

<b>Program Title</b>	<b>Lighting Controls Workshop</b> <a href="#">[Register]</a> <b>7 hrs</b>
<b>Time, Location</b>	May 4 (Friday, 9:00 am to 4:30 pm) <a href="#">San Francisco--PEC</a>
<b>Also Offered</b>	n/a
<b>Description</b>	<p>Rick Miller, principal of RNM Engineering, Inc., and PEC Lighting Program Coordinator Steve Mesh will spend a fun day teaching everything (well, many things) you always wanted to know about lighting controls. Controls can be used to enhance aesthetics and productivity, provide greater flexibility, save energy, adhere to code requirements, and even to obtain more LEED points. Attendees will see several different kinds of lighting controls, such as wallbox devices, occupancy sensors, photosensors, low-voltage relay systems, preset dimming systems, and DALI. Rick and Steve will review other new and exciting technologies as well including some wireless devices. The control devices will be wired up and demonstrated in the class. We will discuss how much control is really needed for a given project, the cost/benefit relationship of using more complex (and sometimes more expensive) lighting controls, and also how much energy can be saved by using various controls. This class covers primarily nonresidential applications.</p>
<b>Audience Level</b>	<p>Basic to intermediate level. This class is geared toward professionals in related fields (architects, interior designers, engineers and others). It is also especially useful for electrical and general contractors who install or influence the purchase of lighting equipment for commercial, institutional and industrial projects -- but everyone is invited to attend. This class is not specifically designed to address residential lighting applications, although many of the control devices are applicable to residential applications as well.</p>
<b>Agenda</b>	<ul style="list-style-type: none"> <li>• Introductions and Safety Announcements</li> <li>• Review of lighting controls technologies : <ul style="list-style-type: none"> <li>○ Wallbox devices</li> <li>○ Occupancy sensors</li> <li>○ Photosensors</li> <li>○ Low-voltage relay systems</li> <li>○ Preset dimming systems</li> <li>○ DALI</li> </ul> </li> <li>• Other new technologies for lighting control</li> <li>• Discussion about how, where, when and why to use certain control strategies</li> <li>• In-class demonstration of selected control strategies</li> <li>• Wrap-up, Q&amp;A, Post-course evaluation</li> <li>• Class adjourns</li> </ul>

<b>Program Title</b>	<b>Evolving Lighting - technology and human factors</b> <a href="#">[Register]</a>
<b>Time, Location</b>	June 27 (Wednesday, 9:00 am to 1:00 pm) <a href="#">San Francisco--PEC</a> <b>4 hrs</b>
<b>Also Offered</b>	n/a
<b>Description</b>	Lighting retrofits will be revisited from the perspective of environmental quality, productivity, and people satisfaction all along with energy savings and sustainability. This lighting class will balance technology with human factors in lighting. Best performing LEDs and conventional lighting products, together with research and application of lighting for human circadian rhythms, will demonstrate how human centered energy efficiency works.
<b>Audience Level</b>	
<b>Agenda</b>	<p style="text-align: center;"><b>Technology</b></p> <ul style="list-style-type: none"> <li>• Best LED performance products</li> <li>• High Performance linear fluorescent</li> <li>• Electronically ballasted CMH</li> <li>• LEDs vs traditional lighting</li> </ul> <p style="text-align: center;"><b>Human Factors</b></p> <ul style="list-style-type: none"> <li>• Modulation in daylight parameters</li> <li>• Research and application of lighting for circadian rhythm</li> <li>• Spectrum and color enhanced lighting and its effect on people</li> <li>• Visual acuity, S/P ratios</li> <li>• Lighting controls and lighting parameter dynamics</li> <li>• New generation of Kelvin changing LED fixtures and nature scene troffers</li> </ul>
<b>Instructor(s)</b>	<p><b>Stan Walerczyk</b></p> <p>Stan Walerczyk is principal of Lighting Wizards, an energy efficient consulting firm. His 23 years lighting experience includes distribution, maintenance, retrofit contracting, 3rd party review, consulting, design, luminaire design, policy making and research. He is a DOE CALiPER Guidance Committee member on LED and competitive products. Stan is a consultant for California's Title 20 Appliance Standard and Federal EPACT Standards, which mandate efficiency standards for lighting products. He has done considerable independent project managing for California Lighting Technology Center's work on California Energy Commission's Public Interest Energy Research. He has been assisting on DOE research on spectrally enhanced lighting. He has written over 30 published articles and presented over 700 seminars, including at 4 Lightfairs, 3 IES Annual Conferences and several IES sections. Various retrofit seminars have been for office, school, hospitality, hospital, warehouse, industrial and exterior applications. He is a Certified Lighting Energy Professional by the Association of Energy Engineers and is Lighting Certified by the National Council on Qualifications for the Lighting Professions. He was an IES member 1995 - 2008, serving on 2 committees. He is currently on the IES Spectral Effects and Energy Management Committees. This spring he consulted for several LED product manufacturers in South Korea. Complete bio, testimonials, seminar schedule, client list and other information are available at <a href="http://www.lightingwizards.com">www.lightingwizards.com</a>.</p>
<b>Resources</b>	N/A
<b>Cost</b>	No fee for this program
<b>Credits</b>	<a href="#">NCQLP</a> : 4

