

36TH ANNUAL
HANDS-ON
Relay School

MARCH 11 – 15, 2019



WASHINGTON STATE UNIVERSITY
PULLMAN, WASHINGTON

SPONSORED BY

Western Energy Institute | Washington State University

ONE WEEK FOR ONLY \$700

Applications Accepted November 1, 2018 – January 15, 2019



Professional Education

Academic Outreach and Innovation

WASHINGTON STATE UNIVERSITY

36TH ANNUAL

HANDS-ON Relay School

“ This program is an incredible resource. All the instructors display great passion for the industry and the desire to pass on knowledge. ”

“ Nowhere else can you learn this much in one week. ”

“ The structure of taking senior and experienced technicians and letting them teach, walk through relays, and pass that experience on to upcoming technicians. What an outstanding concept. ”

“ The school provides excellent hands-on training with equipment that I am directly exposed to daily, along with the necessary theory to provide a strong understanding of protection. ”

WesternEnergy
INSTITUTE



Professional Education

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OBJECTIVES OF THE HANDS-ON RELAY SCHOOL

The Hands-On Relay School is a professional development short course that trains protective relay technicians, electrical/power plant technicians, engineers, and protective relay test specialists.

Students are enrolled in one of seven tracks for the duration of the school.

- Basic
- Distribution
- Transmission
- Generation
- Electromechanical
- Automated Relay Testing
- Theory

Students participating in these tracks will:

- Become familiar with manual or automated test methods for a variety of protective relays and test equipment.
- Gain valuable knowledge relating to relay applications and operating characteristics.
- Exchange ideas and resolve problems in an open forum.
- Learn preventative and corrective maintenance methods.

Application

School enrollment is limited, and priority is given to organizations providing Lab Facilitators, Lecturers, Steering Committee support, and Western Energy Institute member utilities. Refer to important application and enrollment procedures at the end of this brochure.

Call for Lab Facilitators

If you are an experienced relay technician who is willing to share your knowledge with others, you can attend the Hands-On Relay School as a lab facilitator. Lab facilitators work with groups of three students in the hands-on labs testing relays and may attend all classroom lectures and school activities. Lab facilitators are not required to pay the application fee and their company receives priority points for students applying for the school. If you are interested, contact WSU Professional Education at **800-942-4978** or **509-335-3530** or sign up at **<http://cm.wsu.edu/hrs>**.

BASIC TRACK

This track is for those students who wish to focus on the calibration, maintenance, testing, and understanding of basic relays. The selection may include overcurrent, differential, distance, reclosing, voltage, or frequency relays. This track is an excellent choice for beginning technicians. [48 students maximum]

Students in this track will:

- Attend the Introduction to System Protection lecture series on Monday.
- Choose six (6) Concurrent Open Lectures to attend on Tuesday.
- Attend the Friday Feature Lecture Presentations.
- Wire an overcurrent and a reclosing relay to a breaker simulator to test and troubleshoot an entire protection circuit.
- Perform hands-on testing in the lab on the following relays:
 - ABB:** IRD9, RC
 - GE:** BDD, CEY51A, IAC
 - SEL:** 751A

..... **Introduction to System Protection Lecture Series**

This lecture series is for beginning relay technicians, newcomers to the relaying field, or anyone who needs the basics. We start with the very basics of relaying to provide a foundation of knowledge upon which to build. The closest thing to “Relaying for Dummies” that Hands-On Relay School has to offer! Taught by experienced system protection personnel, this lecture series will be presented on **Monday only** from **8:00am – 12:00pm**.

