Motors and Distribution Essentials

who should attend

Engineering Staff within electrical utility, industrials & system integrators who need to design protection and control systems using GE products in non- 61850 and 61850 configurations.

learning outcome

Build a knowledge and understanding of the product hardware, software and configuration and its application within the smart grid.

Application Labs will give the students an opportunity to apply their knowledge.

prerequisites

TRNG-FMPRV is highly recommended to attend.

workshop hardware needs

All equipment is provided as part of the workshop.

what's covered

ANSI Device Elements for:

- Transformer Protection
- Generator Protection
- Motor Protection
- Feeder protection
- Busbar Protection

learning contact hours

Virtual class 1:	1 hour (intro session)
E-learn: (playlist e-957)	10 hours
Virtual class 2:	2 hours
Workshop:	40 hours
Testing:	2 hours
Virtual class 3:	2 hours
Total :	**57 hours**

E- Learning hours depends on the selection of the videos, it maybe longer or shorter than 10 hours.

timeline note 1

Registration Deadline

8 weeks prior to workshop

course notices sent out

7 weeks prior to workshop

virtual class 1

6 weeks prior to workshop

complete: e-learning

2 week prior to workshop

Virtual Class 2

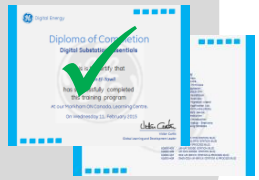
1 week prior to workshop

Workshop

week zero

Virtual Class 3

2 weeks after workshop



e-learning playlist | e-954 and/or 952/953/960 depends on the relay selected

Module	Name
SR-103	369 Motor Protection Hardware
SR-104	369 Motor Protection Software
SR-105	469 Motor Protection Hardware
SR-106	469 Motor Protection Software
SR-107	750 Feeder Protection Hardware
SR-108	750 Feeder Protection Software
SR-109	745 Transformer Protection Hardware
SR-110	745 Transformer Protection Software
SR-111	489 Hardware
SR-112	489 Software

Module	Name
3SP-100	3 Series Relay Overview
3SP-101	3 Series Hardware
3SP-102	3 Series Relay Software
3SP-103	3 Series Platform Elements
3SP-104	350 Feeder Protection
3SP-105	339 Motor Protection
3SP-106	345 Transformer Protection
3SP-107	3 Series IEC 61850

TRNG-MTDT Essentials | Practical Workshop

Workshop

Prerequisites

Students **MUST** complete all course work and successfully pass the prerequisite assessment test for each course module assigned.

Learning Objective

On completion of the Practical Workshop students should be able to identify, assemble, integrate and operate small scale substation solutions from where they can then hone their skills though further application.

In addition to the exercise each module comes with an assessment test and final exam on the last day.

MONDAY | TUESDAY | WEDNESDAY | THURSDAY | FRIDAY

This course is a free form style: after complying with the prerequisites and completing the course work students come to the workshop and complete 6-8 out of 22 relay modules and at least 1 integration exercise for successful course completion.

Distribution

- 489/889/G60 Generator Protection
- D60/L90 Line Protection
- UR-420 | B30 Bus Protection
- 350 /750/850/F60/P14D Feeder Protection
- 345/745/845/T60 Transformer Protection
- F650 Bay Controller

Motors

- 3SR-404 | 339 Motor Protection
- SR-403 | SR369 Motor Protection
- SR-405 | SR469 Motor Protection
- UR-425 | M60 Motor Protection
- 8SP-421 | 869 Motor Protection
- MM-401 | MM series Motor Protection

Integration

- Non 61850 Application Scheme Integration
- 61850 Application Scheme Integration
- 3 phase motor protection and control

Legend

- practical exercise
- classroom taught

Course Note

Workshop activities are a mix of video based, written and instructor demonstrated. followed by student hands on activities.

Learning content is provided on a digital device.

* Students need to decide their workshop relay types when register this course.

Course Code | TRNG-DIST - Distribution Essentials

note 1: timeline is generic may vary dependent on scheduling logistics

who should attend

Engineering Staff within electrical utility, industrials & system integrators who need to design protection and control systems using GE products in non- 61850 and 61850 configurations.

learning outcome

Build a knowledge and understanding of the product hardware, software and configuration and its application within the smart grid.

