

# CCR LEVEL 2

---

# ENTERS THE WORLD

---

TEXT **GUY SHOCKEY**  
PHOTOS **JESPER KJØLLER**



## - GUE'S MOST CHALLENGING CLASS TO DATE?

**Last year GUE updated the CCR Level 1 program and released the much-anticipated CCR Level 2 program. These two programs are the brainchild of Richard Lundgren and represent literally thousands of hours of work in both the field, the classroom, the computer lab, and even a hyperbaric chamber! There has been much written of the genesis of the GUE CCR program and where we saw it fitting into the bigger picture, but now that the program is fully fleshed out, it is time to take a look at the classes in more detail.**

**T**he first beta test of the GUE CCR course was taught to six GUE Tech 2 instructors in Florida in 2013. We believed that this would be a group who could cast a critical eye on the program and offer feedback and suggestions in a collegial atmosphere. I was lucky enough to be a member of this course and the only instructor present who had no previous CCR experience. In some ways I think I was the “crash test dummy” because if I could do it, then it was likely others could also!

After that, we released the program to Tech 2 divers with the later intent of allowing Tech 1 divers with significant experience to also take the course. We entered into this training program conservatively and cautiously, and we were prepared to cancel it at any time if it didn't look like it was workable. GUE has a long history of being conservative when it comes to our diver safety, and this was our way of continuing with this tradition in the CCR world.

### **Complete rewrite**

The original course allowed for our graduates to gradually move into the T1 range after satisfying experiential requirements, and because all the students were T2 level divers, it is not surprising that many of them ended up gradually diving in the T2 range also. The standards and course materials were clear about the limits though, so we worked as quickly as possible to provide the level 2 course so that our CCR divers would not be diving outside the course standards. We were approached regularly with requests for level 2 CCR training, but we did not want to release anything until it was synced perfectly with the level 1 program, and both programs required significant reworking to make that happen.

With the release of CCR Level 1 and CCR Level 2 programs in 2019, GUE has firmly placed itself once again at the forefront of dive training. In short, the materials are remarkable! They are polished and professional, and the supporting materials are world class. There is no other CCR program in the world that is as complete as ours. When you think about de- ▶

signing a class, you may think “how hard could it be?” until you realize that the entire process of design has to be integrated from top to bottom and also supported by new GUE standards written for the programs. Then the programs have to be tested, reviewed, edited, and... “rinse and repeat”.

### **Pent-up demand**

It’s not as simple as just looking at what else was available and throwing our GUE slant on it. This was a new program developed from the ground up and intended to seamlessly integrate with all the rest of our GUE training. Even course progression diagrams found in other courses had to be updated. It was a monumental undertaking and represented thousands of hours of effort from Richard Lundgren and his core working group.

The standards and training limits for the level 1 program are the same as they were for the first iteration of the course. After successfully passing CCR Level 1 and then satisfying post-course specific requirements, the CCR Level 1

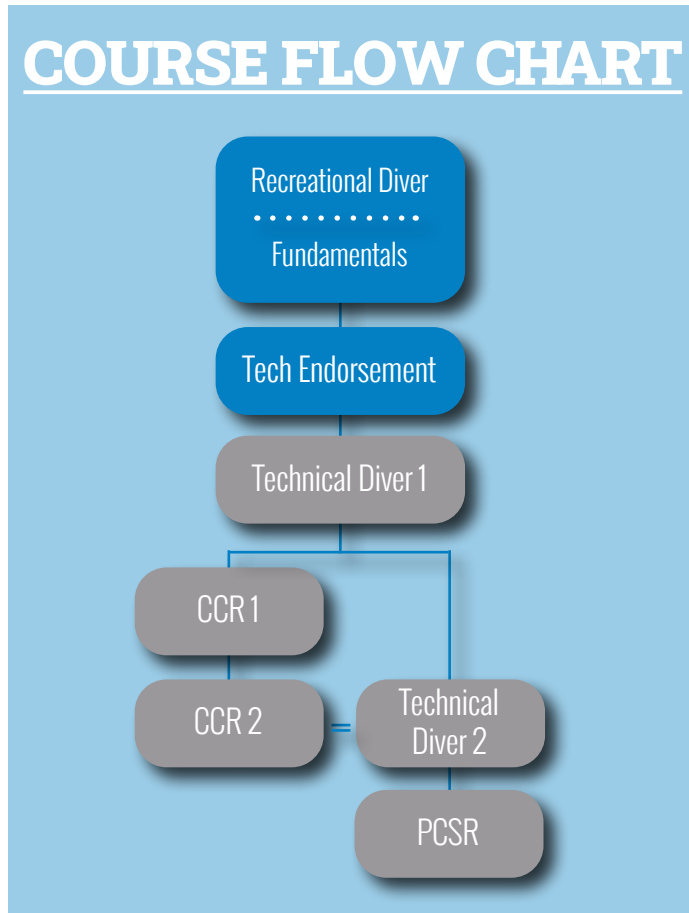
diver will be certified to what are essentially GUE T1 limits. Then after satisfying more experiential requirements, the CCR 1 diver will be able to register for CCR Level 2, where the limits are similar to our Tech 2 limits. This is no different than what existed prior, except we didn’t have the level 2 course available. We anticipated a lot of pent-up demand for the level 2 program and so far the interest level has met expectations.

