

Electrical Engineering Principles and Practice

A Live Course on Essential Fundamentals of Theoretical and Practical Electrical Engineering – Designed for Non-Electrical Engineers

Credit: 15 PDH's (2-Days); 1.5 CEU's

Lead Instructor: Bobby Rauf, PE, CEM, MBA

Course description

This seminar or course covers principles of electricity in a simple, easy to understand, format. Upon attending this course, participants will be able to perform straightforward and common calculations associated with voltage, current, circuit analysis, DC, single phase AC, three phase AC, power, power factor, and much more. Charts and tables, as alternate means for current, voltage and power estimation, are presented. Practical examples of electrical applications, in industrial, commercial and institutional settings are covered. Discussions on electrical, equipment, components, devices and test instrumentation are included. Important concepts in electrical safety are introduced. This course is designed for engineers, professional engineers, energy professionals, engineering managers, technical professionals, facilities managers and other professionals who are not intimately familiar or current on electrical engineering principles and practices.

Learning Objectives & Take-Aways

1. **After attending this course**, you will know the principles and concepts associated with AC and DC electricity, and the distinction between these two realms of electricity. This understanding can be used to apply appropriate mathematics and physics premised techniques, principles and equations for analysing AC and DC systems, in electronics and electrical power domains.
2. **You will know** the role played by voltage and current angles in the determination of power factor. The science and engineering theory behind power factor is illustrated using the vector method, graphical representation of voltage and current as a function of time and angle. Participants learn to apply different methods for calculating leading and lagging power factors.
3. **You will understand** how addition of power factor correcting capacitors results in improvement of power factors and the physics and engineering based explanation behind “addition of too much capacitance,” and how to avoid it.
4. **You will be able to** apply important electrical system concepts, such as, power quality, load factor and service factor, demand, peak demand, distinction between electrical energy and electrical power, and associated engineering computation formulas and methods.
5. **You will have better** appreciation of AC voltage and current representations in phasor, polar and rectangular forms. Complex math associated with manipulation of rectangular and phasor AC parameters is illustrated through examples.

6. **You will know the difference between** three-phase AC, “Y” and “ Δ - Delta” configuration of loads and sources, and know the significance of these configurations from practical power distribution and application perspective.
7. **You will know** how transformers work, their role in voltage transformation and how transformer designs differ from one application to another.
8. **You gain familiarity** with power distribution equipment and instrumentation.
9. **You will understand** the role NEC, and NFPA 70 E, play in the field of electrical design, electrical safety and arc flash hazard.
10. **You will understand** how PLCs work and how to interpret contemporary electrical control drawings.
11. **You will learn** how to interpret electrical one-line and comprehensive wiring diagrams.
12. **You will understand** how electrical power bills are calculated under large industrial and commercial contract scenarios, and take away some tips on electrical cost reduction.

Why you shouldn't miss this course – How this course can benefit you, your organizations, and what is unique about this course:

1. Have you ever felt somewhat inadequate and ill-equipped in your **technical discussions with electrical engineers and electricians**? If so, then this course or seminar is a must.
2. Do you, as an engineer, manager, or technician, **feel that your knowledge and understanding of the difference between AC and DC electricity** is inadequate or insufficient, then you must not miss this seminar
3. How often do you get a chance to attend a workshop, course, or a seminar that is presented by the author of the book on the subject matter - live? In this seminar, you will have the opportunity to interact and learn from **Bobby Rauf, the author of the text, titled, “Electrical Engineering for Non-Electrical Engineers.”** (A copy of the book available at additional cost)
4. As an engineer, technician or manager **have you ever found the concept of power factor, horsepower, apparent power, reactive power, real power, three phase versus single phase elusive** and hard to comprehend? Then, this seminar will present an excellent opportunity to remedy that.
5. **Imagine yourself, as an engineer or manager, at 2 o'clock in the morning, in a triage situation, leading a team, trying to get electrical equipment up and running.** You and your team members have **electrical drawings** of different types spread out, but, without the electrical engineering background, the symbol and

nomenclature appear foreign to you. This seminar is an opportunity for you to bridge that gap.