Application Labs will give the students an opportunity to apply their knowledge.

prerequisites

TRNG-FMPRV is highly recommended to attend.

timeline note 1

Registration Deadline

8 weeks prior to workshop

course notices sent out

7 weeks prior to workshop

virtual class 1

6 weeks prior to workshop

complete: e-learning

2 week prior to workshop

Virtual Class 2

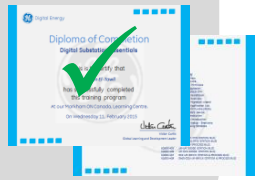
1 week prior to workshop

Workshop

week zero

Virtual Class 3

2 weeks after workshop



workshop hardware needs

All equipment is provided as part of the workshop.

what's covered

ANSI Device Elements for:

- Transformer Protection
- Generator Protection
- Line Protection
- Busbar Protection

Integration Applications:

- IEC61850

learning contact hours

- E-learn: 6 hours (playlist e-958)
- Workshop: 24 hours
- Testing: 2 hours
- **Total : 32 hours**

eLearning hours depends on the selection of the videos, it maybe longer or shorter than 6 hours.

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e-learning playlist | e-954 and/or 952/953/960 depends on the relay selected

Module	Name
SR-103	369 Motor Protection Hardware
SR-104	369 Motor Protection Software
SR-105	469 Motor Protection Hardware
SR-106	469 Motor Protection Software
SR-107	750 Feeder Protection Hardware
SR-108	750 Feeder Protection Software
SR-109	745 Transformer Protection Hardware
SR-110	745 Transformer Protection Software
SR-111	489 Hardware
SR-112	489 Software

Module	Name
3SP-100	3 Series Relay Overview
3SP-101	3 Series Hardware
3SP-102	3 Series Relay Software
3SP-103	3 Series Platform Elements
3SP-104	350 Feeder Protection
3SP-105	339 Motor Protection
3SP-106	345 Transformer Protection
3SP-107	3 Series IEC 61850

Prerequisites

Students **MUST** complete all course work and successfully pass the prerequisite assessment test for each course module assigned.

Learning Objective

On completion of the Practical Workshop students should be able to identify, assemble, integrate and operate small scale substation solutions from where they can then hone their skills though further application.

In addition to the exercise each module comes with an assessment test and final exam on the last day.

MONDAY	TUESDAY	WEDNESDAY

This course is a free form style: after complying with the prerequisites and completing the course work students come to the workshop and complete 2-4 out of 16 relay modules and at least 1 integration exercise for successful course completion.

Distribution

- 489/889/G60 Generator Protection
- D60/L90 Line Protection
- UR-420 | B30 Bus Protection
- 350 /750/850/F60/P14D Feeder Protection
- 345/745/845/T60 Transformer Protection
- F650 Bay Controller

Integration

- Non 61850 Application Scheme Integration
- 61850 Application Scheme Integration

Legend

practical exercise

classroom taught

Course Note

Workshop activities are a mix of video based, written and instructor demonstrated. followed by student hands on activities.

Learning content is provided on a digital device.

* Students need to decide their workshop relay types when register this course.

Protection & Control

Course Delivery Offerings | Workshop

Course Code | TRNG-MTR - Motors Essentials

note 1: timeline is generic may vary dependent on scheduling logistics

who should attend

Engineering Staff within electrical utility, industrials & system integrators who need to design protection and control systems using GE products in non- 61850 and 61850 configurations.

learning outcome

Build a knowledge and understanding of the product hardware, software and configuration and its application within the smart grid.

Application Labs will give the students an opportunity to apply their knowledge.

prerequisites

TRNG-FMPRV is highly recommended to attend.

workshop hardware needs

All equipment is provided as part of the workshop.

what's covered

Configuration and Motor Protection Elements from a selection of GE Multilin Motor Protection Relays.

