

# The Science of Ability:

## Blurring the Line Between Human & the Machine



Shirley Ryan  
**Abilitylab**  
Northwestern  
University

In-person and Virtual  
August 26-27, 2024



# The Science of Ability: Blurring the Line Between Human & Machine

## Course Description

In the rapidly evolving landscape of rehabilitation medicine, the intersection of human ability and machine capabilities has become a focal point for transformative advancements. This symposium will delve into the groundbreaking role that artificial intelligence and machine learning play in reshaping the rehabilitation process and improving patient outcomes. In addition to exploring major advancements in technology development and model optimization, we will discuss some of the challenges that have surfaced with this blurring line between human and machine.

## Location

This is a FLEX COURSE that you can choose to attend virtually or in-person at Shirley Ryan AbilityLab, 355 East Erie Street Chicago IL, 60611. Directions and parking details for the Shirley Ryan AbilityLab can be found: [HERE](#)

## Who Should Attend

Engineers, Data Scientists, Physical Therapists, Physical Therapist Assistants, Occupational Therapists, Occupational Therapy Assistants, Nurses, Physicians and Speech-Language Pathologists

## Learner Outcomes

Upon completion of this course, participants will be able to:

- List three emerging human-in-the-loop technologies being applied in clinical rehabilitation
- Analyze the challenges and opportunities associated with the widespread implementation of these technologies in clinical and community settings
- Identify real-world examples and case studies highlighting the challenges individuals face in accessing or utilizing rehabilitation technologies
- Discuss ideas for fostering a collaborative environment where rehabilitation professionals and end users can share insights and provide feedback that advances the development and/or implementation of novel technologies.
- Describe how artificial intelligence can be used to enhance technology utilization and implementation.

## Successful Completion

To successfully complete this course, you will need to attend both days of the live activity, attest to your attendance and complete an evaluation at its conclusion through the Academy Learning Portal by September 2, 2024.

## About C-Star

The Center for Smart Use of Technologies to Assess Real World Outcomes (C-STAR) is one of six national resource centers comprising the Medical Rehabilitation Research Resource Network (MR3) of the National Institutes of Health. C-STAR is a joint grant between Northwestern University and Shirley Ryan AbilityLab, conceived out of a need to equip investigators with the skills and know-how to accurately employ technologies to measure and interpret data relevant to sensorimotor and cognitive function in the lab, clinic, and real world. Our mission is to connect researchers with the right tools to develop and accurately assess technologies in the field of rehabilitation science. Leveraging the collective experience of clinicians, scientists, engineers and patients, our center provides the expertise, instruction and mentorship to empower researchers on the meaningful use of the vast array of technologies that are readily available but notoriously difficult to implement consistently across diverse patient populations.

## Course Chairs



### **R. James Cotton, MD, Ph.D.**

*Clinician-researcher*

*Lab director at The Regenstein Foundation Center for Bionic Medicine, Shirley Ryan AbilityLab*

Dr. Cotton is a. He graduated from Shirley Ryan AbilityLab's residency program, during which he completed our unique research academic track. This track offers an additional year for research. In fact, our MD/DO-research track is the only one of its kind. His work bridges his medical and scientific interests, as he is developing translational muscle- and neural-interface technologies to help people with neurologic impairments. He earned his BS in electrical engineering and BA in biochemistry from Rice University, and his MD and PhD, with a focus on systems neuroscience, from Baylor College of Medicine. His long-term goal is to develop neural interface technologies and translate them clinically to help restore function in people with spinal cord injury.