One of the biggest changes to the Level 1 program was to make it available to Tech 1 divers who had experience at the Tech 1 level. Based on our experience with delivering the initial CCR program, we believed that an experienced Tech 1 diver would have the skills needed to be successful with the more refined CCR Level 1 program. We also believed that the Level 2 CCR program would gradually supersede the existing open-circuit Tech 2 program and we didn’t see the utility in forcing our future explorers to take expensive and time-consuming training that could be contained within the outline of CCR Level 2. There are certainly specific skills that were found in the OC Tech 2 program that needed to be mastered, but it seemed to make more sense to master them in the environment and with the equipment that they would be diving with.


### **New skills**

Why should a highly skilled GUE Tech 2 OC diver with existing experience on their CCR chose to take level 2 CCR training? What is the value to them for doing this?

Consider what we are trying to achieve with the level 2 course: given that the CCR 1 class was basically limited to a user class with little challenges or failures at all, we are essentially training a diver to dive to 75 m/245 ft on a CCR, and this has multiple implications, some of which are not obvious at the start. First, we are introducing many more new skills than are introduced in a T2 class. This includes 15 new CCR skills and five bailout skills, as well as introducing SCR operations. Then, like T2, we introduce our level 2 students to our hypoxic gas protocols, but in this case, there are some significant additions. In the case of a CCR using hypoxic diluent, hypoxia awareness needs to be there from





A diver is shown in a cave environment, illuminated by a bright light source. The diver is wearing a rebreather (CCR) system, which includes a large cylindrical tank and various hoses and regulators. The cave walls are dark and textured, with some light reflecting off the surfaces. The overall atmosphere is dim and mysterious.

---

**We are introducing many more new skills than are introduced in a T2 class. This includes 15 new CCR skills and five bailout skills, as well as introducing SCR operations.**

---

The GUE Level 2 CCR diver must be able to handle multiple stages, both when on the loop and after a bailout to open circuit.



day one, but also there are some considerations for using hypoxic gases when it comes to bailout.

Second, they must also demonstrate capacity as an OC diver in the event of a bailout from 75 m/245 ft, where they are once again an open-circuit diver who must manage their open-circuit ascent and associated bottle rotations on the way home. Essentially then, we need to add significant OC training on top of already detailed CCR training. Then we need to prepare them for extended durations on the CCR, and this can mean supplementing on-board gases with off-board gases, particularly in the event of on-board gas failures. Which then leads to having to review OC failures...

REBREATHER PRE-DIVE CHECKLIST			
<b>PREPARATION</b>			
O <sub>2</sub> Sensors < 1 year	confirm	confirm	confirm
Air mV Range (9-13)	1	2	3
mV O <sub>2</sub> - mV 2.1x10 <sup>-2</sup> ± .21	1	2	3
* Calibrated mV O <sub>2</sub>	1	2	3
Ext. Battery > 6.6V or 5.5V			v
Int. Battery > 3.3V or 1.3V			v
HUD Battery		confirm	
CTRL Setup		confirm	
<b>ASSEMBLY</b>			
ACE - RAC + VCO <sub>2</sub> or 200min			min
Lid Visual Check		confirm	
Loop Return Valve Check		confirm	
Negative Pressure/O <sub>2</sub> SPG Test		confirm	
Positive Pressure/Dil SPG Test		confirm	
<b>CALIBRATION</b>			
Open O <sub>2</sub> Supply Valve		confirm	
Open DSV/BOV		confirm	
Turn HUD On		confirm	
Turn CTRL On		confirm	
Calibrate CTRL		confirm	
Calibrate HUD		confirm	
Calibration Result Listed at Top of Sheet *			
<b>SUPPLY</b>			
O <sub>2</sub> Reg IP 7-7.5bar or 101-108psi		low/psi	
Dil Reg IP 9-10bar or 130-145psi		low/psi	
<b>SIGNATURE/DATE</b>			
REQUIRED: GUE-EDGE AND CHAGS CRITICAL CONTROL CHECKS			
©2021 P.I. GLOBAL UNDERWATER EXPLORERS - WWW.GUE.COM			

The checklist sticker introduced during GUE CCR 1 has been redesigned to encompass the ACE principle for calculating scrubber endurance.