Integration Applications:

- IEC61850

learning contact hours

• E-learn: (playlist e-959)	6 hours
• Workshop:	24 hours
• Testing:	2 hours
• **Total:**	**32 hours**

E- Learning hours depends on the selection of the videos, it maybe longer or shorter than 6 hours.

timeline note 1

Registration Deadline

8 weeks prior to workshop

course notices sent out

7 weeks prior to workshop

virtual class 1

6 weeks prior to workshop

complete: e-learning

2 week prior to workshop

Virtual Class 2

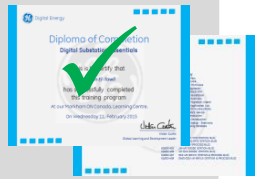
1 week prior to workshop

Workshop

week zero

Virtual Class 3

2 weeks after workshop



e-learning playlist | e-959

Module	Name
SR-103	369 Motor Protection Hardware
SR-104	369 Motor Protection Software
SR-105	469 Motor Protection Hardware
SR-106	469 Motor Protection Software
8SP-121	869 Motor Relay
3SP-105	339 Motor Protection
FMPR-109-1	Motors Protection part 1
FMPR-109-2	Motors Protection part 2
FMPR-109-3	Motors Protection part 3
FMPR-2002	Technical Webinar Motor Protection

TRNG-MTR Essentials | Practical Workshop

Prerequisites

Students **MUST** complete all course work and successfully pass the prerequisite assessment test for each course module assigned.

.

Learning Objective

On completion of the Practical Workshop students should be able to identify, assemble, integrate and operate small scale substation solutions from where they can then hone their skills though further application.

In addition to the exercise each module comes with an assessment test and final exam on the last day.

MONDAY | TUESDAY | WEDNESDAY

This course is a free form style: after complying with the prerequisites and completing the course work students come to the workshop and complete 2-4 out of 6 relay modules, on the last day, the student need to use pickup one of the motor relay and configured to control and protect one GE 1 horsepower 3 phase motor.

Motors

- 3SR-404 | 339 Motor Protection
- SR-403 | SR369 Motor Protection
- SR-405 | SR469 Motor Protection
- UR-425 | M60 Motor Protection
- 8SP-421 | 869 Motor Protection
- MM-401 | MM series Motor Protection

Integration

- 3 phase motor protection and control

Legend

- practical exercise
- classroom taught

Course Note

Workshop activities are a mix of video based, written and instructor demonstrated. followed by student hands on activities.

Learning content is provided on a digital device.

* Students need to decide their workshop relay types when register this course.

TRNG-DSA - IEC61850 Advanced | Practical Workshop

Workshop

Prerequisites

Students **MUST** complete all course work and successfully pass the prerequisite assessment test for each course module assigned.

Learning Objective

On completion of the Practical Workshop students should be able to identify, assemble, integrate and operate small scale substation solutions from where they can then hone their skills though further application.

In addition to the exercise each module comes with an assessment test and final exam on the last day.

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
Networking, Protocols, standards , 61850 fundamentals	MMS, GOOSE, SV, SCL, ICD, CID Configuration	PRP Simulation	Main Tie Main Bus Transfer Scheme	Fast Load Shedding
Gateway, Relay, Merging unit configuration	Digital Substation Simulation	Breaker Failure Transfer Trip Simulation	Main Tie Main Bus Transfer Scheme Simulation	Fast Load Shedding Simulation

Legend

practical exercise

classroom taught

Course Note

Workshop activities are a mix of video based, written and instructor demonstrated. followed by student hands on activities.

Learning content is provided on a digital device.

* Students need to decide their workshop relay types when register this course.

Protection & Control

Course Code | TRNG-URPL - UR Platform

who should attend

Technician and electrician within electrical utility, industrials & system integrators who need to learn the UR hardware, software interface, the setting files download & upload, how to retrieve the events and waveform records, the basic protection elements.
.

learning outcome

Build a knowledge and understanding of the UR hardware, software and configuration and its application within the smart grid.

Application Labs will give the students an opportunity to apply their knowledge.

prerequisites

- Fundamentals of Modern Protective Relaying is highly recommended
- No E-learnings are required for this course.

workshop hardware needs

All equipment is provided as part of the workshop.

what's covered

- Hardware & Software
- Actual Values & Settings
- I/O Configuration
- Protection & Control
- FlexLogic
- IEC61850 or specific UR application

learning contact hours

- 32 hours over 4 days

COURSE CONTENT & TIMING

MONDAY	TUESDAY	WEDNESDAY	THURSDAY
UR Hardware Overview and Exercises	Protections and Exercises	FlexLogic and Exercises	IEC 61850 Overview UR application
EnerVista Software and Exercises	Control and Exercises	Breaker Simulator Exercise and AR test	IEC 61850 Exercises ANSI Device Test

Course Code | TRNG-8SPL - 8 Series Platform

who should attend

Technician and electrician within electrical utility, industrials & system integrators who need to learn the 8 Series hardware, software interface, the setting files download & upload, how to retrieve the events and waveform records, the basic protection elements.
.

learning outcome

Build a knowledge and understanding of the 8 Series hardware, software and configuration and its application within the smart grid.