### **Megan K. O'Brien, Ph.D.**

*Associate Director, Technology and Innovation Hub (tiHUB) Research  
Assistant Professor of PM&R, Northwestern University*

Dr. O'Brien's research utilizes sensors and other mobile technologies to measure, monitor, and improve rehabilitation outcomes. She applies interdisciplinary techniques in engineering, biomechanics, and machine learning to identify disease-specific biomarkers of health and behavior across the continuum of care, from the clinic to the home. These techniques are at the forefront of a revolution in precision medicine and rehabilitation, poised to transform patient care by enabling more effective interventions tailored to meet the unique needs of each patient. Example projects include: predicting long-term recovery after a stroke, understanding changes in community activity and social interactions for individuals with chronic disease, tracking sleep and its impact on patient outcomes in the hospital and at home, and early screening of neuromotor delays in infants.

## Course Faculty



### **Jason Barbas, PT, DPT**

*Director of Allied Health Innovation and Practice and Staff Development*

*Shirley Ryan AbilityLab; Assistant Professor of PM&R, PTHMS, Northwestern University*

Jason Barbas oversees many specialty areas of practice, the integration of research into clinical practice, as well as the professional development and competency of over 400 therapists throughout the system of care. He has published a number of peer-reviewed publications and has presented nationally about neurologic rehabilitation, outcome measures, the integration of novel technologies into practice, and the professional development of clinical staff.



### **Sara Becker, Ph.D.**

*Director, Institute for Public Health and Medicine (IPHAM) - Center for Dissemination and Implementation Science; Professor of Psychiatry and Behavioral Sciences and Medical Social Sciences, Northwestern University*

Dr. Becker is a licensed clinical psychologist and implementation scientist dedicated to bridging the gap between research and practice. Dr. Becker studies both patient-focused dissemination (e.g., direct-to-consumer marketing, technology-assisted interventions) and provider-focused implementation (e.g., multi-level implementation approaches, workforce development) strategies. The overarching objective of her work is to increase both the demand for and supply of effective treatments in community settings. She joined the Feinberg community in 2022 as Inaugural Director of the Center for Dissemination and Implementation Science.



### **Melissa Briody, MOT, OTR/L, MS HSM**

*Senior Project Manager, Research*

Melissa Briody is a Senior Project Manager at Shirley Ryan AbilityLab in Chicago, IL. She oversees the Center for Smart Use of Technologies to Assess Real World Outcomes (C-STAR), an NIH-funded infrastructure center that supports early-career rehabilitation researchers using innovative technology to measure outcomes in the lab, clinic, and community. She also oversees internal research initiatives designed to increase communication and collaboration between researchers and clinicians. Melissa completed her Master's Degree in Occupational Therapy from Xavier University in 2012. She graduated with a Master of Science in Health Systems Management from Rochester Institute of Technology in 2020. Melissa practiced occupational therapy in diverse healthcare settings in Chicago, IL and Rochester, NY before transitioning into management. Her clinical expertise lies within pediatric rehabilitation for developmental, neurological, and physical disabilities.



## **Margaret "Maggie" French, PT, DPT, Ph.D., NCS**

*Assistant Professor, Department of PT and Athletic Training,  
College of Health at the University of Utah*

Dr French's research focuses on improving the value of rehabilitation after stroke through understanding person- and system-level variability. Her research leverages large real-world data to understand sources of heterogeneity in functional outcomes and healthcare utilization after stroke. Her work occurs at the intersection of neurorehabilitation, bioinformatics, health services research, and data science.

Through her work, Maggie aims to change the way rehabilitation is delivered so that individuals after stroke obtain better functional outcomes more efficiently.



## **Kristen Hohl, PT, DPT**

*Senior II Research Physical Therapist  
Board Certified Clinical Specialist in Neurology*

Dr Hohl works in the outpatient department at Shirley Ryan AbilityLab, specializing in treating individuals with neurological diagnoses. Based in Chicago, IL, she skillfully balances her clinical expertise in a research role working in Dr. Miriam Rafferty's Knowledge Translation: Exercise and Management Lab at the renowned Shirley Ryan AbilityLab. Kristen received her Bachelor of Science in Biology from Denison University

(2009) and her Doctor of Physical Therapy from the University of Pittsburgh (2012). With a passion for integrating cutting-edge technologies and emerging interventions into her practice, Kristen has become a leading clinician in the field. Her research interests include using implementation science methodology to study the implementation of evidence-based practices and novel technologies into real-world rehabilitation settings.



