Pioneering key principle advancement over the past 100 years, we continue to lead the way making new protection, control, monitoring and automation applications possible through knowledge and learning.
Visit our web page:
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/

Visit our YouTube channels:
did you know that we have a YouTube portal where you can find e-learning training videos at no cost. Here you can find how 2 videos, training webinars and training course modules for self learning

http://www.youtube.com/GEgridautomationLD

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 mail box.

training.multilin@ge.com

also you can sign up for our monthly newsletter here.

Training Offerings:
- train at no cost use our YouTube Site or web resource pages
- attend one of our webinar training sessions.
- more formal needs.
- standard schedule courses
- on demand courses standard or custom at your place or ours.
- try our virtual classroom sessions (remote learning)
- try one of our certification programs

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.

Did you know:
we are currently in the process of converting course material to provide interactive learning using tablets, many courses have been converted in which case your course material maybe provided on an tablet included as part of the course fees!

Visit our on line store at:
where you can view standard course schedule and purchase a seat/s on a specific course.

http://store.gedigitalenergy.com/TrainingCourses.asp

Visit our web site 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

Certification Programs:
- 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.

Connect with us:
did you know we can be followed and asked questions about our training offerings, we also post info on up and coming learning events and what we are doing to improve your learning experience

Grid IQ Learning Center's: Discover the Difference
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 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.
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 two hour online sessions to discuss specific topics with a live instructor.
- Virtual Classroom
  - Stay seated and connect with your peers through our virtual classroom 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.

We are evolving our training courses. 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 you 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
Your learning starts here.

Our course synopsis has been designed to provide answers to the various questions pertaining to the learning experience of our protection & control training.

Offering the flexibility of course modularization, our courses allow you the freedom of creating a learning experience that meets the specific needs of your professional development. To better identify your needs, follow our four step process below.

**Step One** select type

1. **Scheduled Courses**
   - Scheduled Courses are facilitated at one of our Grid IQ Learning Centre’s. Students are registered on a first-come-first-served basis.
   - Some courses may have a seat limit depending on the nature of the course. Further information regarding scheduled, dates and times can be found on our online catalogue.

2. **On-Demand Courses**
   - To accommodate the interest of delivering a learning experience at a time convenient for you, our On-Demand courses can be facilitated on a date and location of your choice.
   - Note: A minimum of three delivery days and learning audience of 8-12 students are required for on-demand courses outside of Grid IQ Learning Centre’s.

**Step Two** select content

A. **Standard Program**
   - Standard programs are offered through our online calendar and provide training on the most commonly used offerings.

B. **Independent**
   - Our Independent Courses are available for those who are interested in learning about a specific product.

C. **Customized**
   - Custom programs allow you to select content to cover a minimum of 3 days of learning.

**Step Three** select delivery

A. **Classroom**
   - Our classroom sessions focus on hands-on application; these workshops use lab exercise to aid learning retention.

B. **Virtual**
   - Our virtual classroom sessions focus on conceptual learning training modules. However, we can run workshops using this technique.

C. **E-Learning**
   - Self pace training modules made available through our YouTube channel, website resources page or our iPad app dash application.

**Step Four**

- For scheduled courses book online
- For on-demand courses contact training.multilin@ge.com

*try our custom training programs using a mix of content and delivery methods*

*did you know we run live webinars from time to time... signup for our newsletter to know what and when.*

*stay connected and receive information regarding the scheduling of On-Demand courses offered at a location near you!"
over 200 videos and 80 hours of content available for you to learn, when you need it at no charge.

more content being added all the time.

http://www.gegridsolutions.com/Resources.htm
https://www.youtube.com/c/LDforProtectionandControl
There are many ways to learn, enrolling in one of our structured learning programs that leads to certification and recognition by GE or simple learning on your own using our e-learning modules which are made available at no cost, through the GE resource page and YouTube.

Below is a list of current available e-learning modules for you to use and to learn at your leisure, always check back, updates are constantly being added!

<table>
<thead>
<tr>
<th>Module Number</th>
<th>Video Type</th>
<th>Product or Application</th>
<th>Module Name</th>
<th>File Link</th>
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<td>Technical Webinar FMPR</td>
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## Self Serve - Learning Offerings

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## Self Serve - Learning Offerings

List of e-learning modules (continue).

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<td>UR-1001</td>
<td>How2</td>
<td>UR Platform</td>
<td>UR Hardware Setup IEC61850</td>
<td><a href="https://youtu.be/2aPONw4dPR0">https://youtu.be/2aPONw4dPR0</a></td>
<td>3</td>
</tr>
<tr>
<td>Module Number</td>
<td>Video Type</td>
<td>Product or Application</td>
<td>Module Name</td>
<td>File Link</td>
<td>Duration (minutes)</td>
</tr>
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<td>---------------</td>
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</tr>
</tbody>
</table>
Certification Program

The Program

Our certification program is designed to recognize students as being skilled in the use of GE Grid Solutions Products and the application of those products, i.e., creating solutions. Each learning thread is a collection of technical learning undertaken to achieve an overall skill attainment which we recognize through our certification program.

For each learning element, credits are issued for successful completion. Completing all elements leads to certification. These credits also equate to the number of hours expended to achieve successful completion and can be used with other professional organizations to show continuous professional development.

By completing a thread you reach Bronze level, by completing other threads you can reach Silver, Gold and then Platinum level. Each is recognized in your certification status and provides you with entry to our learning portal where you will have access to all our learning content/programs and receive regular updates from the Learning and Development team.

To maintain certification, students are expected to complete a two year recertification assessment and attend any further advanced learning offerings that we make available.

Protection & Control Offerings

Tier 1

- TRNG-FMPRV
  Fundamentals of Modern Protection Relaying
  • e-learning and virtual sessions
  • assessment testing throughout
  • 16 credits/hours of learning
  • 6 hour virtual class

Note 1: experienced engineers can take the TRNG-FMPRV on-line test to get a pass to Tier 2.

Note 2: to attend the tier 3 course you must complete TRNG-URPLV and/or TRNG-8SPV from the Tier 2 offerings. TRNG-VPMV is optional.