Application Labs will give the students an opportunity to apply their knowledge.

prerequisites

- Fundamentals of Modern Protective Relaying is highly recommended
- No E-learnings are required for this course.

workshop hardware needs

All equipment is provided as part of the workshop.

what's covered

- Hardware & Software
- Actual Values & Settings
- I/O Configuration
- Protection & Control
- FlexLogic
- IEC61850 or 8 Series Application

learning contact hours

- 32 hours over 4 days

COURSE CONTENT & TIMING

MONDAY	TUESDAY	WEDNESDAY	THURSDAY
8 Series Hardware Overview and Exercises	Protections and Exercises	FlexLogic and Exercises	IEC 61850 Overview
EnerVista Software and Exercises	Control and Exercises	Breaker Simulator Exercise and AR test	IEC 61850 Exercises

Course Code | TRNG-FMPR - Fundamentals of Modern Protective Relaying

who should attend

Managers, Consultants, Engineers and System Integrators responsible for power delivery in either utility or industrial sectors..

learning outcome

Students acquire basic knowledge on the fundamentals of today's technology in various applications.
The objective is to ensure that Students have the basic knowledge to make future GE courses attendance effective.

prerequisites

Basic electrical knowledge, there are no GE course prerequisites.

workshop hardware needs

None

what's covered

- Power System Overview
- Generator Protection
- Transmission Line Protection
- Busbar Protection
- Distribution Protection
- Transformer Protection
- Motor Protection

learning contact hours

- 32 hours over 4 days

COURSE CONTENT & TIMING

MONDAY	TUESDAY	WEDNESDAY	THURSDAY
Power Systems Overview	Generator Protection	Transformer Protection	Feeder Protection
Power System Protection	Busbar Protection	Transmission Line Protection	Motor Protection

Course Code | TRNG-D20 - D20 Fundamentals

Prerequisite

No pre-requisites for this course.
Course is conducted between 8:30 to 3:30 unless agreed otherwise by instructor and students.
Students are expected to complete all lab work to receive certificates.

Learning Objective

On completion of the Practical Workshop students should be able to identify, assembly, integrate and operate D20MX with DNP to a DNP master station. Students will gain knowledge of DNP message and DNP message analysis.

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
D20-101 D20 MX hardware	D20-401 D20 MX Firmware	D20-404 DNP Overview	D20-408 DNP DPA (Data processing configuration) setup	D20-412 DNP Simulation 2 Master with 2 slaves
D20-102 D20 MX Firmware	D20-402 D20 MX Default Config	D20-405 DNP DCA (Data collection application) setup	D20-409 DNP DPA communication link setup	D20-413 DNP Simulation same box setup
D20-103 DSAS Overview	D20-403 D20 MX IO B003 configuration	D20-406 DNP DCA configuration	D20-410 DNP Simulation 1 master with 1 slave	D20-414 DNP message analyzer
D20-104 DSAS D20 Default Configuration	D20-404 D20 MX IO and Wesmaint configuration	D20-407 DNP DCA communication link setup	D20-411 DNP Simulation 1 master with 2 slaves	D20-415 Summary and closeout

Legend

practical exercise

classroom taught

Course Note

D20 elements of course uses DNP Protocol serial connection to devices so protocol messages can easily been seen and allow student to fault find and quickly assimilate the information easily in a classroom environment within the time constraint.

Students are then able to apply this to Ethernet systems and other protocols and applications, using the relevant documentation.

Automation

Course Code | TRNG-D25, D25 Fundamentals

Prerequisites

No pre-requisites for this course.
Course is conducted between 8:30 to 3:30 unless agreed otherwise by instructor and students.
Students are expected to complete all lab work to receive certificates.

Learning Objective

On completion of the Practical Workshop students should be able to identify, assembly, integrate and operate D25 with DNP to a DNP master station. Students will gain knowledge of DNP message and DNP message analysis.