Topics include:

- Introduction to Protection Basics and Terminology
Brent Carper, 3AC Engineering
- Technicians Basic Math Review
Bill Unbehaun, Tacoma Power
- Lessons Learned from the Field
Paul Luther, Puget Sound Energy

RELAY SCHOOL

DISTRIBUTION TRACK

This track is for those students who wish to focus on the testing and understanding of multifunction microprocessor relays and recloser controllers used for distribution protection. The selection of relays may include overcurrent, transformer differential, reclosing, synch-check, and frequency protection. [18 students maximum]

[Laptop Computer Required]

Students in this track will:

- Attend the Distribution Overview lecture.
- Choose six (6) Concurrent Open Lectures to attend.
- Attend the Friday Feature Lecture Presentations.
- Perform hands-on testing in the lab on the following relays:

ABB: REF615

Basler: BE1-11F

Beckwith: M7651A D-PAC

Cooper: Form 6

SEL: 351S, 787

..... **Distribution Protection Overview Lecture**

Kevin Damron, Avista, Spokane, WA

This lecture will review fundamental principles of distribution system protection, including IEEE device designations, fault current calculations, coordination of overcurrent protection, and reclosing schemes.



TRANSMISSION TRACK

This track features both electromechanical and micro-processor-based multifunction relays used for protection of transmission equipment, including distance and line current differential protection. [30 students maximum]

[Laptop Computer Required]

Students in this track will:

- Attend the Transmission Overview lecture.
- Choose six (6) Concurrent Open Lectures to attend.
- Attend the Friday Feature Lecture Presentations.
- Perform hands-on testing in the lab on the following relays:

ABB: KD10, REL670

Beckwith: M-3311-A

SEL: 411L, 487E

..... **Transmission Protection Overview Lecture**

TBD, Schweitzer Engineering Laboratories, Inc.

This lecture will review fundamental principles of transmission line protection. Concepts of distance protection, directional overcurrent, line differential, and pilot protection schemes will be discussed.



RELAY SCHOOL

GENERATION TRACK

This track features electromechanical and multifunction microprocessor relays used for transformer and generator differential, over-excitation, stator ground, reverse power, synch-check, negative sequence, and loss of field protection of generators. [24 students maximum] [Laptop Computer Required]

Students in this track will:

- Attend the Generation Protection Overview lecture.
- Choose six (6) Concurrent Open Lectures to attend.
- Attend the Friday Feature Lecture Presentations.
- Perform hands-on testing in the lab on the following relays:

ABB: KLF-1

Basler: BE1-11G

Beckwith: 3425A

GE: CEH51, G60

SEL: 700G/400G

..... Generation Protection Theory and Application Overview Lecture

TBD, Schweitzer Engineering Laboratories, Inc.

This lecture will review fundamental principles of generation protection theory and application with a focus on industry standards and best practices.



ELECTROMECHANICAL TRACK

This track focuses exclusively on electromechanical relays used for line, bus, transformer, or generator protection. More hands-on effort is spent on troubleshooting relay problems, calibrating relays, adjustment techniques, and verifying results. [12 students maximum]

Prerequisite: Basic track or related experience.

Students in this track will:

- Attend their choice of Distribution, Transmission, or Generation Protection Overview Lectures.
- Choose six (6) Concurrent Open Lectures to attend.
- Attend the Friday Feature Lecture Presentations.
- Perform hands-on testing in the lab on the following relays:
ABB: HU, KAB, KD11
GE: CEH51, GCX51, JBCG



RELAY SCHOOL

AUTOMATED TESTING TRACK

This track is intended for technicians who already understand relay operating principals, have experience in manual testing, and are ready to learn automated testing methods.

[Student maximum varies] [Laptop Computer Required]

Note: This track is NOT recommended for those relay technicians who are just starting out. The emphasis of this track is on the test equipment and software, not on the relays. The hands-on labs are taught by the test equipment and software manufacturers, not by the relay manufacturers.

Prerequisite: Experience in manual relay testing and computer use. A laptop computer will be used to communicate with the relays and/or the test set. All students must have administrative rights to their laptop, with the appropriate software pre-loaded.

Students in this track will:

- Attend their choice of Distribution, Transmission, or Generation Protection Overview Lectures.
- Choose six (6) Concurrent Open Lectures to attend.
- Attend the Friday Feature Lecture Presentations.
- Perform hands-on testing in the lab using one of the following testing software platforms:

Doble

Enoserv RTS

KoCoS

Manta

Megger RTMS

Omicron

Some test software vendors will offer both a Beginning and an Advanced section, depending on enrollment and skill level of the students. Beginning automated testing still requires a prerequisite understanding of manual testing.

