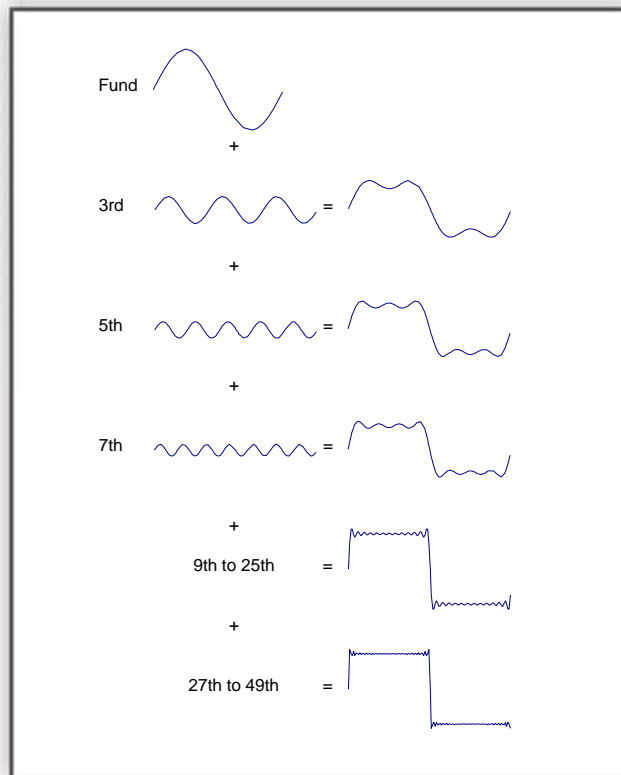




# Harmonics / Dynamic Stability in EasyPower

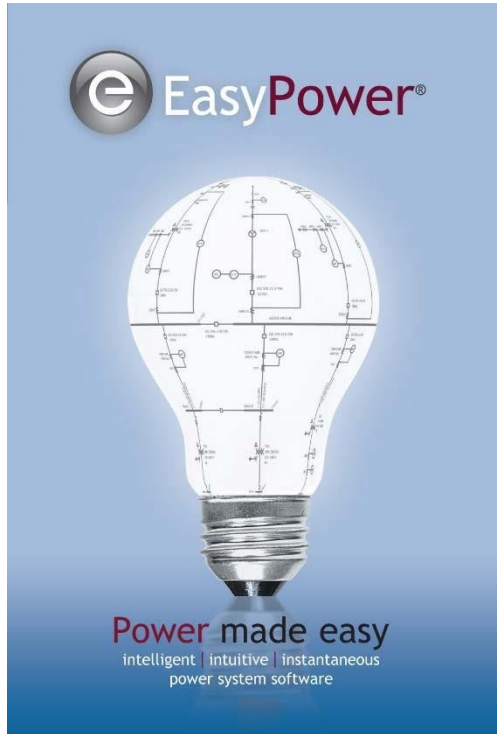


**Live Web-Based Seminar**  
**August 15-19, 2022**

**EasyPower LLC**

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# Introduction to System Modeling, Harmonics, & Dynamic Stability



This EasyPower training course is tailored for engineers and designers who want to learn new skills or polish existing skills in the application of the EasyPower software suite for harmonics analysis. It describes the impact of harmonics on equipment and provides some exposure to dynamic stability analysis.

The training reference manual provided includes necessary theory and extensive notes. This training caters mostly to experienced power system engineers who have experience using the Power Flow analysis tool. This class builds on your previous working knowledge of EasyPower. The course starts with the basics of power system design and progresses toward a full system design and analysis with an emphasis on harmonics. There is also a review of the harmonics fundamentals.

The class covers a variety of different power system design fundamentals before moving to the EasyPower applications.

The examples are backed up by real life application references and a review of the hand calculations. This class is a great starting point if you perform any study work and would like to extend the scope of your work to include harmonic analysis.

## Day 1 – Introduction to EasyPower, Power Flow, System Design Fundamentals

*Monday, August 15, 2022 | 9:00AM to 4:00PM CST*

### Topics Include:

- » Power Flow Basics
- » System Modelling
- » Load Types
- » Power Flow Options
- » IEEE 3002.2 Review
- » Motor Starting & Flicker (IEEE 241 Review)
- » Renewable Energy Interconnection Design & Equivalent

**3.0 CEU Credits  
Harmonics**

## **Day 2 to 4 – Introduction to Harmonics, Harmonics Theory, Applications, Filters**

*Tuesday, August 16, 2022 | 9:00AM to 4:00PM CST*

*Wednesday, August 17, 2022 | 9:00AM to 4:00PM CST*

*Thursday, August 18, 2022 | 9:00AM to 4:00PM CST*

### **Topics Include:**

- » Harmonics Theory
- » Fourier Series
- » Required Data
- » System Modeling
- » Harmonics Effect
- » Harmonic Simulation
- » Equipment De-rating Due to Harmonics
- » Transformer KRating
- » C57.110, UL1561
- » Harmonics Flow/Frequency Scan/Current Injection/Voltage Source
- » Voltage THD, Losses Due to the Harmonics
- » Active & Passive Filters in EasyPower and Design & tuning
- » Harmonics/Power Flow/Motor Starting Examples
- » IEEE 3002.8 Review
- » Drives Waveform/Harmonics Cancellation

## **Day 5 – Introduction to Dynamic Stability and Applications**

*Friday, August 19, 2022 | 9:00AM to 4:00PM CST*

### **Topics Include:**

- » Synchronous Generator Modeling
- » Induction Motor Modeling and Mechanical load types
- » Governor/Exciter Models
- » Renewable Plant Design and Equivalent
- » EasyPower DS simulation and plots

## Detailed Harmonic Analysis

Most of us are well exposed to power flow simulations since almost any type of the design work requires knowledge about the power equipment, their ratings, and modeling techniques. Short circuit studies are being performed as frequently as power flow studies due to updated arc flash requirements. Most engineers are involved with these type of studies, and use a simulation tool to analyze the system results.