During the development of the CCR Level 2 program, Richard Lundgren conducted tests in a decompression chamber to verify the controller's default setpoint in case of a failure.



Essentially then, we need to add significant OC training on top of already detailed CCR training.



The GUE Level 2 CCR diver is optimally prepared for exploration and adventure.

## GUE CCR LEVEL 2 FACTS

GUE's Closed-Circuit Rebreather Diver Level 2 course is intended to develop GUE CCR Level 1 skills by gradually building diver skill and knowledge regarding closed-circuit diving. The course is also designed to extend diver capacity for challenges in a comfortable learning environment by emphasizing a higher degree of physical fitness, as well as a deeper understanding of the management, maintenance procedures, and protocols of the closed circuit rebreather.

### WHO IS IT FOR?

CCR Level 2 is intended for graduates of the GUE CCR Level 1 course who wish to further their knowledge and understanding of advanced CCR diving in more demanding environments.

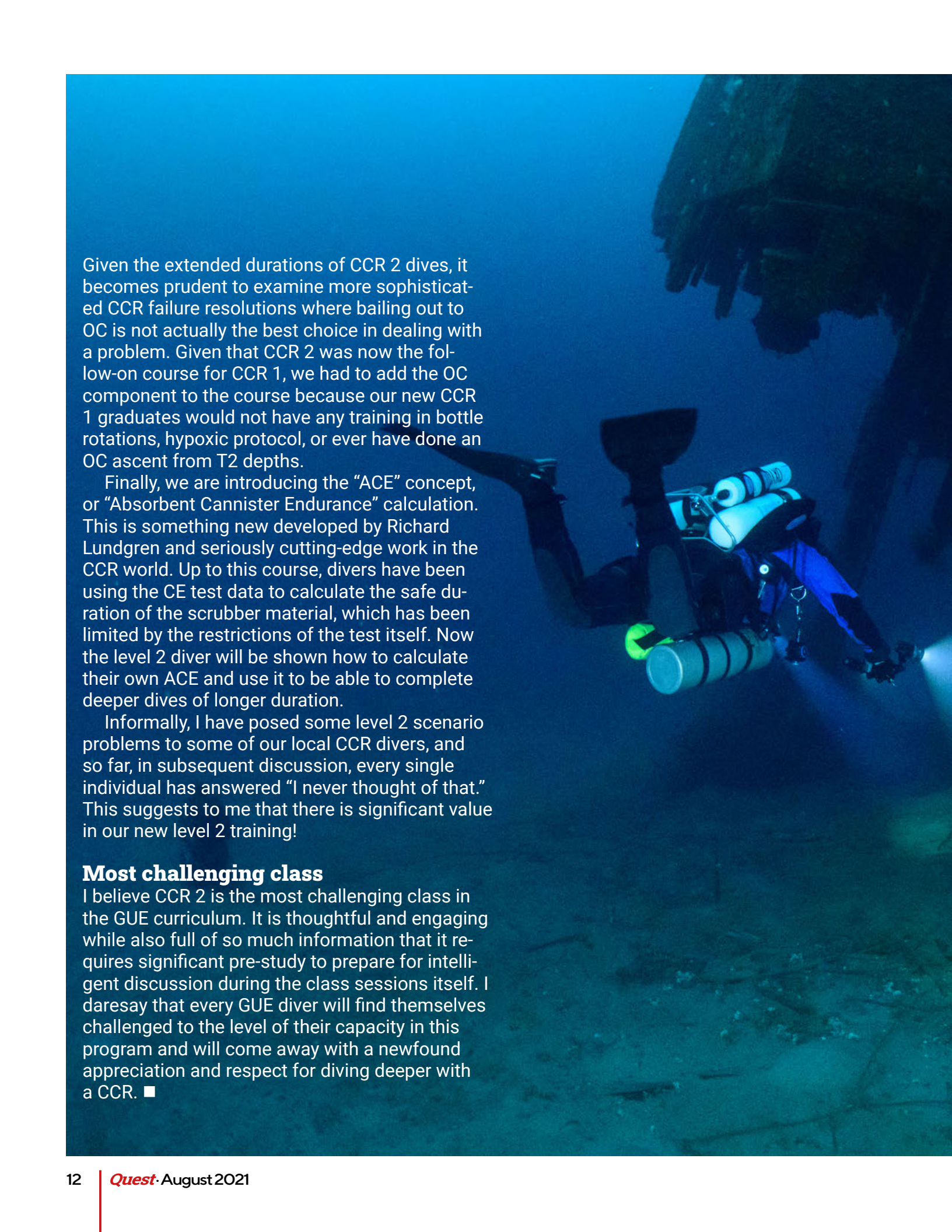
Students of this class wish to enhance their capacity of CCR diving within the GUE system. Applicants must have completed at least 50