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
D25-101 D25 hardware	D25-401 D25 Firmware	D25-404 DNP Overview	D25-408 DNP DPA (Data processing configuration) setup	D25-412 DNP Simulation 2 Master with 2 slaves
D25-102 D25 Firmware	D25-402 D25 Default Config	D25-405 DNP DCA (Data collection application) setup	D25-409 DNP DPA communication link setup	D25-413 DNP Simulation same box setup
D25-103 DSAS Overview	D25-403 D25 Plant I/O configuration	D25-406 DNP DCA configuration	D25-410 DNP Simulation 1 master with 1 slave	D25-414 DNP message analyzer
D25-104 DSAS D25 Default Configuration	D25-404 D25 IO and Wesmaint configuration	D25-407 DNP DCA communication link setup	D25-411 DNP Simulation 1 master with 2 slaves	D25-415 Summary and closeout

Legend

practical exercise

classroom taught

Course Note

D25 elements of course uses DNP Protocol serial connection to devices so protocol messages can easily been seen and allow student to fault find and quickly assimilate the information easily in a classroom environment within the time constraint.

Students are then able to apply this to Ethernet systems and other protocols and applications, using the relevant documentation.

Course Code | TRNG-61850, 61850 Communications Essentials

Prerequisites

No pre-requisites for this course.

Learning Objective

On completion of this course, the students should be able to identify different types of communication protocols used in industrial and utilities, understand the concepts of PTP, PRP, IRIG-B, 1588, VLAN, SV, MMS and GOOSE.

DAY 1	DAY 2	DAY 3	DAY 4
Introduction			
UCOM-3000 Network Fundamentals SA-107	RT 430 Configuration Demo	UCOM-3002 I DNP SA-115 & Demo	61850-3006 Client/Server MMS Communication
UCOM-3001 Modbus Protocol SA-116 & Demo	61850-3005 Sampled Values	61850 - 3004 I SCL GOOSE	UR to D400 MMS Configuration 61850-402 Demo
61850-3003 I UCA-61850	MU320 Merging Unit Configurations Demo	61850-3007 I SCL	PRP Configuration with UR & D400 61850-103
UCOM-3004 IRIG- B to PTP1588	Wireshark Software Video & Demo 61850-401	UR GOOSE Ed2 Configuration Demo & Exercises	UR w/F650, 3/8Series, MiCOM, SEL Interoperability Exercises

Legend

Instructor demo

classroom taught

Prerecorded Material

Logistics

Workshop activities are a mix of video based, written and demonstration instruction.

Learning content is provided on a digital device.

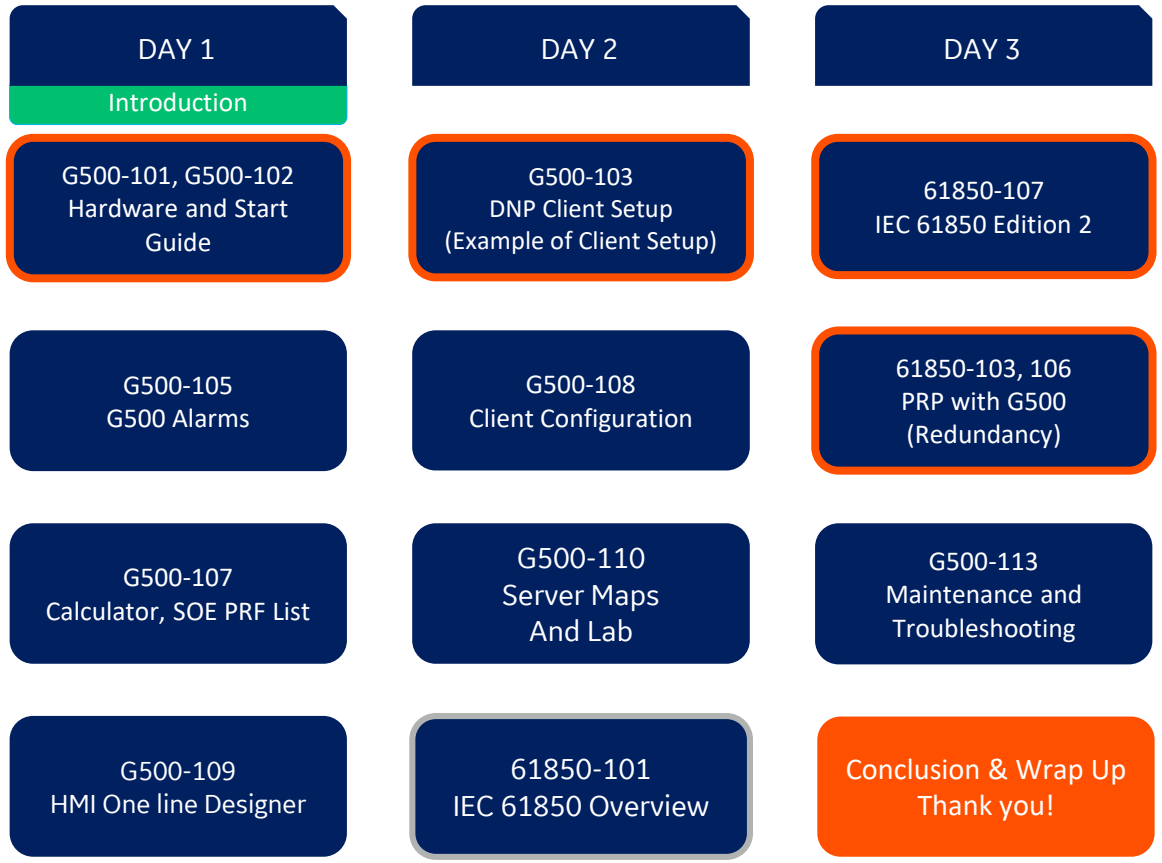
Course Code | TRNG-G500, G500 Essentials