Tier 2

- TRNG-URPLV
  UR Platform Essentials
  • e-learning and virtual sessions
  • assessment testing throughout
  • 16 credits/hours of learning
  • 6 hour virtual class

- TRNG-8SPV
  8 Series Essentials
  • e-learning and virtual sessions
  • assessment testing throughout
  • 16 credits/hours of learning
  • 6 hour virtual class

- TRNG-VPMV
  Viewpoint Monitoring Essentials
  • e-learning and virtual sessions
  • assessment testing throughout
  • 16 credits/hours of learning
  • 6 hour virtual class

Tier 1 & 2 are prerequisites

Tier 3

- TRNG-UR8S (UR/8S)
  UR and/or 8 Series Essentials Workshops
  • e-learning, virtual and in class workshops
  • assessment testing throughout
  • up to 40 credits/hours of learning
  • up to 40 hour workshop

- TRNG-MTDT (MTR/DIST)
  Motors and/or Distribution Essentials Workshops
  • e-learning, virtual and in class workshops
  • assessment testing throughout
  • up to 40 credits/hours of learning
  • up to 40 hour workshop

Tier 1 & 2 are prerequisites

Tier 4

- TRNG-UR8SA
  UR and 8 Series Advanced Workshops
  • e-learning, virtual and in class workshops
  • assessment testing throughout
  • 40 credits/hours of learning
  • 40 hour workshop

Tier 1, 2 & 3 are prerequisites
Each Virtual Course uses e-learning self pace course work, virtual class sessions and on-line testing/assessment of what you have learned. These courses are prerequisites for attending any of our workshop sessions that we offer.

**course structure tier 1 and 2**

- **Virtual Classroom**
- **eLearning**
- **Test**
- **Virtual classroom**
- **Test**

**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.

- **Test**
  - 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 aim is to learn together.
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.
This course is a prerequisite for all other learning course/program offerings. A pass will be provided to participants who can demonstrate their knowledge by taking our on-line test.

virtual class hardware needs
This is a theory course only. There is no hands-on whatsoever. Instructor may demonstrate subject to the specific topic in question.

what’s covered
• The Power Grid and Protections
• Theory and Protection for the following applications:
  • Generator
  • Transmission Line
  • Busbar
  • Distribution
  • Transformer
  • Motor

learning contact hours
• Virtual class 1: 1 hour (intro session)
• E-learn: 4 hours (playlist e-950)
• Virtual class 2: 6 hours
• Testing: 2 hours
• Total: 13 hours
Virtual class 2 is two 3 hours sessions.
Learning contact hours quoted are our estimate of time to complete, actual is very much dependent on students prior knowledge.

e-learning playlist | e-950

Module | Name                      | Module | Name                      
-------|---------------------------|-------|---------------------------|
FMPR-102 | Power Systems Introduction v1 | FMPR-109-1 | Motors Protection part 1 v1 |
FMPR-103-1 | Power Systems Protection part 1 v1 | FMPR-109-2 | Motors Protection part 2 v1 |
FMPR-103-2 | Power Systems Protection part 2 v1 | FMPR-109-3 | Motors Protection part 3 v1 |
FMPR-103-3 | Power Systems Protection part 3 v1 | FMPR-2002 | Technical Webinar Motor Protection |
FMPR-104 | Generator Protection v1 |       |               |
FMPR-105-1 | Transmission Line Protection part 1 v1 |       |               |
FMPR-105-2 | Transmission Line Protection part 2 v1 |       |               |
FMPR-106 | Distribution Protection v2 |       |               |
FMPR-107 | Busbar Protection v1 |       |               |
FMPR-108 | Transformer Protection v1 |       |               |

timeline
**Registration Deadline**
8 weeks prior to virtual 2

**Course Notices Sent Out**
7 weeks prior to virtual 2

**Virtual Class 1**
5 weeks prior to virtual 2

**Complete: E-Learning**
1 week prior to virtual 2

**Virtual Class 2**
week zero

**Complete Final Test**
1 week after virtual 2
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 integration of protection and control of the UR relay.

The objective is to ensure that Students have a working knowledge on the operation and functionality of the UR.

prerequisites

The following are necessary to attend.

TRNG-FMPRV*

* a pass on TRNG-FMPRV will be provided if you can take and pass our on-line FMPR test.

virtual class hardware needs

PC running Windows 7 that has the latest version of EnerVista™ UR Setup software installed & confirmed operational.

UR Relay of any configuration

If you don’t have equipment available, you may utilize our Equipment Loan Program for a fee, or you can follow our exercise demonstrations

what’s covered

- Specifications
- Hardware Review
- UR Engineer EnerVista Setup program
  • Communications
  • I/O
  • Diagnostic Tools
  • Protection & Control
  • FlexLogic
  • IEC61850

learning contact hours

- Virtual class 1: 1 hour (intro session)
- E-learn: 8 hours (playlist e-952)
- Virtual class 2: 6 hours
- Testing: 2 hours
- Total: 17 hours

Virtual class 2 is two 3 hours sessions. Learning contact hours quoted are our estimate of time to complete. Actual is very much dependent on students prior knowledge.

e-learning playlist | e-952

<table>
<thead>
<tr>
<th>Module</th>
<th>Name</th>
<th>Module</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>UR-100</td>
<td>UR Platform Overview</td>
<td>UR-1004</td>
<td>UR Using Fixed Goose</td>
</tr>
<tr>
<td>UR-101</td>
<td>UR Platform Hardware</td>
<td>ENR-100</td>
<td>EnerVista Overview</td>
</tr>
<tr>
<td>UR-102</td>
<td>UR Platform Software</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>UR-103</td>
<td>UR Platform FlexLogic</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>UR-104</td>
<td>UR Platform Protection</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>UR-140</td>
<td>UR7.0 Release Introduction v1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>UR-141</td>
<td>UR7.3 Release Introduction v1</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>UR-1001</td>
<td>UR Hardware Setup IEC61850</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>UR-1002</td>
<td>UR Software IEC 61850 Configuration</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>UR-1003</td>
<td>UR Configurable Goose Programming</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

note: timeline is generic may vary dependent on scheduling logistics
Protection & Control Tier 2

virtual course code | TRNG-8SPV - 8 Series Protection Relays

**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 integration of protection and control of the 8 Series relay. The objective is to ensure that Students have a working knowledge on the operation and functionality of the 8 Series.

**prerequisites**
The following are necessary to attend.
TRNG-FMPRV*

* a pass on TRNG-FMPRV will be provided if you can take and pass our on-line FMPR test.

**virtual class hardware needs**
PC running Windows 7 that that has the latest version of EnerVista™ 8 Series Setup software installed & confirmed operational.
8 Series Relay of any configuration
If you don't have equipment available you may utilize our Equipment Loan Program for a fee, or you can follow our exercise demonstrations

**what's covered**
- Specifications
- Hardware Review
- 8 Series EnerVista Setup program
  - Communications
  - I/O
  - Diagnostic Tools
  - Protection & Control
  - FlexLogic
  - IEC61850

**learning contact hours**
- Virtual class 1: 1 hour (intro session)
- E-learn: 7 hours (playlist e-953)
- Virtual class 2: 6 hours
- Testing: 2 hours
- Total: 16 hours

Virtual class 2 is two 3 hours sessions.
Learning contact hours quoted are our estimate of time to complete, actual is very much dependent on students prior knowledge.