6. How often do you get an **opportunity to understand abstract and complex electrical concepts through relatively simple analogies and explanation**? This seminar will provide you that invaluable opportunity.
7. Some workshops and seminars end up being monotonous monologues from the presenter to the audience. Not this one. **In this seminar, you will get an opportunity to exercise the skills and concepts through classwork and engage the instructor in discussions.**
8. Do you manage or work with electrical engineers or electricians, and **are rusty in electrical engineering concepts, analytical techniques and design considerations, or are completely unfamiliar with them**? This seminar provides you the opportunity to brush up on those knowledge and skills, so that you can understand the challenges confronted by your subordinates and colleagues more clearly and can make informed decisions.
9. **Last, but not least** – If you are **not** a licensed Professional Engineer, but aspire to be one, and if you are rusty in the fundamentals of electrical engineering concepts and principles, then this two (2) day course could serve as a **“warm-up”** on some of the electrical engineering principles, concepts and problem analyses techniques.

Who should attend:

- **Licensed Professional Engineers**, who need to meet the annual or biennial license renewal PDH (Professional Development Hour) or CEU (Continuing Education Units) requirements.
- **Engineers and Architects** who do not possess current working knowledge of electrical engineering.
- **Facility Managers, Engineering Managers, Program/Project Managers and other executives** or leaders who feel a lack of adequate electrical knowledge to hold meaningful discussions and to make informed decisions with interacting with their electrical subordinates or colleagues
- **Non-engineers**, including **technical writers** responsible for developing operations and maintenance manuals for electrical or electrically operated equipment
- **Procurement/purchasing professionals** who are responsible for acquisition of electrical or electrically operated equipment
- Candidates aspiring to take the **FE or PE exams.**
- **Energy Managers and Construction Managers**
- **Maintenance Engineers and Maintenance Managers**
- **Patent attorneys** and attorneys who specialize in construction, workplace safety workmanship litigation cases.
- **Other professionals** whose annual **PLP, Performance and Learning Program**, includes engineering/technical courses/seminars/workshops.

Instructor Bio:

Professor S. Bobby Rauf, P.E, C.E.M, MBA; member, ASEE, American Society of Engineering Education.



Bobby Rauf is the President, Chief Consultant and a Senior Instructor at Sem-Train, LLC. Bobby has over 25 years of experience in teaching undergraduate and post-graduate Engineering, Math, Business Administration and MBA courses, seminars and workshops. Professor Rauf is registered (PE) **Professional Engineer**, in the State of North Carolina and is a **Certified Energy Manager**.

Mr. Rauf was inducted as “**Legend in Energy**” by AEE, in 2014. He is a published author of multiple engineering and energy books and professional development courses. He holds a patent in process controls technology.

Professor Rauf is certified to instruct various engineering, ergonomics, and industrial safety courses. He has conducted certification training and trained engineers for Professional Engineering licensure exams in the United States, The United Kingdom, Kingdom of Saudi Arabia, The Netherlands and Ukraine, over the past ten years.

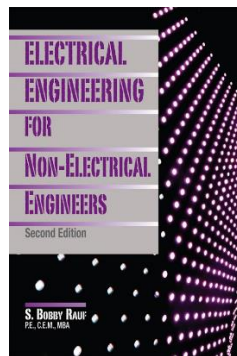
Mr. Rauf develops and instructs PDH (Professional Development Hour) and, continuing education, engineering skill building courses. He conducts these courses in form of webinars, live on-site presentations, workshops, pre-recorded audio and self-study texts. Some his major clients include **Texas A&M University, Saudi Aramco – KSA, University of North Carolina at Charlotte, McNeese University, Lamar University, Clemson University, Association of Energy Engineers, EPIC College - Canada; US Bureau of Reclamation, BHP Billiton, PDH Engineers, CED, and PDH Source**. He is also an Adjunct Professor at Gardner-Webb University.

Professor Rauf has also developed and published several self-study books that cater to the continuous professional development needs of Engineers, Technicians and Technical Managers.

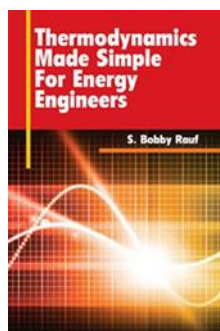
Mr. Rauf's last full-time engineering employment, in the corporate world, was at PPG Industries, Inc. where he served as a **Senior Staff Engineer**. During his long career at PPG, his responsibilities included development and management of energy and ergonomics programs for multiple manufacturing plants, in the US and overseas. He also provided consultation and training services in, energy, electrical engineering, industrial safety, ergonomics and arc flash arena. His extensive engineering experience includes, power design, control system design, project management, process management, energy and utilities management, energy audits/assessments, plant maintenance, robotics, manufacturing automation, HVAC audits, and design of ergonomic equipment.