Beginning Tracks will cover the following:

- Building of test plans
- Macros used for testing basic relay functions

Advanced Tracks will cover the following:

- Worksheets and advanced software features
- Quad Element Testing
- Breaker simulators
- Playback features
- End-to-end testing

THEORY TRACK

This track provides more in-depth training on the application and theory of operation of protection systems utilized in the power system. This track does not normally include any hands-on training with relays, but will include some hands-on use of your laptop. [Laptop Computer Required]

Emphasis this year will be on Distribution concepts and applications.

Note: The theory track is for the journeyman relay technician and relay engineer. It is NOT recommended for those relay technicians who are just starting out. Instructors and lecturers for the theory track are considered to be experts in their field. Students are expected to bring their own laptop PC with administrative privileges over the operating system sufficient to load vendor software.

Students in this track will:

- Attend the Distribution Overview lecture.
- Choose six (6) Concurrent Open Lectures to attend.
- Attend the Monday and Tuesday PM and all day Wednesday and Thursday Lectures.
- Attend the Friday Feature Lecture Presentations.
- Attend the advanced topic lectures throughout the week, as follows.

.....
Arc Flash

Samy Faried, ABB, Inc.

This lecture will include understanding arc flash hazards, arc flash hazard analysis methods, arc flash warning labels, mitigation methods for arc flash, arc flash detection systems and testing arc flash detection systems.

.....
Distribution Protection

Jeanne Harshbarger, Snohomish County PUD

Protection of distribution systems has many unique and interesting challenges. We will cover the objectives of protection, look at some examples, review equipment available for use, and consider how distribution protection is evolving with the changing times.

RELAY SCHOOL

THEORY TRACK

..... **Distribution Circuit Phasing**

Brent Carper, 3AC Engineering, Greg Sharpes, Avista Utilities and Walter Collins, Puget Sound Energy

Understanding the as-built phasing of a distribution circuit is necessary for fault analysis and troubleshooting, and it is critical for line reclosers and other devices that are going to perform distribution automation and advanced protection functions such as negative sequence overcurrent. This session will review common conventions for distribution line construction phasing and will demonstrate how to use the HMI phasor displays available in line reclosers to troubleshoot common circuit phasing issues. Weather dependent, the class will visit an in-service 13kV line recloser installation where the local utility will perform a live demonstration of modern tools that use GPS and cellular IP data to make positive phase identification at any location in the power system.

..... **Distributed Generation: Interconnection, Operation and Protection**

Wayne Hartmann, Beckwith Electric Co., Inc.

This session provides solid background on distributed generation (DG) from multiple aspects: industry history, types, operational sequences, benefits to Utilities and Owners, control, example guidelines, IEEE 1547 and point-of-common coupling (PCC) interface to culminate and focus on protection aspects at the PCC as well as impact on distribution protection. Lab sessions include examination of documentation for a DG installation to culminate on typical protection settings. Various relays will be used to accomplish the protection mission, settings made on the relays, and impact of settings discussed.

..... **Wind Energy**

Roy Moxley, Siemens

This discussion will provide information on wind generation and how it impacts the grid and protection in particular. An overview of machine types and their performance will be provided. Connections to the grid and problems encountered will be presented. Protection solutions will be presented and future developments discussed.

CONCURRENT OPEN LECTURES

The Hands-On Relay School offers twelve lectures on a wide range of topics relevant to the trade. Each lecture is one (1) hour long and given a total of three times. Students can attend up to six (6) lectures of their choosing.

.....
Arc Flash Protection

Joe Xavier, ABB

Arc flash incidents do occur in indoor switchgear installations. There are several factors which can initiate an arc flash event. Such an event can cause serious damage to the equipment, injure operating personnel, and result in loss of revenue. This lecture will review probable reasons behind arc flash incidents, parameters which influence the incident energy, and arc flash detection and mitigation techniques.