**e-learning playlist | e-953**

<table>
<thead>
<tr>
<th>Module</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>8SP-100</td>
<td>8 Series Relay Overview</td>
</tr>
<tr>
<td>8SP-101</td>
<td>8 Series Hardware</td>
</tr>
<tr>
<td>8SP-2001</td>
<td>8 Series Technical Webinar part 1</td>
</tr>
<tr>
<td>8SP-2001</td>
<td>8 Series Technical Webinar part 1</td>
</tr>
<tr>
<td>8SP-2003</td>
<td>8 Series Technical Webinar part 3</td>
</tr>
<tr>
<td>ENR-100</td>
<td>EnerVista Overview</td>
</tr>
<tr>
<td>-</td>
<td></td>
</tr>
<tr>
<td>-</td>
<td></td>
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</tr>
</tbody>
</table>

**timeline**

<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Registration Deadline</td>
<td>8 weeks prior to virtual 2</td>
</tr>
<tr>
<td>Course notices sent out</td>
<td>7 weeks prior to virtual 2</td>
</tr>
<tr>
<td>Virtual class 1</td>
<td>5 weeks prior to virtual 2</td>
</tr>
<tr>
<td>Complete: E-LEARNING</td>
<td>1 week prior to virtual 2</td>
</tr>
<tr>
<td>Virtual Class 2</td>
<td>week zero</td>
</tr>
<tr>
<td>Complete final test</td>
<td>1 week after virtual 2</td>
</tr>
</tbody>
</table>

*Note: timeline is generic may vary dependent on scheduling logistics*
**Course Delivery Offerings | Virtual**

**virtual course code | TRNG-VMV - ViewPoint Monitoring**

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

**learning outcome**
Student's acquire basic knowledge on the EnerVista Viewpoint Monitoring program. Student's will create a mini-SCADA system utilizing the tools available within VPM.

**prerequisites**
Basic electrical knowledge, there are no GE course prerequisites. A pass will be provided to participates who can demonstrate their knowledge by taking our on-line test.

**virtual class hardware needs**
PC running Windows 7 that has the latest version of EnerVista™ ViewPoint Monitoring software installed & confirmed operational.
Any relay device that supports MODBUS.
If you don’t have equipment available you may utilize our Equipment Loan Program for a fee, or you can follow our exercise demonstrations

**what's covered**
- IED Dashboard
- Device Setup
- One-Line Editor
- One-Line Viewer
- Annunciator Panel design
- Events & Waveform retrieval
- Report Generation
- Security

**learning contact hours**
- Virtual class 1: 1 hour (intro session)
- E-learn: 1 hours (playlist e-955)
- Virtual class 2: 6 hours
- Testing: 1 hours
- Total: 9 hours

Virtual class 2 is two 3 hours sessions.
Learning contact hours quoted are our estimate of time to complete, actual is very much dependent on students prior knowledge.

**timeline**
- **Registration Deadline**
  - 8 weeks prior to virtual 2
- **Course Notices Sent Out**
  - 7 weeks prior to virtual 2
- **Virtual Class 1**
  - 5 weeks prior to virtual 2
- **Complete: E-Learning**
  - 1 week prior to virtual 2
- **Virtual Class 2**
  - Week zero
- **Complete Final Test**
  - 1 week after virtual 2

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

**Module** | **Name**
--- | ---
ENR-100 | EnerVista Overview
ENR-101 | Viewpoint Monitoring Essentials v1
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 tier 3 and 4**

- **virtual class #1**
  - eLearning
  - testing
- **virtual class #2**
  - workshop
- **virtual class #3**
  - testing

**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.

Both the Essentials and Advanced course follow this model with the advanced course building on the Essentials course activities to build more complex solutions.

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 start with an initial virtual class session. This is then followed with e-learning coursework and testing, leading to a second virtual classroom session and then a hands-on face to face workshop. We will conclude with a final test and a final virtual class to close out the course.

The aim of the final virtual session is to allow students time to reflect on the course and ask any question they might have about the course and its content.

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!
Protection & Control Tier 3

Course Delivery Offerings | Workshop

**course code | TRNG-UR8S - Universal Relay and 8 Series 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**
The following are necessary to attend.
TRNG-URPLV
TRNG-8SPV

**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**
- Virtual class 1: 1 hour (intro session)
- E-learn: 6 hours (playlist e-954)
- Virtual class 2: 2 hours
- Workshop: 40 hours
- Testing: 2 hours
- Virtual class 3: 2 hours
- **Total**: 53 hours

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

**e-learning playlist | e-954**

<table>
<thead>
<tr>
<th>Module</th>
<th>Name</th>
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<tbody>
<tr>
<td>UR-2006</td>
<td>Hard Fiber Technical Webinar</td>
</tr>
<tr>
<td>SA-112</td>
<td>Cyber Security</td>
</tr>
<tr>
<td>61850-101</td>
<td>IEC 61850 Essentials</td>
</tr>
<tr>
<td>61850-102</td>
<td>IEC 61850 Introduction</td>
</tr>
<tr>
<td>RTT-1001</td>
<td>How2 use the RTT</td>
</tr>
</tbody>
</table>

**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 weeks prior to workshop
- **Workshop**: 1 week prior to workshop
- **Virtual Class 2**: 2 weeks after workshop
- **Virtual Class 3**: week zero
### Prerequisites

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

Failure to comply **EXCLUDES** students from the workshop session.

### 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 and final exam on the last day.

### Course Note

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

Learning content is provided on a digital device.

This is an intensive application based course students may stay on past Friday midday to complete integration tasks if so required.

---

**Legend**

- **practical exercise**
- **classroom taught**

---

**MONDAY**

- UR-401 | Initial Setup
- UR-402 | Diagnostic Setup
- UR-403 | Inputs & Outputs
- UR-404 | Metering

**TUESDAY**

- UR-405 | Protection Summary
- UR-406 | FlexLogic
- UR-408 | v7.2-IEC61850

**WEDNESDAY**

- 8SP-401 | Hardware Setup
- 8SP-402 | Software Interface
- 8SP-403 | Generic Settings
- 8SP-404 | Protection Functions

**THURSDAY**

- 8SP-405 | Controls and Monitoring
- 8SP-406 | FlexLogic
- 8SP-407 | IEC61850

**FRIDAY**

- 8SP-408 | v7.2-IEC61850
- UR-411 | IEC61850 Integration
- ENR-401 | VPM Essentials
- UR8S Application Integration
**Protection & Control Tier 3**

course code | TRNG-UR - Universal Relay 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**
The following are necessary to attend.
TRNG-URPLV

**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**
- Virtual class 1: 1 hour (intro session)
- E-learn: 6 hours (playlist e-962)
- Virtual class 2: 2 hours
- Workshop: 24 hours
- Testing: 2 hours
- Virtual class 3: 2 hours
- Total: 37 hours

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

**e-learning playlist | e-962**

<table>
<thead>
<tr>
<th>Module</th>
<th>Name</th>
<th>Module</th>
<th>Name</th>
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<tbody>
<tr>
<td>RTT-1001</td>
<td>How2 use the RTT</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>UR-2006</td>
<td>Hard Fiber Technical Webinar</td>
<td>-</td>
<td>-</td>
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<tr>
<td>SA-112</td>
<td>Cyber Security</td>
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</tr>
<tr>
<td>61850-101</td>
<td>IEC 61850 Essentials</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>61850-102</td>
<td>IEC 61850 Introduction</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>UR-2007</td>
<td>UR Release 7.4 Technical Webinar</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>UR-126</td>
<td>F35/60 UR Wiring</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

**timeline note 1**
- Registration Deadline: 8 weeks prior to workshop
- Course Notices Sent Out: 7 weeks prior to workshop
- Virtual Class 1: Complete: e-learning 2 weeks prior to workshop
- Workshop: week zero
- Virtual Class 2: 1 week prior to workshop
- Virtual Class 3: 2 weeks after workshop
Prerequisites

Students MUST complete all course work and successfully pass the prerequisite assessment test for each course module assigned. Failure to comply EXCLUDES students from the workshop session.