The topic of harmonics doesn't come up as frequently as power flow or short circuit due to its complexity, and also a lack of public knowledge on this subject. The understanding of harmonics requires a good background on the operation and fundamentals of the switching devices, switching techniques, sinusoidal waveforms, and the expansion of the periodic functions. The impact of this knowledge touches every aspect of the study work from the data collection all the way up to the engineering recommendations that are based on the frequency spectrum of the waveforms in the system. This class covers the existing gap between regular power flow, short circuit study work, and an in-depth harmonics analysis. EasyPower is an excellent tool to perform these studies, and it covers every harmonics output and parameter needed for the system recommendations. The class also reviews IEEE 3002.2 AND IEEE 3002.8 as IEEE recommended practices for conducting load flow and harmonics studies.

This training boosts your harmonics fundamentals knowledge, and provides numerous examples on the application of the discussed concepts. You also learn about dynamic stability, which is a more involved type of study. The scope of dynamic stability is very wide and covers motor starting and any transient phenomena. Renewable generation interconnection studies using EasyPower will also be covered.

*Imagine... Completing your Harmonics Analysis  
in the time it takes others to get started!*

## General Information

This web-based class allows students to access the training on our web-based platform from their own computers from anywhere. They can hear the instructor and see his screen live. They can interact and ask questions. **Please note:** No audio or video recording is allowed during the training sessions.

## Computer Requirements

This is a practical, hands-on seminar; you will need to provide your own computer. EasyPower does not provide computers. **The Wednesday before the seminar (August 10) you will be supplied with and required to install a temporary copy of EasyPower® training software on your laptop via download link; this will require admin rights are enabled on your laptop and you have access to the Internet.** We require that you use the training software, so you will have access to all the features available within EasyPower.

If you are a current EasyPower user with your own license on your laptop, you may opt to uninstall your company's copy of EasyPower, or simply plan to reinstall upon completion of the seminar. The seminar copy of EasyPower will not override or affect any other types of software on the laptop; however, if you have a personal copy of EasyPower loaded, it may affect some of those files. If any device library changes have been made to your personal copy, you will need to archive your device library before installing the seminar copy of EasyPower. **You will NOT need your hardware key for the training class.**

## Minimum System Requirements

- Operating System: 32/64-bit Windows® Server 2008, Server 2012, or Windows 7/Windows 8/Windows 10
- CPU: Intel®-based computer with dual-core or higher processor
- RAM: 512 MB (2 GB recommended)
- Monitor: 1280 x 1024 or higher resolution monitor and video adapter
- Hard Disk: 1 GB disk space
- Mouse: Microsoft mouse or other compatible pointing device with spin wheel
- Listening Device: Computer speakers or headset/headphones that can be connected to your computer
- Microphone: A computer microphone or an integrated headphone with microphone. Cell phone-type headphones with integrated microphone will work if they can be plugged into your computer.
- Internet: High speed internet recommended

## EasyPower Training Contact Information

Contact our training department at 503-655-5059 between 8 a.m. and 4 p.m. PST with your training questions, or email [training@easypower.com](mailto:training@easypower.com)

# COURSE INFORMATION

Course Dates: August 15-19, 2022 Live Web-Based Platform | Registration closes August 8, 2022

How to register: email [training@easypower.com](mailto:training@easypower.com)

Course Description	Dates	Price per Student	
		Standard Course Fee	With Premium Maintenance*
Intro, Power Flow, Design, Harmonics, Dynamic Stability, Arc Flash	Aug 15 – 19	\$2,200.00	Training points may be applied up to 50% of course fee

Each student will receive a training manual and a temporary copy of EasyPower® training software to use for the class. A mailing address must be provided to [training@easypower.com](mailto:training@easypower.com) by the registration closing date in order to receive the training materials.

\*EasyPower users with current premium maintenance will receive the appropriate discounted rate on seminar registration fees. You will also qualify for the maintenance discount if you purchase EasyPower within seven days of seminar completion.

**Substitutions and cancellations** are allowed at no additional charge if EasyPower is notified **prior** to the registration closing date. Substitutions **after** the registration closing will incur a \$100 administrative fee to cover the costs of course material and certificate replacements. For any **cancellation received after** the registration closing date, the attendee will incur a \$500 administrative fee. No refund or seminar transfer will be issued without cancellation notice provided to [training@easypower.com](mailto:training@easypower.com).

**NOTE: No audio recording or video recording is allowed during training sessions.**

Interested in training at your facility? Contact us for a customized proposal for client site training at your location!