Prerequisites

No pre-requisites for this course.

Learning Objective

On completion of this course, the students should be able to understand and recite all key new features of this device. Special focus will be given to Hardware and Software.



This course will make use of some prerecorded materials/videos outlined in orange.

Legend

classroom taught

Prerecorded Material

Logistics

Workshop activities are a mix of video based, written and demonstration instruction.

Learning content is provided on a digital device.

Protection & Automation

Course Code | TRNG-61850 - IEC 61850 Fundamentals

who should attend

Managers, Consultants, Engineers and System Integrators responsible for power delivery in either utility or industrial sectors..

learning outcome

Students acquire basic knowledge on the fundamentals of today's technology in various applications.
The objective is to ensure that Students have the basic knowledge to make future GE courses attendance effective.

prerequisites

Basic electrical knowledge, there are no GE course prerequisites.

workshop hardware needs

None

what's covered

- Network Protocols
- SV Messages
- GOOSE Messages
- MMS Messages
- SCL, CID, ICD, IID Configuration
- Applications

learning contact hours

- 40 hours over 5 days

COURSE CONTENT & TIMING

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY
Network Protocols	SV Messages	GOOSE Message	MMS Messages	Applications
Gateway Configuration	Merging Units Configuration	Protection Relay Configuration	Relay to Gateway Configuration	Digital Substation Simulation

Course Code | P40PL-C MiCOM P40 Platform

who should attend

Engineering Staff within electrical utility, industrials & system integrators who need to design protection and control systems using MiCOM P40

learning outcome

At the end of this course you will have the essentials of the MiCOM P40 platform hardware software and configuration, using the P14x relay. To be able to program feeder protection and operate with auto-reclose.

prerequisites

Fundamentals of Modern Protective Relaying is highly recommended

what's covered

- Overview of the of MiCOM P40 relays and applications,
- Hardware, front panel navigation of P14x relay, communication setup with MiCOM P40 software, Settings creation, upload, download, event extraction, interrogation, disturbance record extraction and interrogation.
- PSL (Programmable scheme logic) file creation and upload/download.
- Hands on tests of overcurrent and various functions with RTT test set.

learning contact hours

28 hours over 4 days

COURSE CONTENT & TIMING

MONDAY	TUESDAY	WEDNESDAY	Thursday
Overview of MiCOM P40 relay family and hardware.	MiCOM P40 Software interface operation.	P14x Feeder relay hands on workshop and test.	IEC61850

Legal

For general information concerning GE Grid Solutions Learning & Development please visit our website at http://www.gegridsolutions.com/ or contact us at training.multilin@ge.com

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Contents contained within this document are subject to change without notice.

Imagination at Work