.....
DC Ground Detection

Eric Haut, Portland General Electric

Unmitigated ground paths on ungrounded DC systems pose a threat to reliability and safety. The technology for monitoring and troubleshooting DC grounds has evolved over the decades. This lecture will cover the simple dual-lightbulb monitoring of the past up to today's digital monitoring systems. Watch hands-on demonstrations of troubleshooting methods, from the simple-but-effective resistive jumper to computerized DC ground locators.

.....
Energy Storage

Steve Larson, Snohomish PUD

Energy storage will become increasingly important to electric utilities, as more renewable energy sources are added to the generation mix replacing base-load fossil fuel plants. Battery-based storage systems are being added to utility systems at a rapid rate. This lecture will describe various types of energy storage, including Pumped Hydro Storage, flywheels, compressed air, and the various battery technologies. Mr. Larson will also discuss two operating battery energy storage systems installed at Snohomish PUD, a lithium-ion system installed in 2014/2015 and a vanadium flow battery installed in 2017.

RELAY SCHOOL

CONCURRENT OPEN LECTURES

.....

Fault Analysis for Technicians

TBD, Schweitzer Engineering Laboratories, Inc.

Event reports continue to be an invaluable feature in microprocessor-based relays. Some events are relatively straightforward to analyze, and others require experience and considerable knowledge of the power system and protective relay system in order to find the root cause. This session provides an outline of the event analysis process, several real-world event examples, time to evaluate them, and solutions.

.....

Ground Mho

Steve Laslo, Bonneville Power Administration

This lecture will cover fundamentals of Ground-Distance Relay Protection and Testing. We will examine principles that affect relay settings and decision-making and introduce ground-distance relay concepts such as 'compensation factor/ K_n ', 'per-phase impedance', and 'loop impedance'. We will also discuss how to calculate test quantities for ground-mho and ground-quad characteristics and examine some sample automated test results.

.....

Mho Testing Techniques & Math (Ph-Ph)

Rodger Allen, ACS Professional Staffing

Learn or re-visit the considerations to take and the math behind selecting the voltages and currents to test the characteristics of phase-to-phase mho distance units effectively and efficiently. Students will put to use the skills learned from vector math like taught in the phasor lecture by participating in phase-to-phase voltage & current calculations. Test equipment, meters & relays are used to demonstrate those calculations.

CONCURRENT OPEN LECTURES

.....
Phasors

Steve Laslo, Bonneville Power Administration

Phasors are the universal language of system protection technicians and engineers. This lecture emphasizes the need for a basic knowledge of phasor diagrams and their use in understanding the power system. Topics include load flow phasor analysis, fault phasor analysis, and using phasors to determine the phase angle across delta-wye transformers banks.

.....
SCADA for Relay Technicians

Tracy Kealy, Bonneville Power Administration

Covers aspects of SCADA that most affect relay technicians. This includes an overview of Distributed Network Protocol (DNP) 3.0, Modbus, and troubleshooting common errors from the protective relay/IED configured as a DNP3 or Modbus slave.

.....
Testing Breaker Failure Schemes

Chris Werstiuk, Valence Electrical Training Services

Relay testers who want to test breaker failure (50BF) schemes should understand how 50BF schemes are applied, how to perform basic relay testing tasks, and how to interpret and simulate relay logic schemes. This lecture will help you understand and simulate the three main parts of breaker failure protection (50BF initiate, Breaker open/close status, and 50BF time delay) to help you create effective breaker failure test plans that can be applied to any relay with any test-set.

.....
Transformer Aux Protection

Brent Carper, 3AC Engineering

Transformer protection includes specialized equipment such as sudden pressure relays, Buchholz relays, temperature monitors, liquid level gauges, gas and moisture monitors, and other devices. This lecture will cover these auxiliary devices and how they function, including trip circuit seal-in, targeting, and lockout relays.

RELAY SCHOOL

CONCURRENT OPEN LECTURES

.....

Two- & Three-Winding Transformer Connections and Circulating Currents

Abdur Rehman, Puget Sound Energy

This presentation explores common 2- and 3-winding transformer connections and how positive, negative, and zero sequence currents circulate during phase and ground fault conditions. Transformer sequence networks and associated symmetrical components are analyzed.

.....