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 and final exam on the last day.

MONDAY

- UR-401 | Initial Setup
- UR-402 | Diagnostic Setup
- UR-403 | Inputs & Outputs
- UR-404 | Metering

TUESDAY

- UR-405 | Protection Summary
- UR-406 | FlexLogic
- UR-408 | v7.2-IEC61850

WEDNESDAY

- ENR-401 | VPM Essentials
- UR-414 | Project

Course Note

Workshop activities are a mix of video based, written and demonstration instruction, followed by student hands on activities. Learning content is provided on a digital device.

This is an intensive application based course students may stay on past Friday midday to complete integration tasks if so required.
Course Delivery Offerings | Workshop

### 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
The following are necessary to attend. TRNG-8SPV

### 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
- Virtual class 1: 1 hour (intro session)
- E-learn: 6 hours (playlist e-963)
- Virtual class 2: 2 hours
- Workshop: 24 hours
- Testing: 2 hours
- Virtual class 3: 2 hours
- Total: 37 hours

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

### e-learning playlist | e-963

<table>
<thead>
<tr>
<th>Module</th>
<th>Name</th>
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<tbody>
<tr>
<td>RTT-1001</td>
<td>How2 use the RTT</td>
</tr>
<tr>
<td>61850-101</td>
<td>IEC 61850 Essentials</td>
</tr>
<tr>
<td>61850-102</td>
<td>IEC 61850 Introduction</td>
</tr>
</tbody>
</table>

**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 weeks prior to workshop
- **Virtual Class 2**: 1 week prior to workshop
- **Workshop**: week zero
- **Virtual Class 3**: 2 weeks after workshop
## Prerequisites

Students **MUST** complete all course work and successfully pass the prerequisite assessment test for each course module assigned. Failure to comply **EXCLUDES** students from the workshop session.

## 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

- 8SP-401 | Hardware Setup
- 8SP-402 | Software Interface
- 8SP-403 | Generic Settings
- 8SP-404 | Protection Functions

### TUESDAY

- 8SP-405 | Controls and Monitoring
- 8SP-406 | FlexLogic
- 8SP-407 | IEC61850

### WEDNESDAY

- ENR-401 | VPM Essentials
- 8S Application Integration

### Course Note

Workshop activities are a mix of video based, written and demonstration instruction, followed by student hands on activities. Learning content is provided on a digital device. This is an intensive application based course students may stay on past Friday midday to complete integration tasks if so required.
Protection & Control Tier 3

Course Delivery Offerings | Workshop

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
The following are necessary to attend.
TRNG-FMPRV*

* a pass on TRNG-FMPRV will be provided if you can take and pass our on-line FMPR test.

workshop hardware needs
All equipment is provided as part of the workshop.

what’s covered
Configuration and Protection Elements for:
- Transformer Protection
- Generator Protection
- Motor Protection
- Feeder protection
- BusBar Protection
Integration Applications:
- Viewpoint Monitoring
- IEC61850

learning contact hours
- Virtual class 1: 1 hour (intro session)
- E-learn: 6 hours (playlist e-957)
- Virtual class 2: 2 hours
- Workshop: 40 hours
- Testing: 2 hours
- Virtual class 3: 2 hours
- Total: 53 hours

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

e-learning playlist | e-957

<table>
<thead>
<tr>
<th>Module</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>RTT-1001</td>
<td>How2 use the RTT</td>
</tr>
<tr>
<td>SR-103</td>
<td>369 Motor Protection Hardware</td>
</tr>
<tr>
<td>SR-104</td>
<td>369 Motor Protection Software</td>
</tr>
<tr>
<td>SR-105</td>
<td>469 Motor Protection Hardware</td>
</tr>
<tr>
<td>SR-106</td>
<td>469 Motor Protection Software</td>
</tr>
<tr>
<td>SR-107</td>
<td>750 Feeder Protection Hardware</td>
</tr>
<tr>
<td>SR-108</td>
<td>750 Feeder Protection Software</td>
</tr>
<tr>
<td>SR-109</td>
<td>745 Transformer Protection Hardware</td>
</tr>
<tr>
<td>SR-110</td>
<td>745 Transformer Protection Software</td>
</tr>
<tr>
<td>SR-111</td>
<td>489 Hardware</td>
</tr>
<tr>
<td>SR-112</td>
<td>489 Software</td>
</tr>
<tr>
<td>61850-101</td>
<td>IEC 61850 Essentials</td>
</tr>
<tr>
<td>61850-102</td>
<td>IEC 61850 Introduction</td>
</tr>
<tr>
<td>UR-126</td>
<td>F35/60 UR Wiring</td>
</tr>
<tr>
<td>UR-127</td>
<td>F35/60 Relay Settings</td>
</tr>
<tr>
<td>8SP-110</td>
<td>Feeder Protection</td>
</tr>
<tr>
<td>8SP-111</td>
<td>Motor Protection</td>
</tr>
<tr>
<td>8SP-121</td>
<td>Transformer Protection</td>
</tr>
<tr>
<td>8SP-131</td>
<td>Generator Protection</td>
</tr>
<tr>
<td>3SR-104</td>
<td>350 Feeder Relay</td>
</tr>
<tr>
<td>3SR-105</td>
<td>339 Motor Relay</td>
</tr>
<tr>
<td>3SR-106</td>
<td>345 Transformer Relay</td>
</tr>
</tbody>
</table>

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

Timeline

- 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 weeks after workshop Virtual class 3
- 1 week prior to workshop Virtual class 2
- 2 weeks prior to workshop Virtual class 1
- week zero Workshop
- 2 weeks after workshop Virtual class 3
Prerequisites

Students MUST complete all course work and successfully pass the prerequisite assessment test for each course module assigned. Failure to comply EXCLUDES students from the workshop session.

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 through further application.

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

**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 on VC1.**
Protection & Control Tier 3

**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**
The following are necessary to attend.

TRNG-FMPRV*

* a pass on TRNG-FMPRV will be provided if you can take and pass our on-line FMPR test.