Professor Rauf's publications include (Available through AEE, Amazon.com, and Barnes and Noble):

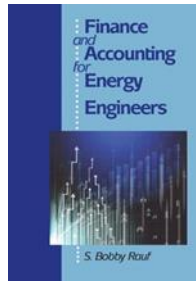
- 1) Text book titled **"Electrical Engineering for Non-Electrical Engineers,"** The Second Edition of this book was published in 2016 through Fairmont Press and CRC Press – Worldwide distribution.



- 2) Text book titled **"Thermodynamics Made Simple for Energy Engineers,"** Published in 2012 through Fairmont Press and CRC Press – Worldwide distribution.



- 3) Text book titled **"Finance and Accounting for Energy Engineers,"** Published in 2011 through Fairmont Press and CRC Press – Worldwide distribution.



Mr. Rauf of Sem-Train has provided training and/or consulting services to the following organizations over the last fifteen years:

1. **BHP Billiton**
2. **Saudi Aramco (Dammam, Kingdom of Saudi Arabia)**
3. **US Bureau of Reclamation (Hoover Dam)**
4. **CED**
5. **Balfour Beatty**
6. **Shaw Group**
7. **McNeese University**
8. **University of North Carolina, Charlotte**
9. **Texas A&M University,**
10. **Clemson University,**
11. **PPG Industries, Inc.,**
12. **PDHengineer,**
13. **PPI, Professional Publications**
14. **University of Maryland Baltimore County,**
15. **EPIC (Canada)**
16. **Y-F Asia - Singapore**

“SemTrain, LLC, is an approved sponsor and course provider with NY, NYSED, Maryland, NCBELS, North Carolina Board of Examiners for Engineers and FBPE, Florida Board of Professional Engineers, New Jersey, for the provision of CPC, Continuing Professional Competency, courses.”

“SemTrain, LLC, is approved for US Federal Government Contract Work, and is SAM and CAGE registered.

Testimonials from clients:

- 1) Timothy M., CEM, CDSM: “Bobby: I wanted to pass on my thoughts concerning the recently completed, Electrical Engineering for Non-Electrical Engineers. I found it to be very helpful, especially the section on Power Factor. I have had it explained to me a number of times, but your explanation was the best.
- 2) Kimberly T., 2011: Bobby, I would like to say that even though I am not an engineer, I am really glad that I took this class (EE for Non-EE). You have helped me to dissect and visualize some of the terms and concepts that were not tangible to me prior to this class.

- 3) Gregory (Greg) V. D., P.E.: “Hi Bobby, I've enjoyed both of your pdhengineer.com webinars that I've attended.....I don't know how you get through a full 8 hours at such a high energy level!”
- 4) Dr. A. P., Professor and Dean, 2013: “Dear Bobby, it was such a pleasure to meet you and having you as the great instructor of our Electrical Engineering seminar. As I understood from the attendees they really enjoyed your course and learned a lot...”

Lead Instructor's Phone: (704) 477-9166

Important Notes for Participants:

- In order to enhance the learning experience, the class size is limited – register early.
- Seminars are subject to cancellation if the minimum registration threshold is not met. Registration fees will be refunded in entirety if a seminar is cancelled.
- Name on the attendance certificate will be as it appears on the registration documents. Please Note: If an admin associate registers you, have them enter YOUR name on the registration/payment form.
- Verify exact location of venue before the seminar date. *
- Bring valid ID and copy of registration information. *
- Light refreshments will be served. *
- Certificates of attendance will be provided.
- The handouts for the course will be provided via “Drop Box.”
- Seminar Hours – Each Day: 8:00 am - 5:00 pm. One hour for lunch. *
- Venue Wi-Fi where available. *

* This information applies to in-person, face to face, seminars only.

Cancellation Policy: Full refund granted if registration is cancelled **30 days** or more prior to the scheduled date of the seminar; otherwise, registrant can apply the course credit toward attendance at another, scheduled, equivalent event, in the region, at a later date.

SemTrain, LLC, reserves the right to cancel the seminar when minimum registration threshold is not met. In such case, SemTrain, LLC, will issue full refund to the registrant. Registrants for live, in-person seminars, in some cases, may be given the option to attend the on-line, live, webinar, version of the seminar.

Sem-Train LLC ©

All Rights Reserved.

Prices subject to change without notice.