Understanding and Troubleshooting Real-World Power Quality Problems

TBD, Schweitzer Engineering Laboratories, Inc.

This session will be an introduction to the characteristics of power quality (PQ) problems. Real-world examples will be reviewed. The discussion will include symptoms, tools for analysis and prevention measures.

FRIDAY FEATURE PRESENTATIONS

.....
Falling Conductor Protection

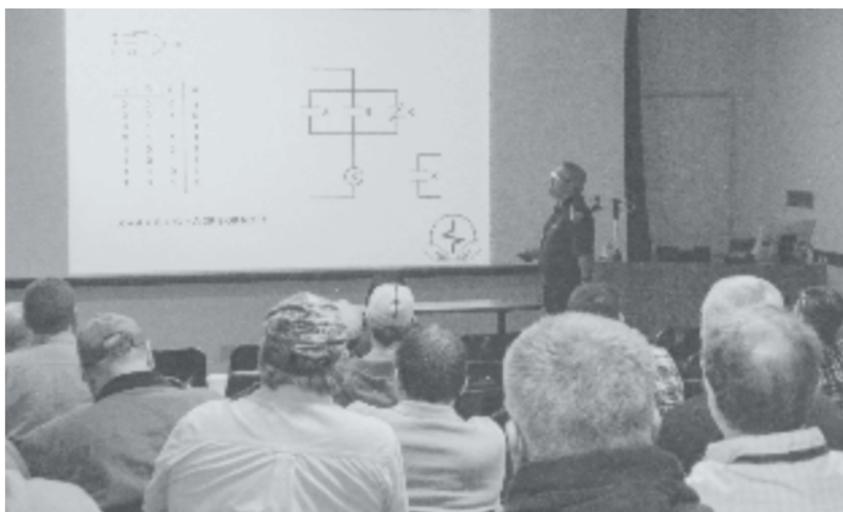
Kirsten Petersen, San Diego Gas & Electric

SDG&E is implementing Falling Conductor Protection on its distribution system to minimize the risk of wildfire ignition and other potential impacts to public safety. Falling Conductor Protection utilizes advanced relay, phasor measurement, radio, and IT communications technology to detect broken overhead conductors and de-energize distribution circuits before the line can reach the ground. This technology is currently undergoing testing and has been implemented on four of SDG&E's existing distribution circuits, with two more scheduled to be completed this year.

.....
Root Cause Analysis for System Protection

Rich Bauer, NERC

Root Cause Analysis (RCA) has been demonstrated to be a critical tool in the prevention of events, especially in the area of human performance errors. System Protection is a very complex function that has a high opportunity for human error. With the ever increasing complexity of relay settings, control logic schemes and requirements for periodic testing, the opportunity for errors/misoperations is greater than ever. RCA can help us to learn from our events and implement the right measures to prevent future similar events. This presentation will discuss some of the tools and methods of RCA as well as discuss actual events and their corrective actions after an RCA was performed.



RELAY SCHOOL

2019 SCHEDULE AT A GLANCE

The Hands-On Relay School is held on the Washington State University campus in Pullman, Washington. Evening events and Sunday check-in registration are held at the University Inn Best Western in Moscow, Idaho, or as noted.

Sunday, March 10

- 3:00-6:00 PM **Facilitator Lab Set Up** (EE/ME 44)
- 5:30-7:30 PM **Registration & Reception** (University Inn)
- 7:00-8:00 PM **Lab Facilitator Meeting** (University Inn)

Monday, March 11

- 6:45-7:30 AM **Registration**
- 7:30 AM-Noon **Opening Announcements**
Safety Presentation
Overview Lectures
Concurrent Open Lectures
Introduction to System Protection
Lecture Series
- 1:00-5:00 PM **Hands-on Lab Instruction**
- 5:00 PM **Optional Social Get-Together at Zeppo's**

Tuesday, March 12

- 7:30 AM-Noon **Concurrent Open Lectures**
- 1:00-5:00 PM **Hands-on Lab Instruction**
- 6:30-9:00 PM **Suppliers Showcase** (University Inn)