**workshop hardware needs**
All equipment is provided as part of the workshop.

**what’s covered**
Configuration and Protection Elements for:
- Transformer Protection
- Generator Protection
- Line Protection
- BusBar Protection

Integration Applications:
- Viewpoint Monitoring
- IEC61850

**e-learning playlist | e-958**

<table>
<thead>
<tr>
<th>Module Code</th>
<th>Module Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>RTT-1001</td>
<td>How2 use the RTT</td>
</tr>
<tr>
<td>61850-101</td>
<td>IEC 61850 Essentials</td>
</tr>
<tr>
<td>61850-102</td>
<td>IEC 61850 Introduction</td>
</tr>
<tr>
<td>UR-126</td>
<td>F35/60 UR Wiring</td>
</tr>
<tr>
<td>UR-127</td>
<td>F35/60 Relay Settings</td>
</tr>
<tr>
<td>SR-107</td>
<td>750 Feeder Protection Hardware</td>
</tr>
<tr>
<td>SR-108</td>
<td>750 Feeder Protection Software</td>
</tr>
<tr>
<td>SR-109</td>
<td>745 Transformer Protection Hardware</td>
</tr>
<tr>
<td>SR-110</td>
<td>745 Transformer Protection Software</td>
</tr>
<tr>
<td>SR-111</td>
<td>489 Hardware</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module Code</th>
<th>Module Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>SR-112</td>
<td>489 Software</td>
</tr>
<tr>
<td>8SP-110</td>
<td>Feeder Protection</td>
</tr>
<tr>
<td>8SP-121</td>
<td>Transformer Protection</td>
</tr>
<tr>
<td>8SP-131</td>
<td>Generator Protection</td>
</tr>
<tr>
<td>3SR-104</td>
<td>350 Feeder Relay</td>
</tr>
<tr>
<td>3SR-106</td>
<td>345 Transformer Relay</td>
</tr>
</tbody>
</table>

**learning contact hours**

- Virtual class 1: 1 hour (intro session)
- E-learn: 6 hours (playlist e-958)
- Virtual class 2: 2 hours
- Workshop: 24 hours
- Testing: 2 hours
- Virtual class 3: 2 hours
- Total: 37 hours

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

**timeline**

- Note 1: Timeline is generic may vary depending on scheduling logistics

<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Registration Deadline</td>
<td>8 weeks prior to workshop</td>
</tr>
<tr>
<td>Course Notices sent out</td>
<td>7 weeks prior to workshop</td>
</tr>
<tr>
<td>Virtual Class 1</td>
<td>6 weeks prior to workshop</td>
</tr>
<tr>
<td>Course Notice sent out</td>
<td>COMPLETE: E-LEARNING</td>
</tr>
<tr>
<td>Virtual Class 2</td>
<td>2 week prior to workshop</td>
</tr>
<tr>
<td>Virtual Class 3</td>
<td>1 week prior to workshop</td>
</tr>
<tr>
<td>Workshop</td>
<td>Workshop</td>
</tr>
<tr>
<td>Week Zero</td>
<td>2 weeks after workshop</td>
</tr>
</tbody>
</table>
TRNG-DIST Essentials | Practical Workshop (tier 3)

Prerequisites
Students MUST complete all course work and successfully pass the prerequisite assessment test for each course module assigned.
Failure to comply EXCLUDES students from the workshop session.

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 through 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 15 relay modules and at least 1 out of 3 integration exercises for successful course completion.

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

Integration
- ENR-401 | VPM Essentials
- UR-411 | IEC61850 Integration
- Application Scheme Integration

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

* Students need to decide their workshop relay types on VC1.

Learning content is provided on a digital device.
### 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
The following are necessary to attend.
TRNG-FMPRV*
* a pass on TRNG-FMPRV will be provided if you can take and pass our on-line FMPR test.
* Students need to decide their workshop relay types on VC1.

### 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:
- Viewpoint Monitoring
- IEC61850

#### Module Name Module Name
- RTT-1001 How2 use the RTT
- 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-411 869 Motor Protection
- 3SR-105 339 Motor Relay
- - -
- - -
- - -
- - -
- - -

### learning contact hours
- Virtual class 1: 1 hour (intro session)
- E-learn: 6 hours (playlist e-959)
- Virtual class 2: 2 hours
- Workshop: 24 hours
- Testing: 2 hours
- Virtual class 3: 2 hours
- Total: 37 hours

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

### e-learning playlist | e-959

<table>
<thead>
<tr>
<th>Module</th>
<th>Name</th>
<th>Module</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>RTT-1001</td>
<td>How2 use the RTT</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>SR-103</td>
<td>369 Motor Protection Hardware</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>SR-104</td>
<td>369 Motor Protection Software</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>SR-105</td>
<td>469 Motor Protection Hardware</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>SR-106</td>
<td>469 Motor Protection Software</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>8SP-411</td>
<td>869 Motor Protection</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>3SR-105</td>
<td>339 Motor Relay</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

### 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 weeks prior to workshop
- **Virtual Class 2**: 1 week prior to workshop
- **Workshop**: Week zero
- **Virtual Class 3**: 2 weeks after workshop
Prerequisites

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

Failure to comply EXCLUDES students from the workshop session.

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 through further application.

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

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 and at least 1 out of 3 integration exercises for successful course completion.

Motors

- 3SR-404 | 339 Motor Protection
- SR-405 | SR469 Motor Protection
- 85P-411 | 869 Motor Protection
- UR-411 | M60 Motor Protection
- MM-401 | MM series Motor Protection

Integration

- ENR-401 | VPM Essentials
- UR-411 | IEC61850 Integration
- Application Scheme Integration

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.
Protection & Control Tier 4

**Course Delivery Offerings | Workshop**

course code | TRNG-UR8SA - Universal and 8 Series Advanced Applications

**who should attend**
Protection Engineers responsible for designing Smart Grid application protection using GE products.

**learning outcome**
This course will build on the Tier 3 course and provide advanced knowledge and understanding of the 8Series and UR relays within specific applications. Students will be able to design, create, integrate and test application settings.

**prerequisites**
The following are necessary to attend.
- TRNG-UR8S
- Students need to finish UR-410 Hardfiber module if they prefer to use Hardfiber brick to do all the UR modules.

