

Hands-on Relay School Schedule

SUNDAY, MARCH 12, 2017

3:00-6:00p.m. Facilitator Lab Station Set-up

EE/ME Laboratory Rooms

5:30 - 7:30 p.m. Registration & Reception

University Inn, Moscow, ID

7:00 – 8:00 p.m. Facilitator Meeting

University Inn, Moscow, ID

MONDAY, MARCH 13, 2017

6:45 - Registration & Refreshments

7:30 Todd Hall, Main Atrium

7:30 - Welcome & Announcements

Todd Hall 116

7:40 - Safety and Human Performance

Todd Hall 116

8:00 TRACK OVERVIEW LECTURES

Distribution Todd Hall 120

Generation Todd Hall 125

Transmission Todd Hall 130

Doble Todd Hall 133

Enoserv RTS Todd Hall 230

Megger AVTS Todd Hall 226

Noram SMC Todd Hall 204

Omicron Todd Hall 220

Theory Todd Hall 216

Electromechanical Todd Hall 120, 125, or 130

**Electromechanical Track attend choice of Distribution, Generation or Transmission Overview

Basic Todd Hall 116

**Basic Track attend the Introduction to System Protection Lecture Series

8:00 Series Topic: Introduction to Protection Basics and Terminology

9:40 Break - Todd Hall Atrium

9:50 CONCURRENT OPEN LECTURES

• Basic Math Review for Relay Techs Todd Hall 125

• Symmetrical Components 1 Todd Hall 130

• Substation Commissioning Todd Hall 133

• Transformer Protection Todd Hall 216

• The X, Y, and Z of Circuit Breaker Control Todd Hall 120

• Communication Aided Tripping Todd Hall 230

Introduction to System Protection Lecture Series (continued) Todd Hall 116

9:50 Series Topic: Technicians Basic Math Review

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11:00 CONCURRENT OPEN LECTURES

- Symmetrical Components 2 Todd Hall 130
 - Fault Analysis for Relay Technicians Todd Hall 133
 - Bus Protection Todd Hall 216
 - CT Testing Todd Hall 120
 - Series Capacitors Todd Hall 230
- Introduction to System Protection Lecture Series** (continued) Todd Hall 116
11:00 Series Topic: Introduction to Phasors including Phasor Math

12:00 Lunch on your own

Following lunch, all students will move to the EE/ME, Sloan Hall, and Carpenter Hall for the remainder of the day.

1:00

- **Basic - Introduction to System Protection Lecture Series** (continued) Sloan 175
- Basic students attend:
1:00 Series Topic: Mho Testing Techniques and Math
2:00 Series Topic: Lessons Learned from the Field
- Basic Lab Facilitators report to EE/ME B54

HANDS-ON EXPERIENCE IN THE LAB

- **Distribution:** Beckwith: M7651M EE/ME 56
- **Generation:** SEL: 700G Sloan 169
- **Transmission:** ABB: KD10 EE/ME 34
- **Electromechanical:** GE: PVD Sloan 150
- **Doble Advanced:** ABB: HU Sloan 5
- **Doble Beginning:** ABB: CO Sloan 7
- **Enoserv Advanced:** ABB: HU Sloan 9
- **Enoserv Beginning:** ABB: CO Sloan 46
- **Megger:** GE: IAC Sloan 38
- **Noram SMC:** GE: IAC Sloan 167
- **Omicron Advanced:** ABB: HU Sloan 161
- **Omicron Beginning:** ABB: CO Sloan 163
- **Theory:** IEC 61850 Carpenter 101/102

3:00 **Break** - EE/ME Building outside Room 26 & B54, Automated Tracks near Sloan 7 & 169

3:10 CONTINUE LABORATORY TESTING

- **Basic:** GE: IAC EE/ME B54
- **Electromechanical:** GE: INC77 Sloan 150

5:00 Adjourn

Dinner on your own

Optional Social Get Together at Birch & Barley

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TUESDAY, MARCH 14, 2017

7:30 CONCURRENT OPEN LECTURES

- Basic Math Review for Relay Techs Todd Hall 125
- Symmetrical Components 1 Todd Hall 130
- Substation Commissioning Todd Hall 133
- Transformer Protection Todd Hall 216
- The X, Y, and Z of Circuit Breaker Control Todd Hall 120
- Communication Aided Tripping Todd Hall 230