non-training closed-circuit rebreather dives beyond GUE CCR Level 1 certification and furthermore have completed at least 25 non-training closed-circuit rebreather dives beyond GUE CCR Level 1 certification, deeper than 100 ft/30 m. They also must own a GUE-approved closed-circuit rebreather.

### WHAT WILL YOU LEARN?

Course outcomes include, but are not limited to: a competent and comfortable rebreather diver with solid personal and team skills, robust knowledge of rebreather functions, operation, and failures; competent performing deep bailout to open circuit, including ascent protocol involving gas switches, rotations, and loss of decompression gases; and a diver that can plan aggressive technical dive missions including, gas, absorbent canister endurance, oxygen toxicity management and decompression strategies.



A diver in a blue wetsuit and CCR gear is swimming underwater. The diver is wearing a blue wetsuit, a blue CCR tank, and a blue BCD. The diver is holding a flashlight and is looking towards the camera. The background is a dark blue underwater environment with a large, dark structure on the right side.

Given the extended durations of CCR 2 dives, it becomes prudent to examine more sophisticated CCR failure resolutions where bailing out to OC is not actually the best choice in dealing with a problem. Given that CCR 2 was now the follow-on course for CCR 1, we had to add the OC component to the course because our new CCR 1 graduates would not have any training in bottle rotations, hypoxic protocol, or ever have done an OC ascent from T2 depths.

Finally, we are introducing the “ACE” concept, or “Absorbent Cannister Endurance” calculation. This is something new developed by Richard Lundgren and seriously cutting-edge work in the CCR world. Up to this course, divers have been using the CE test data to calculate the safe duration of the scrubber material, which has been limited by the restrictions of the test itself. Now the level 2 diver will be shown how to calculate their own ACE and use it to be able to complete deeper dives of longer duration.

Informally, I have posed some level 2 scenario problems to some of our local CCR divers, and so far, in subsequent discussion, every single individual has answered “I never thought of that.” This suggests to me that there is significant value in our new level 2 training!

### **Most challenging class**

I believe CCR 2 is the most challenging class in the GUE curriculum. It is thoughtful and engaging while also full of so much information that it requires significant pre-study to prepare for intelligent discussion during the class sessions itself. I daresay that every GUE diver will find themselves challenged to the level of their capacity in this program and will come away with a newfound appreciation and respect for diving deeper with a CCR. ■



GUE CCR Level 2 divers will gain an unprecedented knowledge and understanding of the CCR and its operation in a vast range of applications.

---

**The “ACE” concept or “Absorbent Cannister Endurance” calculation, is something new developed by Richard Lundgren and seriously cutting-edge work in the CCR world.**

---



**Guy Shockey**

Guy Shockey lives on Vancouver Island, Canada, about two minutes from the ocean. He is an ex-military officer and holds a graduate degree in political science. He has played competitive rugby for several years. Guy travels and dives extensively and is involved with several wreck exploration projects, including ongoing work with the Underwater Archaeology Society of British Columbia. He is also a GUE Instructor Evaluator, teaching all the technical classes, including the CCR curriculum. He is also actively working with new instructor candidates and supporting local GUE communities.





## Current GUE CCR Level 1 and Level 2 Instructors

- Antonio Bresciani (Level 1)
- Bob Sherwood (Level 1)
- Derk Remmers (Level 2)
- Graham Blackmore (Level 2)
- Gunnar Midtgaard (Level 2)
- Guy Shockey (Level 2)
- Hui Jin (Level 1)
- Jarrod Jablonski (Level 2)
- John Kendall (Level 2)
- JP Bresser (Level 1)
- Karim Hamza (Level 2)
- Kirill Egorov (Level 2, IE)
- Kyungsoo Kim (Level 1)
- Richard Lundgren (Level 2, IE)
- Richard Walker (Level 1)
- Sameh Sokar (Level 1)
- Stefano Di Cosimo (Level 2)

---

**This was a new program developed from the ground up and intended to seamlessly integrate with all the rest of our GUE training.**

---

Read more about the individual instructors [↗](#)  
And review scheduled CCR classes [↗](#)



CCR instructor training in progress.