**workshop hardware needs**
All equipment is provided as part of the workshop.

**what’s covered**
- Motor Protection Application
- Transmission Line Protection Application
- Transformer Protection Application
- Generator Protection Application
- Busbar Protection Application
- System Integration

**learning contact hours**
- Virtual class 1: 1 hour (intro session)
- E-learn: 6 hours (playlist e-956)
- Virtual class 2: 2 hours
- Workshop: 40 hours
- Testing: 2 hours
- Virtual class 3: 2 hours
- Total: 53 hours

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

**e-learning playlist | e-956**

<table>
<thead>
<tr>
<th>Module</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>UR-120</td>
<td>D60 Overview</td>
</tr>
<tr>
<td>UR-121</td>
<td>D60 Distance Protection Theory</td>
</tr>
<tr>
<td>UR-122-1</td>
<td>D60 Distance Protection part 1</td>
</tr>
<tr>
<td>UR-122-2</td>
<td>D60 Distance Protection part 2</td>
</tr>
<tr>
<td>UR-123-1</td>
<td>D60 Distance Schemes part 1</td>
</tr>
<tr>
<td>UR-123-2</td>
<td>D60 Distance Schemes part 2</td>
</tr>
<tr>
<td>UR-124</td>
<td>D60 Controls</td>
</tr>
<tr>
<td>FMPR-2004</td>
<td>Technical Webinar Bus Bar Protection</td>
</tr>
<tr>
<td>FMPR-2005</td>
<td>Line Differential Protection Webinar</td>
</tr>
<tr>
<td>FMPR-2006</td>
<td>Transformer Differential Protection Webinar</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>8SP-110</td>
<td>Feeder Protection</td>
</tr>
<tr>
<td>8SP-111</td>
<td>Motor Protection</td>
</tr>
<tr>
<td>8SP-121</td>
<td>Transformer Protection</td>
</tr>
<tr>
<td>8SP-131</td>
<td>Generator Protection</td>
</tr>
</tbody>
</table>

**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 weeks prior to workshop
- Workshop: week zero
- Virtual class 2: 1 week prior to workshop
- Virtual class 3: 2 weeks after workshop

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

Module Name Module Name
UR-120 D60 Overview 8SP-110 Feeder Protection
UR-121 D60 Distance Protection Theory 8SP-111 Motor Protection
UR-122-1 D60 Distance Protection part 1 8SP-121 Transformer Protection
UR-122-2 D60 Distance Protection part 2 8SP-131 Generator Protection
UR-123-1 D60 Distance Schemes part 1 -
UR-123-2 D60 Distance Schemes part 2 -
UR-124 D60 Controls -
FMPR-2004 Technical Webinar Bus Bar Protection -
FMPR-2005 Line Differential Protection Webinar -
FMPR-2006 Transformer Differential Protection Webinar -
This is an intensive Application Project based course requiring students to participate for five full days.

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.
Protection & Control Tier 3

Course Delivery Offerings | Classical

course code | TRNG-APPS - UR Advanced Applications

who should attend
This course is designed for senior protection engineering staff responsible for relay selection and overall network design.

learning outcome
At the end of this whole week course, your knowledge of UR relays will change from product oriented into system oriented schemes and understand better how the power grid protection system works.

prerequisites
• The UR Platform Course
• Fundamentals of Modern Protective Relaying is highly recommended

workshop hardware needs
none

what’s covered
The protection engineer will gain an in-depth understanding of the major protective element algorithms for the B30/B90, C70, D60, F60, G60, L90, M60, T60 and N60. Each topic will be taught by the experts in the relevant field

learning contact hours
• 35 hours over 5 days

COURSE CONTENT & TIMING

<table>
<thead>
<tr>
<th>MONDAY</th>
<th>TUESDAY</th>
<th>WEDNESDAY</th>
<th>THURSDAY</th>
<th>FRIDAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feeder Protection F35/F60</td>
<td>Generator Protection G30/G60</td>
<td>Capacitor Bank Protection (cont’d) C70</td>
<td>Transformer Protection T35/T60</td>
<td>Line Current Differential Protection L90</td>
</tr>
<tr>
<td>Busbar Protection B30/B90</td>
<td>Capacitor Bank Protection C70</td>
<td>Distance Protection D30/D60</td>
<td>Motor Protection M60</td>
<td>Network Stability &amp; Synchro-Phasor Protection. N60</td>
</tr>
</tbody>
</table>

Network Stability & Synchro-Phasor Protection. N60
## Course Delivery Offerings | Classical

### course code | TRNG-MIC - Px40 Agile Platform

### who should attend
Engineering Staff within electrical utility, industrials & system integrators who need to design protection and control systems using Px40 Agile platform

### learning outcome
At the end of this course you will have the essentials of the Px40 platform hardware software and configuration, using the P142 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 Px40 Agile relays and applications,
- Hardware, front panel navigation of P142 relay, communication setup with MiCOM S1 Agile 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
21 hours over 3 days

### COURSE CONTENT & TIMING

<table>
<thead>
<tr>
<th>MONDAY</th>
<th>TUESDAY</th>
<th>WEDNESDAY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overview of MiCOM Px40 Agile relay family and hardware.</td>
<td>Software interface operation.</td>
<td>P142 Feeder relay hands on operate and test.</td>
</tr>
</tbody>
</table>
Each workshop exercise is designed to teach specific steps in setup, configuration, and its application, leading to the successful completion of an operating system. What follows is a brief description of each workshop module.

**UR-401 | Initial Setup**

In this lab, you will wire up the UR relay for control power, CT/VT inputs, contact I/O’s, establish communications between the computer and the relay using 4 different methods which are, quick connect using serial connection, quick connect using Ethernet, device setup using serial connection, and device setup using an Ethernet connection. An overview will be done for the online/offline menus, installation settings will be changed to put the relay into “Service Mode”, date and time will be set using a computer, a new settings file will be created using the order code, and lastly those settings will be written into the relay.

**UR-402 | Diagnostic Setup**

This lab will cover oscillography, data logger, fault recorder, the Modbus user map, and the user programmable self-tests.

**UR-403 | Inputs & Outputs**

This lab covers the configuration of inputs, outputs, virtual inputs, verification of input operations manually using the RTT and also the assignment of LED’s to them in the process. The test mode will be introduced including configuration of control pushbuttons, user programmable pushbuttons will be configured and lastly flex states will be programmed.

**UR-404 | Metering**

This lab covers the configuration of ac inputs, power system settings, signal sources, where metered values are displayed, and lastly user-definable displays will be configured.

**UR-405 | Protection Summary**

This lab covers the protection summary menu including programming the IOC, TOC, Trip Bus and its operations, under/over voltage, breaker failure and lastly settings group configuration will be covered.

**UR-406 | FlexLogic**

This lab covers and introductions to FlexLogic and logic designer followed by practical exercises creating a manual trip using close logic, adding a protection element to trip logic, creation of a timer circuit, counter circuit, flex element circuit, latch circuit, data logger trigger and lastly the creation of a relay alarm logic.

**UR-408 | v7.2-IEC61850**

In this lab, you will create a GOOSE message using the Simplified GOOSE Configurator application within v7.2 firmware. You will publish both digital and analog signals on one UR and subscribe to these signals on another UR. GOOSE signals will be verified using the Remote Input status for digital signals and GOOSE Analog Inputs under Metering. Digital signals will be assigned to a LED for further verification.
Each workshop exercise is designed to teach specific steps in setup, configuration, and its application leading to the successful completion of an operating system. What follows is a brief description of each workshop module.