## **Helen Huang, Ph.D.**

*Jackson Family Distinguished Professor,  
Department of Biomedical Engineering at North Carolina State University (NC State);  
The University of North Carolina at Chapel Hill (UNC)  
Director of the Closed-Loop Engineering for Advanced Rehabilitation (CLEAR) core.  
Co-director of NIDILRR funded Rehabilitation Engineering Research Center.*

Dr Huang's research interest lies in neural-machine interfaces, wearable robotics (robotic prosthetics and exoskeletons), learning-based wearable robot control, wearer-robot interaction and co-adaptation, and human motor control/biomechanics. She was a recipient of the Delsys Prize for Innovation in Electromyography, NIDILRR Switzer Fellowship, NSF CAREER Award, ASA Statistics in Physical Engineering Sciences Award, and NC State ALCOA Foundation Distinguished Engineering Research Award. She is a Fellow of AIMBE, Fellow of IEEE, NC State faculty scholar, and member of the Society for Neuroscience, BMES, American Society of Biomechanics, and AAAS. She is the Editor-in-Chief for the IEEE Transactions on Neural Systems and Rehabilitation Engineering and an Editorial Board Member for IEEE Transactions on Biomedical Engineering.





## **Arun Jayaraman, PT, Ph.D.**

*Director, Max Näder Center for Rehabilitation Technologies & Outcomes Research*

*Director & Business Development Officer, Office of Translational Research*

*Associate Professor of PM&R, Medical Social Science, PTHMS, Northwestern University*

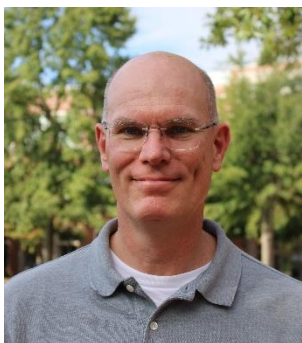
Dr. Arun Jayaraman's work primarily focuses on developing and executing both investigator-initiated and industry-sponsored research in prosthetics, orthotics, rehabilitation robotics, and other assistive and adaptive technologies to treat physical impairments. He conducts all of his outcomes research using advanced wearable patient monitoring wireless sensors and novel machine learning techniques, in addition to the traditional performance-based and patient-reported outcome measures. He collaborates both nationally and internationally with many academic and industrial organizations and is internationally recognized in the field of rehabilitation robotics.



## **Nammi Kandula, MD, MPH**

*Co-Director, C-STAR Implementation Science Core; Co-Director, Institute for Public Health and Medicine (IPHAM) - Center for Community Health; Professor of Medicine and Preventive Medicine, Northwestern University*

Dr. Namratha Kandula's research is focused on cardiovascular health of immigrants and community-engaged research to reduce cardiovascular disparities. Dr. Kandula's research has made fundamental contributions to how immigration, culture, and social context shape health and health disparities. She is co-PI of the Mediators of Atherosclerosis in South Asians Living in America (MASALA) study, which is the first longitudinal cardiovascular cohort study focused on understanding the development and progression of cardiovascular disease in South Asian Americans. She is also the lead investigator of NIH-funded community clinical trials on lifestyle interventions to improve cardiovascular health among South Asian Americans. Dr. Kandula's leadership extends beyond academia, where she works with multisector partners across the Chicago-metro area to conduct collaborative science aligned with community priorities.