8:40 CONCURRENT OPEN LECTURES

- Phasor Diagrams Todd Hall 125
- Symmetrical Components 2 Todd Hall 130
- Fault Analysis for Relay Technicians Todd Hall 133
- Bus Protection Todd Hall 216
- CT Testing Todd Hall 120
- Series Capacitors Todd Hall 230

9:40 Break - Todd Hall Atrium

9:50 CONCURRENT OPEN LECTURES

- Basic Math Review for Relay Techs Todd Hall 125
- Symmetrical Components 1 Todd Hall 130
- Substation Commissioning Todd Hall 133
- Transformer Protection Todd Hall 216
- The X, Y, and Z of Circuit Breaker Control Todd Hall 120
- Communication Aided Tripping Todd Hall 230

11:00 CONCURRENT OPEN LECTURES

- Phasor Diagrams Todd Hall 125
- Symmetrical Components 2 Todd Hall 130
- Fault Analysis for Relay Technicians Todd Hall 133
- Bus Protection Todd Hall 216
- CT Testing Todd Hall 120
- Series Capacitors Todd Hall 230

12:00 Lunch on your own

Following lunch, all students will move to the EE/ME & Sloan Halls for the remainder of the day.

1:00 HANDS-ON EXPERIENCE IN THE LAB

- **Basic:** ABB: RC EE/ME B54
- **Distribution:** Cooper: Form 6 EE/ME 56
- **Generation:** SEL: 700G Sloan 169
- **Transmission:** ABB; RED670 EE/ME 34
- **Electromechanical:** GE; GCX51 Sloan 150
- **Doble Advanced:** SEL: 421 Sloan 5
- **Doble Beginning:** GE: JBCG Sloan 7
- **Enoserv Advanced:** SEL: 421 Sloan 9
- **Enoserv Beginning:** GE: JBCG Sloan 46
- **Megger:** GE: JBCG Sloan 38
- **Noram SMC:** GE: JBCG Sloan 167
- **Omicron Advanced:** SEL: 421 Sloan 161

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- **Omicron Beginning:** GE: JBCG Sloan 163
- **Theory:** Power Line Carrier Carpenter 101/102

3:00 Break - EE/ME Building outside Room 26 & B54, Automated Tracks near Sloan 7 & 169

3:10 CONTINUE LABORATORY TESTING

- **Basic:** Basler: BE1-79A / BE1-27/59 EE/ME B54
- **Generation:** Beckwith: 3425A Sloan 169

5:00 Adjourn

Dinner on your own

6:30 - 9:00 SUPPLIER'S SHOWCASE

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WEDNESDAY, MARCH 15, 2017

7:30 HANDS-ON EXPERIENCE IN THE LAB

- **Basic:** GE: BDD EE/ME B54
- **Distribution:** ABB: REF615 EE/ME 56
- **Generation:** Beckwith: 3425A Sloan 169
- **Transmission:** GE: L90 EE/ME 34
- **Electromechanical:** ABB: KD11 Sloan 150
- **Doble Advanced:** SEL: 421 Sloan 5
- **Doble Beginning:** Basler: BE1-81O/U Sloan 7
- **Enoserv Advanced:** SEL: 421 Sloan 9
- **Enoserv Beginning:** Basler: BE1-81O/U Sloan 46
- **Megger:** ABB: HU Sloan 38
- **Noram SMC:** ABB: HU Sloan 167
- **Omicron Advanced:** SEL: 421 Sloan 161
- **Omicron Beginning:** Basler: BE1-81O/U Sloan 163
- **Theory:** RS-232 Standard, Modems, and PSTN Connectivity Carpenter 101/102

10:00 Break - EE/ME Building outside Room 26 & B54, Automated Tracks near Sloan 7 & 169