<table>
<thead>
<tr>
<th>Workshop</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>UR-409</td>
<td>Cyber Security</td>
</tr>
</tbody>
</table>
In this lab, you will cover the following topics: Basic Password Security, Role-Based Access Control (RBAC), and the Radius Server using Free Radius.  

| UR-410 | Hard Fiber  |
This lab covers installation of the hard fiber process module, a review of the hard fiber hardware, brick programming, and lastly hard fiber operation.  

| UR-411 | IEC61850 Integration  |
This lab covers the publishing and subscribing of GOOSE messages between a UR and 8Series relay.  

| UR-412 | Viewpoint Monitoring  |
This lab covers the configuration of the Viewpoint Monitoring application. You will cover the following topics: Device Setup, One-Line Editor, One-Line Viewer, Annunciator Panel, Events, Trending Reports, Waveforms, IED Dashboard, and Administration (Security).  

| UR-420 | B30 Bus Protection  |
This lab covers the bus bar protections, including configuration of the zones, biased differential, and unbiased differential operation, external fault, and CT saturation simulation.  

| UR-423 | G60 Generator Protection  |
This lab covers the configuration of the G60 relay in reference to generator protection. The student will configure the UR setting for the following settings: 100% Stator Ground, Accidental Energization, Generator unbalance, Loss of excitation, Phase Sequence Reversal, Stator Differential, Volts/Hertz, and Third harmonic Undervoltage. Students are encouraged to bring their own three-phase test set.  

| UR-424 | L90 Transmission Protection  |
This lab covers the configuration of the L90 relay in reference to transmission line protection. The student will configure the UR setting for the following settings: 87Line Differential characteristics, Mho/Quad Distance elements, Pilot Schemes, Single Pole Autoreclose. Students are encouraged to bring their own three-phase test set.
Each workshop exercise is designed to teach specific steps in setup, configuration, and its application leading to the successful completion of an operating system. What follows is a brief description of each workshop module.

<table>
<thead>
<tr>
<th>UR-425</th>
<th>M60 Motor Protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>This lab covers the motor protections, including the configuration of a motor protection parameters, thermal model, acceleration time, motor metering, Amp Unbalance, Undercurrent/power, Mechanical Jam, Motor start supervision, VD Motor Curve.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>UR-427</th>
<th>T60 Transformer Protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>This lab covers the transformer protections, including percent differential characteristics, 2nd/5th harmonic restrain, Instantaneous differential, Volts/Hertz.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>UR-428</th>
<th>Integration Testing</th>
</tr>
</thead>
<tbody>
<tr>
<td>This lab covers a load shedding and transfer scheme – the objective being to create an integrated system using GE products.</td>
<td></td>
</tr>
</tbody>
</table>
Each workshop exercise is designed to teach specific steps in setup, configuration, and its application leading to the successful completion of an operating system. What follows is a brief description of each workshop module.

**8SP-401 | Hardware Setup**

This lab covers 8 series power supply and module removal, relay info verification, relay login, message timeout and default screen, phase & ground CT metering testing, contact input test in wet/dry mode, 3 color program LED’s, breaker open/close simulation, breaker close with pushbutton 2, breaker color convention configuration, IP address setup using front panel and event recorder viewing and clearing.

**8SP-402 | Software I/F**

This lab covers the 8 series IP address setup with USB port, metering of current, voltage, power and energy, setpoint files read and write comparison, offline setpoint file creation and editing, conversion of 750 setting file into 850, read status of contact inputs, outputs information and the viewing of transient records and events.

**8SP-403 | Generic Settings**

This lab covers the generic settings of 8Series in software: Real Time Clock, Programmable LEDs, Transient recorder, Contact Inputs, Breakers, FlexCurves, Virtual Inputs, Data Logger and Phase IOC function.

**8SP-404 | Protection**

This Lab covers the configuration and tests of the protection elements: Phase IOC, Phase TOC, Phase Directional OC, Neutral IOC, Load Encroachment, Phase UV, Phase OV, Under Frequency and Over Frequency.

**8SP-405 | Controls**

This lab covers 8 series setpoint groups, breaker control, trip bus, breaker failure, cold load pickup, autoreclose and digital counters.

**8SP-406 | FlexLogic**

This lab covers how to program flex logic equations using logic designer, the basic Boolean FlexLogic equations with Timers and Non-Volatile Latches, FlexElements. User will use previous knowledge of Protection and Control to program one Trip & Close Scheme with FlexLogic equations.

**8SP-407 | IEC61850**

In this lab, you will create a GOOSE message using the IEC61850 Configurator application. You will publish digital signals on one 8Series relay and subscribe to these signals on another 8Series. GOOSE signals will be verified using the Remote Input status for digital signals. Digital signals will be assigned to a LED for further verification.
Each workshop exercise is designed to teach specific steps in setup, configuration, and its application leading to the successful completion of a operating system. What follows is a brief description of each workshop module.

### 8SP-410 | 850 Feeder Protection
This lab covers the advanced protection and controls of feeder relay other than the platform element, like Ntrl Directional, Neg Seq Directional, Ground Directional, Load Encroachment, Cold Load Pickup, Auto Reclose and transfer scheme.

### 8SP-411 | 869 Motor Protection
This lab covers the motor protections, including the configuration of motor protection parameters, thermal model, acceleration time, motor metering, Unbalance (single phase trip), Undercurrent/power, Mechanical Jam, Motor start supervision, VD Motor Curve.

### 8SP-421 | 845 Transformer Protection
This lab will cover the following elements of transformers: Percent differential, 2nd / 5th Harmonic Restraint, Volts/Hertz and Instantaneous differential, Restricted Ground Fault (RGF). The application will involve the calculation and settings implementation of the protection elements listed above. Students are encouraged to bring their own three phase test set.

### 8SP-431 | 889 Generator Protection
This lab covers the generator protections, including 100% Stator Ground, Accidental Energization, Generator unbalance, Loss of excitation, Phase Sequence Reversal, Stator Differential, Volts/Hertz and Third harmonic Undervoltage. Students are encouraged to bring their own three phase test set.
Customize your Learning

To better suit the needs of your business, course customization has been designed to allow you with the flexibility of customizing your own program. Both customized and standard course offerings can be delivered at one of our GE Grid IQ Learning Centre's, or at a location of your choice. Our product training courses comfortably accommodates a learning audience of 12.

How does it work?

Begin with selecting a combination of Product Training and Lab modules as shown below. Customized programs must meet the minimum of six modules which is the equivalent of three business days with a class size of 8-12 participants.