Wednesday, March 13

- 7:30 AM-Noon **Hands-on Lab Instruction**
- 1:00-5:00 PM **Hands-on Lab Instruction**
- 6:30-9:00 PM **Banquet & Entertainment** (University Inn)

Thursday, March 14

- 7:30 AM-Noon **Hands-on Lab Instruction**
- 1:00-5:00 PM **Hands-on Lab Instruction**

Friday, March 15

- 7:30-8:00 AM **Closing Remarks**
- 8:00-11:30 AM **Friday Feature Presentations**

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STEERING COMMITTEE

Chris Gallacher	<i>Chair, Bonneville Power Administration</i>
Karl Cabrera	<i>Salt River Project</i>
Chris Bolton	<i>San Diego Gas & Electric</i>
Bryan Focht	<i>Portland General Electric</i>
Scott Hanson	<i>Washington State University</i>
Cliff Harris	<i>Idaho Power Company</i>
Calvin Howard	<i>Avista Utilities</i>
Tamara Kirk	<i>Washington State University</i>
Stephen Marx	<i>Bonneville Power Administration</i>
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Randy Turnley	<i>Puget Sound Energy</i>
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Beverly Woolf	<i>Western Energy Institute</i>
Louis Wright	<i>Bonneville Power Administration</i>
Diana Zoren	<i>Western Energy Institute</i>

RELAY SCHOOL

CONTRIBUTING ORGANIZATIONS

The Hands-On Relay School Steering Committee gratefully acknowledges the following organizations for their generous contributions of equipment and support personnel.

- | | |
|-----------------------------------|---------------------------------------|
| 3AC Engineering | OMICRON |
| ABB Power T&D Company Inc. | PacifiCorp |
| ACS Professional Staffing | Pacific Gas & Electric Company |
| Avista Utilities | Peak Measure |
| Basler Electric Company | Pegasus–Global |
| Beckwith Electric Company | Portland General Electric |
| Benton County PUD | POWER Engineers |
| Bonneville Power Administration | Power Testing and Energization Inc. |
| BSC Engineered Systems | PPL Montana |
| Central Electric Cooperative Inc. | Puget Sound Energy |
| Central Lincoln PUD | Relay Application Innovation |
| Chelan County PUD | RFL Electronics Inc. |
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| Clark Public Utilities | Sacramento Municipal Utility District |
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| Doble Engineering Company | San Diego Gas & Electric |
| Douglas County PUD | Schneider Electric |
| Emerson | Schweitzer Engineering Laboratories |
| Energy Northwest | Seattle City Light |
| ENOSERV | Siemens |
| Eugene Water & Electric | SMC Inc. |
| Franklin County PUD | Snohomish County PUD |
| GE Digital Energy – Multilin | Tacoma Power |
| Grant County PUD | Tri-State G&T |
| Idaho Power Company | U.S. Army Corps of Engineers |
| Manta Test Systems | U.S. Bureau of Reclamation |
| Matanuska Electric Association | Washington State University |
| Megger | Western Area Power Administration |
| MWH | Western Energy Institute |
| NorthWestern Energy | |
| NV Energy | |

SCHOOL INFORMATION

..... **Application Process and Fees**

- Application is online at <http://cm.wsu.edu/hrs>
- School fee of \$700 includes electronic copies of lecture notes, Sunday night reception, Tuesday night Vendor Showcase, Wednesday night banquet meal, break refreshments, and parking fees.
- Payment is due by the start of the school. There will be a \$50 late fee assessed to any registrant who has not paid by 30 days after the school.
- Priority is given to utilities providing lab facilitators, lecturers, steering committee support, and Western Energy Institute member utilities, if the application is received by January 15, 2019. Remaining slots will be filled on a first-come, first-served basis.
- Applicants select which track they wish to attend in order of preference. Every effort will be made to place students into their preferred track, but track placement is by availability and subject to the priorities as described above. Many tracks will fill up and students may not be able to get their preferred track. If we are unable to place you in a track you have selected, or in an acceptable substitute track, your full application fee will be refunded.
- Students will be notified in writing no later than February 5, 2019, of their acceptance into the school and track placement. **You are not accepted to attend unless you receive the confirmation of acceptance from WSU.**
- Questions? Call **800-942-4978** or **509-335-3530** or email us at handsonrelay@wsu.edu. Visit our website at conferences.wsu.edu.