<b>Program Title</b>	<b>Commissioning Lighting Controls</b> <a href="#">[Register]</a>
<b>Time, Location</b>	July 10 (Tuesday, 8:30 am to 4:30 pm) <a href="#">San Francisco</a> --PEC <b>7 hrs</b>
<b>Also Offered</b>	n/a
<b>Description</b>	<p>Most of the focus and available resources related to building commissioning are dedicated to mechanical systems, while there is an abundance of evidence that lighting systems are often in a similar state of disarray. One study found that 16% of issues identified during new construction commissioning are related to lighting systems. This is remarkable considering how little investigation time is spent on these systems. This training is dedicated to the somewhat overlooked topic of Commissioning Lighting Controls and will focus on commissioning of schedule controls, occupancy sensors and daylight controls.</p> <p>The class will begin with a brief introduction to building commissioning and will include an overview of common terms and concepts. We will look at some of the major drivers toward building commissioning including USGBC's LEED rating system and Cal Green and discuss how these ratings systems are related to the commissioning of lighting systems. The Cx overview will include a review of the commissioning process, the roles and responsibilities of all participants and typical documentation requirements including the development of a Cx plan and the owner's project requirements. To prepare for this training, participants will be asked to review materials on commissioning fundamentals in advance of the training.</p> <p>A large portion of the class will focus on test procedures for different lighting control systems that were developed as part of a paper presented at the 2011 National Conference on Building Commissioning(<a href="http://www.peci.org/ncbc/2011/agenda.html">http://www.peci.org/ncbc/2011/agenda.html</a>). We will present tests for scheduled controllers, occupancy sensors, dimmable ballasts, and photo controllers. A short overview of the operational characteristics will be included for each system. These test procedures will eventually be integrated into the Functional Test Library located here:<a href="http://www.peci.org/ftguide/">http://www.peci.org/ftguide/</a></p> <p>In the afternoon the class will be divided into small groups and will perform functional tests on lighting systems within the Energy Center. In these labs we will showcase instrumentation utilized by Cx providers for tuning lighting systems. We will also cover how to use data loggers and trend data to identify lighting-based performance opportunities. The class will include material on related resources.</p> <p>Attendees need to come prepared to be in the field by dressing appropriately. Loose clothing (ties, scarves) and improper footwear (open-toed shoes, high heels) are prohibited. Attendees should also bring a laptop computer with wireless access, a calculator, a clipboard and a flashlight. All other tools and equipment will be provided.</p> <p>1. Evan Mills, "Building Commissioning, A Golden Opportunity for Reducing Energy Costs and Greenhouse-Gas Emissions", 2009</p>
<b>Audience Level</b>	Class intended for experienced lighting professionals, facilities staff, and Cx providers interested in providing commissioning services on lighting systems.
<b>Agenda</b>	<ul style="list-style-type: none"> <li>• A very short overview of commissioning <ul style="list-style-type: none"> <li>○ A description of the Cx process</li> <li>○ Roles and responsibilities</li> <li>○ Documentation produced</li> <li>○ Acceptance tests and Title 24</li> <li>○ CalGreen</li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>○ LEED Commissioning</li> <li>• Testing equipment overview and components of a test</li> <li>• Testing schedule/relay controllers</li> <li>• Testing occupancy controllers</li> <li>• Testing dimming ballasts</li> <li>• Testing photo controllers</li> <li>• Monitoring lighting systems (using trends or data loggers to monitor performance)</li> <li>• Introduce field work/discuss precautions</li> <li>• Rotating fieldwork exercise</li> <li>• Lighting commissioning resources</li> <li>• Wrap-up and evaluations</li> </ul>
<b>Instructor(s)</b>	<p><b>Ryan Stroupe</b></p> <p>Ryan Stroupe is the Pacific Energy Center's Whole Building Performance Program Coordinator. He worked as the contact for the Center's Tool Lending Library program for several years and continues to support this program in an advisory role. Ryan also supports shading, daylighting, and other studies for architects and designers interested in optimizing the performance of their built projects. He develops and teaches many of the Energy Center's architectural and whole building performance programs. Ryan also teaches for The California College of the Arts and The Academy of Art University. He is currently supporting the monitoring-based commissioning efforts occurring at the University of California and California State University campuses. Ryan is a product of the Bachelor's of Environmental Design program at Miami University in Ohio and the Master's of Architecture Program at University of California, Berkeley.</p>
<b>Resources</b>	<p><a href="#">EDR Design Briefs: Lighting Controls</a></p> <p><a href="#">EDR Design Guidelines: Commissioning Guidelines</a></p> <p><a href="#">PG&amp;E Resource: Large Business Energy Management Solutions and Incentives: Solutions designed for your industry segment.</a></p> <p><a href="#">PG&amp;E Third Party Incentive Programs: Overview</a></p>
<b>Cost</b>	No fee for this program
<b>Credits</b>	<a href="#">AIA: 6.5 (HSW)</a> , <a href="#">NCQLP: 6.5</a>

# BEST Center Curricula, Resources & Recordings

## Academic Programs

Georgia Piedmont Technical College - Building Automation Systems

Milwaukee Area Technical College - Sustainable Facilities Operations

Laney College - Commercial HVAC Systems

City College San Francisco - Commercial Building Energy Analysis & Audits

## Professional Development Materials, Presentations & Videos

National Institutes

Building Automation Systems Instructor Workshops

Webinars (e.g., BEST Talks)

## Faculty Profile Videos

## Reports & Case Studies

## Marketing Resources

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