## **Derek Kamper, Ph.D.**

*Associate Professor, Joint Department of Biomedical Engineering*

*Associate Director, Closed Loop Engineering for Advanced Rehabilitation (CLEAR)*

*North Carolina State University*

*University of North Carolina at Chapel Hill*

Derek G. Kamper received a B.E. degree in electrical engineering from Dartmouth College, Hanover, NH, and M.S. and Ph.D. degrees in biomedical engineering from The Ohio State University, Columbus, OH. He subsequently completed a postdoctoral fellowship at Northwestern University/ Rehabilitation Institute of Chicago. He is currently an Associate Professor in the Joint Department of Biomedical Engineering at North Carolina State University and the University of North Carolina at Chapel Hill, as well as Director of the Assisting Stroke Survivors with Engineering Technology (ASSET) Rehabilitation Engineering Research Center and Associate Director of the Closed-Loop Engineering for Advanced Rehabilitation (CLEAR) research core spanning both universities. His research interests include neuromechanics, mechatronics, and neurorehabilitation.



## **Allison Kessler, MD, MSc**

*Section Chief; Spinal Cord Injury Innovation Center*

*Shirley Ryan AbilityLab*

*Assistant Professor of Physical Medicine and Rehabilitation*

*Northwestern University's Feinberg School of Medicine*

Dr. Kessler earned her Doctor of Medicine from Northwestern University Feinberg School of Medicine and her Master of Science in Biomedicine, Bioscience and Society from the London School of Economics. She completed her residency in PM&R through the McGaw Medical Center of Northwestern University/RIC (now Shirley Ryan AbilityLab), and her fellowship in SCI Medicine at RIC. Dr. Kessler is the Associate Director of Shirley Ryan AbilityLab's SCI Medicine Fellowship. She holds appointments at Northwestern University Feinberg School of Medicine as Assistant Professor in the Department of PM&R and Teamwork and Leadership Curricular Thread Leader. In her role leading the Renée Crown Center for Spinal Cord Innovation, Dr. Kessler directs attending physicians and ensures high-quality, interdisciplinary care, and oversees the adoption of evidence-based practices and clinically relevant innovations.



## **Lee E. Miller, Ph.D.**

*Professor of Neuroscience/Physical Medicine and Rehabilitation*

Dr Miller received his Ph.D. degree in Physiology from Northwestern University in 1989, then completed two years of postdoctoral training in the Department of Medical Physics, University of Nijmegen, The Netherlands. He was inducted into the American Institute for Medical and Biological Engineering in 2016 and was president of the Society for the Neural Control of Movement from 2015 - 2023. Dr. Miller has had a career-long interest in the motor and sensory signals generated by single neurons in the brains of monkeys during arm and hand movement. His early work was devoted to studying these signals in the brainstem, cerebral cortex, and cerebellum, and their relation to muscle activity. In the past 20 years, Dr. Miller's lab has increasingly focused on the development of intracortical brain computer interface technology to restore limb movement to persons paralyzed by spinal cord injury. His interdisciplinary approach has led to productive collaborations locally, nationally, and internationally. Most recently he has begun working with humans with spinal cord injury as part of the Cortical Bionics Consortium.



## **José L. Pons, PhD**

*Scientific Chair, Legs + Walking Lab*

*Professor to Dept. of PM&R, Feinberg School of Medicine and to Dept. of Biomedical Engineering and Dept. of Mechanical Engineering, McCormick School of Engineering, Northwestern University*

Dr. Pons is a creative engineer with a long-standing history of collaboration with physicians in physical medicine and rehabilitation. He has authored more than 150 peer-reviewed articles and is best known for his work in wearable robotics and neuroprosthetics as applied to patients with spinal cord injury, stroke and Parkinsonism. He has developed methods for studying balance and tremor in patients with Parkinson's disease and essential tremor; created robotic manipulators and mobility devices for children with cerebral palsy; modified computer cursors for patients with limited mobility; and developed movement sensors for patients who have lost limbs through amputation. The depth of his expertise in physics has enabled him to perform fundamental analyses of devices and

movement patterns that are generally applicable to any movement disorder. An expert advisor for science agencies in seven countries, Dr. Pons also serves as associate editor for several journals, including *Frontiers in Neurology* and various Institute of Electrical and Electronics Engineers (IEEE) publications.