RELAY SCHOOL

SCHOOL INFORMATION

..... **Accommodations and Travel**

Please make your own travel and hotel reservations once you have received registration confirmation. The Pullman/Moscow Airport is served by Alaska/Horizon Airlines. Spokane International Airport is 80 miles north of Pullman. Holiday Inn Express (509-334-4437) in Pullman, and the University Inn (208-882-0550) in Moscow, Idaho, have rooms blocked for this event and all will provide local transportation upon request.

..... **Cancellation Policy**

Your complete application fee will be refunded if WSU receives your written cancellation notice by **February 20, 2019**. Cancellations made after February 20 are subject to a processing fee of \$350. Students who do not attend and have not cancelled by March 7 are responsible for the full application fee. Substitutions may be made at any time.

Cancellations and substitutions should be emailed to: **handsonrelay@wsu.edu**.

..... **Program Changes and Cancellations**

WSU reserves the right to make changes in programs or speakers or to cancel programs if enrollment criteria are not met. In the unlikely event that this school is cancelled, Washington State University's liability is limited to refund of registration fees. If we are unable to place you in a track you have selected or an acceptable substitute track, your full registration will be refunded.



SCHOOL INFORMATION

.....
Americans with Disabilities Act

Accommodations for individuals who qualify under the Americans with Disabilities Act are available upon request. Please contact us at least ten (10) days before the school at **800-942-4978** or **509-335-3530**, email **wsuconf@wsu.edu**.

.....
Continuing Education Units (CEUs)

CEUs are available to participants who complete a CEU enrollment form prior to the start of the school and satisfactorily complete the requirements for the class. CEUs are nationally recognized units of achievement that may be used as evidence of professional development and for job advancement. One CEU is awarded for every 10 hours of instruction, totaling 3.6 for this school. A fee of \$10 must accompany the registration fee to receive the CEU credits.

.....
Promotional Video

Need help convincing your organization about the benefits of attending the Hands-On Relay School? Contact us today to request your copy of our promotional video that demonstrates the invaluable training experience of attending this school or view the video at **www.youtube.com/watch?v=Tu5GmeJg7r0**. Call **800-942-4978** or **509-335-3530** or email us at **wsuconf@wsu.edu** for more information.



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MARCH 11 – 15, 2019

#2089

BY MAIL:

Washington State University
Conference Management
PO Box 645222
Pullman, WA 99164-5222

BY EMAIL: handsonrelay@wsu.edu
ONLINE: cm.wsu.edu/hrs

Please print or type. For additional applicants, please duplicate this form.
To significantly increase your chances of being accepted, send a facilitator.

Name: _____

Organization: _____

Title: _____

Address: _____

City: _____

State/Province: _____

Zip/Postal Code: _____

Country: _____

Phone: _____

Fax: _____

Attendee email (required): _____

TRACK SELECTION

NUMBER only the tracks you will accept in order of preference (1 being your first choice). A letter of confirmed registration and track assignment will be emailed on February 5, 2019. Students will not be allowed to switch tracks once the school has begun.

Manual Relay Testing

- Basic
- Distribution
- Transmission
- Generation
- Electromechanical
- Theory

Automated Relay Testing

- Doble (Beginning)
- Doble (Advanced)
- Enoserv (Beginning)
- Enoserv (Advanced)
- KoCoS
- Manta
- Megger RTMS
- Omicron (Beginning)
- Omicron (Advanced)

SCHOOL FEE

- \$700 Please register me for the school
(Checks payable to Washington State University,
payment in U.S. funds drawn on a U.S. bank.)
- \$10 I would like Continuing Education Units (CEUs).

PAYMENT METHOD

- Check enclosed
- Please call 509-335-3530/800-942-4978 to pay by **Visa** or **MasterCard**
after submitting the form
- Bill my company, purchase order no. _____
- Bill to email _____



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Po Box 645222
Pullman, WA 99164-5222



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