Use our P&C custom course configurator to structure your course and get an instant quote, request at training.multilin@ge.com

---

**Product Modules**

- FMPR
- EnerVista Viewpoint Monitoring
- UR Platform
- 8 Series
- 3 Series
- SR Range
- HardFiber
- Meters
- 650 Series

**Workshop Modules**

- UR labs
- 8 Series labs
- HardFiber labs
- SR Range labs
- 3 Series labs
- Motor & Distribution labs
- Non 61850 system labs
- IEC 61850 system labs
- Advanced labs

**Build Course to meet your needs**

- **Day 1**
  - Module No.1
  - Module No.2

- **Day 2**
  - Module No.3
  - Module No.4

- **Day 3**
  - Module No.5
  - Module No.6

- **Day 4**
  - Module No.7
  - Module No.8

- **Day 5**
  - Module No.9
  - Module No.10
list of products for which training is available on-demand, for more information on these products please refer to the product guides on our web site gegridsolutions@ge.com

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<th>Transformer</th>
<th>Transmission</th>
<th>Bus</th>
<th>Feeder</th>
<th>Motor</th>
<th>Network &amp; Control</th>
<th>Special Functions</th>
<th>Process Bus</th>
<th>Distribution Auto</th>
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</table>

for enquiries on training on these products please contact the learning and development team at training.multilin@ge.com
**Structure**

The Tier 1 through 4 courses are run back to back each quarter, typically with the virtual class sessions and workshops taking place in the last month of the quarter.

All courses have prior coursework before attendance at a virtual class or workshop session, hence course registration deadlines are much earlier than typical classical style training.

This allows for courses to be scheduled to run once every 13 weeks.

The benefits for students is that it allows flexibility:

1. select individual courses and attend them over time or
2. book a block of courses and attend back to back virtual sessions.

To clearly show this we have provided two schedules to show dates by course and dates per each run of the courses in a quarter. We also provide an example to indicate how it works.

**course running order**

**week 1:**
- Monday: Fundamentals of Modern Protection Relaying (TRNG-FMPRV)
- Tuesday: UR Platform (TRNG-URPLV)
- Wednesday: 8 Series (TRNG-8SPV)
- Thursday: EnerVista View Point Monitoring (TRNG-ENVV)

**week 2**
- Mon thru Fri: UR Platform and 8 Series Essentials & Advanced (TRNG-UR8S/UR8SA)

**week 3**
- Mon thru Fri: Motors and Distribution Week (TRNG-MTD/MTR/DIST)

**course timeline example**

Student wishes to attend all virtual sessions back to back over one week.

- **19 Jan**: students must register by the deadline.
- **29 Jan**: GE provides registration confirmation notice to the student, providing virtual meeting and coursework information for all virtual courses.
- **01 Feb**: student attends course virtual session 1 where we walk through the course and answer any questions.
- **01 Feb & 26 Feb**: students completes the coursework and associated testing phase.
- **26 Feb**: students must complete the coursework & testing by the deadline set out in order to proceed.
- **29 Feb & 4 Mar**: students attends the various course virtual class session over the week.
- **15 Mar**: students complete final test by deadline.
- **18 Mar**: courses are deemed closed and completion certificates are issued to students who have successfully completed all elements.
**Schedule Selector, by Course Name/Code**

**Note 1:** All prices are in US$. All dates subject to change without prior notice. Refer to on-line store for current dates  
**Note 2:** Course work required before classroom session

<table>
<thead>
<tr>
<th>Course Name/Code</th>
<th>Course Code</th>
<th>Fee</th>
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<td>Fundamentals of Modern Protection Relaying</td>
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<td>UR Platform</td>
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### Motors & Distribution Essentials | code TRNG-MTDT | fee $3,000

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### UR Platform Essentials | code TRNG-UR | fee $1,800

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### 8 Series Essentials | code TRNG-8SP | fee $1,800

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### UR and 8 Series Essentials | code TRNG-UR8S | fee $3,000

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## Note 1:
All prices are in US$, All dates subject to change without prior notice, Refer to on-line store for current dates

## Note 2:
Course work required before classroom session

## Note 3:
These courses do not have any e-learning, they are straight classroom sessions

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<thead>
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<th>Course Name/Code</th>
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<td>TRNG-UR</td>
<td>$1,800</td>
<td>30-Jan-17</td>
<td>13-Feb-17</td>
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Note 1: All prices are in US$, All dates subject to change without prior notice, Refer to on-line store for current dates

Note 2: Course work required before classroom session
### Q2 2017 (sorted by registration deadline)

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<th>course name</th>
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<th>courses start</th>
<th>class session</th>
<th>courses complete</th>
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### Q3 2017 (sorted by registration deadline)

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<th>registration deadline</th>
<th>courses start</th>
<th>class session</th>
<th>courses complete</th>
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<tbody>
<tr>
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<tr>
<td>8 Series Virtual</td>
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<td>UR and 8 Series Advance</td>
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**Schedule Selector, Courses by Quarter**

**Note 1:** All prices are in US$, All dates subject to change without prior notice, Refer to on-line store for current dates  
**Note 2:** Course work required before classroom session  
**Note 3:** Dates in Red are 2018

### Q4 2017 (sorted by registration deadline)

<table>
<thead>
<tr>
<th>course name</th>
<th>code</th>
<th>fee</th>
<th>course number</th>
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<th>courses start</th>
<th>class session</th>
<th>courses complete</th>
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<tr>
<td>Fundamentals of Modern Protection Relaying</td>
<td>code TRNG-FMPRV</td>
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<td>20-Nov-17</td>
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<td>UR and 8 Series Essentials</td>
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<td>UR and 8 Series Advance</td>
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<td>6-Nov-17</td>
<td>20-Nov-17</td>
<td>22-Jan-18</td>
<td></td>
</tr>
</tbody>
</table>
### Webinars

**Note 1:** there is no fee to attend these webinars  
**Note 2:** webinars run twice on same day at 10am and 8pm Eastern US time zone

**sign up at:**  

#### Protection & Control Webinars | code TRNG-WEB | fee: no charge

<table>
<thead>
<tr>
<th>course name</th>
<th>course number</th>
<th>registration deadline</th>
<th>webinar date</th>
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<tr>
<td>Technical Webinar</td>
<td>Transformer Differential</td>
<td>C170410-1</td>
<td>13-Mar</td>
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<tr>
<td>Technical Webinar</td>
<td>UR IEC 61850 Edition 2</td>
<td>C170411-1</td>
<td>13-Mar</td>
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<tr>
<td>Technical Webinar</td>
<td>3 Pole &amp; Single Pole Auto Reclose</td>
<td>C170705-1</td>
<td>07-Jun</td>
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<tr>
<td>Technical Webinar</td>
<td>Fault Locator</td>
<td>C170706-1</td>
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<td>Technical Webinar</td>
<td>Directional Power &amp; Overcurrent</td>
<td>C171011-1</td>
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<td>Technical Webinar</td>
<td>Arc Flash</td>
<td>C171012-1</td>
<td>13-Sep</td>
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</table>
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