

Registration

Ways to Register

1. Call 423-425-4344 with your credit card information.
2. Fax the completed registration form to 423-425-4170.
3. Pay online at <http://www.utc.edu/ce> scroll to Register Online
4. Send the completed registration form to:
UTC Continuing Education, Dept. 5255
615 McCallie Ave
Chattanooga, TN 37403.

Cancellation Policy – Registrants are responsible for the entire invoice amount unless cancellation is received in writing and in advance. Individuals canceling will be charged a \$75 cancellation fee. Refunds will not be granted after the course begins.

Tax Deductions – An income tax deduction is allowed for expenses of education, including registration fees, travel, meals and lodging undertaken to maintain and improve professional skills.



Registration Form

Name _____ SSN# _____

Address _____

City, State, Zip _____

Phone (Home) _____ (Work) _____ (Fax) _____

Company (if PO used) _____

Attention _____

Seminar on Generator Protection (Course # 10300300)
August 11-14, 2008
8:30 a.m.—4:30 p.m.
\$1,295 (materials included)

Method of Payment

Cash Visa MC Check PO _____
Number

Account Name _____

Credit Card # and Expiration Date _____

Signature _____

The University of Tennessee at Chattanooga
The Division of Continuing Education
119 Race Hall, Dept 5255
615 McCallie Avenue
Chattanooga, TN 37403-2598

The University of Tennessee
at Chattanooga
College of Engineering
and Computer Science
in cooperation with the
Division of
Continuing Education



UTC / TVA Relay Laboratory

Present...

A Seminar on **Generator Protection**

August 11-14, 2008
8:30 a.m.—4:30 p.m.
UTC Engineering,
Math, and Computer Science Building
Chattanooga, TN

<http://www.utc.edu/EngineeringandComputerScience>

Course Outline

This course explores the fundamental principles of relaying, fault analysis, and electrical machines. It provides an in depth study of generator protection including the latest developments in IEEE Standards and Guides. Students will participate in actual set point calculations.

Who Should Attend

Electric-power utility engineers who need in depth understanding of the design concepts and methods used in protecting generation systems. Engineers with protective relaying equipment supply companies. University power system educators and graduate students.

Prerequisites

Participants should have an electrical engineering degree or equivalent experience and basic knowledge of symmetrical components, protective relay and power system protection.

Course Materials

Class notes :

J. Lewis Blackburn and Thomas A. Domin, Protective Relaying Principles & Applications, 3rd edition, CRC, Inc., 2007.

Copies of the book will be provided. You need to bring a scientific calculator to class.

What is Covered:

1. Generator Fundamentals
 - Synchronous machines
 - Prime mover considerations
 - Connections to the power system
2. Machine Grounding Methods
 - High impedance
 - Low impedance
 - Resonant
3. Fault Calculation
 - Per unit system
 - Symmetrical components
 - Fault analysis
 - Example of machines faults and abnormal conditions

What is Covered (Continued):

4. Protection
 - GSU transformer phasing
 - GSU and generator overall, 87T, 87G
 - Generator phase differential, 87G
 - GSU restricted earth fault protection, 87N
 - phase standard transformer connection & CTs connection for differential
 - Stator ground fault protection
 - Neutral fundamental overvoltage, 59GN
 - Third harmonic neutral undervoltage, 27TN
 - Third harmonic differential, 87TN
 - Injection Methods
 - Student participation - calculate 60Hz voltage expected at neutral for solid ground faults along the length of the stator
 - Loss-of-field, 40
 - Unbalanced currents
 - Out-of-step, 78
 - Overexcitation, 24
 - Overvoltage, 59
 - Reverse Power, 32R
 - Field ground faults
 - Abnormal freq, 81
 - Loss of potential “60FL”
 - System Phase fault backup
 - Ground fault backup
 - Generator breaker failure
 - Inadvertent energization
5. Auxiliary Systems
 - Motor bus transfer methods used with auxiliary systems & concerns
 - Motor protection

Course Administrator

For more information about this course please contact Continuing Education at 423-425-4344

or Professor Ahmed Eltom at ahmed-eltom@utc.edu
Voice 423-425-4381

Note

Please check the **Power Systems Management Certificate** <http://www.utc.edu/EngineeringAndComputerScience/engm/certificates.php>.

Course Instructors

Dr. Ahmed H. Eltom, Distinguished Teaching Professor of Electrical Engineering at UTC. He is an expert in the areas of energy efficient systems, energy conservation, power system protection, advanced motor modeling, and fault analysis.

He has been teaching power system analysis and protection for over 20 years. He developed state of the art industry grade relay laboratory. The laboratory is an educational and research tool for undergraduate and graduate students as well as a training facility for industry engineers. He is the author of Energy Efficient Motors Reference Guide, the University Press of the Pacific, 2005. He has published numerous articles in the areas of system protection, motor modeling, and energy conservation.

Dr. Eltom was a Fulbright Scholar, a consultant for the African development bank, Tennessee Valley Authority and the recipient of the Distinguished Teaching Professorship. He is a senior member of the IEEE, the former chair of the IEEE PES section in the greater Chattanooga area, and a registered professional engineer in the state of Tennessee. Dr. Eltom's webpage is <http://www.utc.edu/EngineeringAndComputerScience/facultystaff/aeltom.php>.

Russell W. Patterson is a consultant in power system protection and control with 17 years in the industry. Prior to entering full time consulting he was Manager of System Protection & Analysis for the Tennessee Valley Authority (TVA) in Chattanooga, Tennessee. As Manager of System Protection & Analysis he was responsible for the setting calculations for all protective relays in the TVA transmission system and at hydro, fossil and nuclear generating plants. Prior to managing System Protection & Analysis his roles included Manager of Advanced Power Applications group, Manager of Power Quality, and a Specialist in System Protection & Analysis. Russell is a member of the IEEE Power System Relaying Committee (PSRC) and is vice-chairman of the Line Protection Subcommittee and a member of the Rotating Machinery Subcommittee. Mr. Patterson earned the B.S.E.E. from the Mississippi State University in 1991. Russell is a registered professional engineer in the state of Tennessee, a Senior Member of IEEE and a member of CIGRE. Russell can be e-mailed at rupatterson@ieee.org and his webpage is <http://relayman.org>.

Gary Kobet is an Operations Engineer for the Tennessee Valley Authority (TVA) in Chattanooga, Tennessee. His responsibilities include performing voltage and generator stability studies for the operating horizon, as well as developing operational tools to monitor reactive reserve within the TVA service area. Previously he worked in TVA's System Protection department planning relaying schemes for transmission and generation projects, as well as calculating relay setpoints and performing postfault analysis. He has performed transient studies using EMTP for breaker TRV studies and switching surge overvoltages. Previously he worked as a field engineer and as power quality specialist. Mr. Kobet earned the B.S.E. (electrical) from the University in Alabama in Huntsville in 1989 and the M.S.E.E. from Mississippi State University in 1996. He was a member of the NERC System Protection & Control Task Force from 2004-2005. He is a senior member of the IEEE Power Engineering Society and is active in the Power System Relaying Committee, having participated in several working groups, and is a member of the PSRC's Rotating Machinery Subcommittee, System Protection Subcommittee, and Line Protection Subcommittee. He is also a member of CIGRE, Eta Kappa Nu, Tau Beta Pi, and is a registered professional engineer in the state of Alabama.