10:10 CONTINUE LABORATORY TESTING

12:00 Lunch on your own

1:00 HANDS-ON EXPERIENCE IN THE LAB

- **Basic:** ABB: IRD9 EE/ME B54
- **Distribution:** SEL: 351S EE/ME 56
- **Generation:** Basler: BE1-11G Sloan 169
- **Transmission:** GE: L90 EE/ME 34
- **Electromechanical:** GE: JBCG Sloan 150
- **Doble Advanced:** SEL: 421 Sloan 5
- **Doble Beginning:** ABB: HU Sloan 7
- **Enoserv Advanced:** SEL: 421 Sloan 9
- **Enoserv Beginning:** ABB: HU Sloan 46
- **Megger:** SEL: 311C Sloan 38
- **Noram SMC:** SEL: 311C Sloan 167

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- **Omicron Advanced:** SEL: 421 Sloan 161
- **Omicron Beginning:** ABB: HU Sloan 163
- **Theory:** RS-232 Standard, Modems, and PSTN Connectivity Carpenter 101/102

3:00 Break - EE/ME Building outside Room 26 & B54, Automated Tracks near Sloan 7 & 169

3:10 CONTINUE LABORATORY TESTING

- **Transmission:** GE: PVD EE/ME 34
- **Theory:** IRIG Timecode and relays/Relay Communication Carpenter 101/102 Schemes

5:00 Adjourn

6:00 Social, No-host Bar

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6:30 - 9:00 BANQUET AND ENTERTAINMENT

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THURSDAY, MARCH 16, 2017

7:30 HANDS-ON EXPERIENCE IN THE LAB

- **Basic:** GE: CEY51A EE/ME B54
- **Distribution:** GE: F60 EE/ME 56
- **Generation:** Siemens: 7UM621 Sloan 169
- **Transmission:** SEL: 411L EE/ME 34
- **Electromechanical:** ABB: KLF1 Sloan 150
- **Doble Advanced:** SEL: 421 Sloan 5
- **Doble Beginning:** SEL: 311C Sloan 7
- **Enoserv Advanced:** SEL: 421 Sloan 9
- **Enoserv Beginning:** SEL: 311C Sloan 46
- **Megger:** SEL: 311C Sloan 38
- **Noram SMC:** SEL: 311C Sloan 167
- **Omicron Advanced:** SEL: 421 Sloan 161
- **Omicron Beginning:** SEL: 311C Sloan 163
- **Theory:** IP Based Data Communication Networks Carpenter 101/102

10:00 Break - EE/ME Building outside Room 26 & B54, Automated Tracks near Sloan 7 & 169

10:10 CONTINUE LABORATORY TESTING

12:00 Lunch on your own

1:00 HANDS-ON EXPERIENCE IN THE LAB

- **Basic:** SEL: 551 EE/ME B54
- **Distribution:** SEL: 787 EE/ME 56
- **Generation:** GE: CEX57/GSY51 Sloan 169
- **Transmission:** SEL: 411L EE/ME 34
- **Electromechanical:** ABB: HU Sloan 150
- **Doble Advanced:** SEL: 421 Sloan 5
- **Doble Beginning:** SEL: 311C Sloan 7

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- **Enoserv Advanced:** SEL: 421 Sloan 9
- **Enoserv Beginning:** SEL: 311C Sloan 46
- **Megger:** SEL: 311C Sloan 38
- **Noram SMC:** SEL: 311C Sloan 167
- **Omicron Advanced:** SEL: 421 Sloan 161
- **Omicron Beginning:** SEL: 311C Sloan 163
- **Theory:** Cyber Security Carpenter 101/102

3:00 Break - EE/ME Building outside Room 26 & B54, Automated Tracks near Sloan 7 & 169

3:10 CONTINUE LABORATORY TESTING

5:00 Adjourn
Dinner on your own

FRIDAY, MARCH 17, 2017

*All tracks will convene in
Todd Hall 116 for this day*

7:30 REVIEW OF THE WEEK

7:45 FEATURE PRESENTATION
Switching Incident Lessons Learned – Ty Ehrman & Bob Lemon, Grant County PUD

9:00 Break

9:15 FEATURE PRESENTATION
Ukrainian Power System Cyber Attack – Roger Alexander, Schweitzer Engineering Laboratories, Inc.

10:30 ADJOURN

PLEASE TURN IN YOUR EVALUATIONS!
THANK YOU!