### **Sara Prokup, PT, DPT**

*Manager of Research Operations*

*Max Nader Center for Rehabilitation Technologies and Outcomes (RT&O) & Technology and Innovation Hub (tiHUB)*

Sara has an educational background in the study of human movement in addition to an advanced degree in physical therapy. Her current and past work includes a combination of clinical treatment and research in the area of neurologic rehabilitation. The research she is involved in within the RT&O Lab and the tiHUB investigates the effectiveness of using robotic exoskeletons, wearable sensors, and other technologies in physical rehabilitation for patients with neurologic diagnoses.



### **Miriam Rafferty, PT, Ph.D.**

*Director of Implementation Science*

*Shirley Ryan AbilityLab*

*Assistant Professor of Physical Medicine and Rehabilitation, Northwestern University's Feinberg School of Medicine*

Dr. Miriam Rafferty is the Director of Implementation Science and a Research Scientist at the Shirley Ryan AbilityLab. She is also an Assistant Professor at Northwestern University's Feinberg School of Medicine in the Departments of Physical Medicine & Rehabilitation, Medical Social Science, and Psychiatry & Behavioral Science. She is also an active physical therapist clinician specializing in neurologic physical therapy for people with Parkinson's disease. Dr. Rafferty's research focuses on health services delivery models for people with Parkinson's disease, particularly proactive delivery models. She also uses implementation science methodology to study the implementation of evidence-based practices and novel technologies into real-world rehabilitation settings.



### **Elliot J Roth, MD**

*Attending Physician, Brian Innovation Center, Shirley Ryan AbilityLab*

*Paul B. Magnuson Professor and Chairman of PM&R at Northwestern University's Feinberg School of Medicine; Chairman of the Department of Rehabilitation Medicine at Northwestern Memorial Hospital*

Elliot Roth, MD brings more than 30 years of experience in rehabilitation patient care, research, teaching, and program leadership for patients with stroke, traumatic brain injury spinal cord injury, and other neurological conditions. His research and academic interests are in the areas of novel methods to enhance recovery, improve functional outcomes, and prevent associated medical conditions for people with disabling conditions. He currently is Project Director of a Rehabilitation Research and Training Center on Health and Function for People with Physical Disabilities, and he



recently completed a Rehabilitation Research and Training Center grant on stroke rehabilitation, which he led for 20 years. He is also PI on several other research projects focused primarily on neurorehabilitation, including a current NIH-supported project on stroke-induced hand dysfunction.



## **Douglas J. Weber, PhD**

*Akhtar and Bhutta Professor, Mechanical Engineering,  
Neuroscience Institute Carnegie Mellon University*

Douglas Weber is broadly interested in understanding the role of sensory feedback in supporting and regulating a wide range of perceptual, motor, cognitive, and autonomic functions. His research combines fundamental neuroscience and engineering research to understand physiological mechanisms underlying sensory perception, feedback control of movement, and neuroplasticity in sensorimotor systems. Knowledge gained from these studies is being applied to invent new

technologies and therapies for enhancing sensory and motor functions after stroke, spinal cord injury, or limb loss. A founding member of DARPA's Biological Technologies Office, Weber created and managed a portfolio of neurotechnology research programs to support the White House BRAIN initiative, launched by President Obama in 2013. He created DARPA's HAPTIX, ElectRx, and TNT programs, which are developing implantable, injectable, and wearable neurotechnologies that restore natural motor and sensory functions for amputees, enable novel and drug-free therapies for treating inflammatory disease and mental health disorders, and promote plasticity in the brain to enhance learning of complex cognitive skills. Weber completed post-doctoral training in the Centre for Neuroscience at the University of Alberta. He holds eight US patents and has published extensively on a wide range of topics spanning sensorimotor neurophysiology, biomechanics, neural engineering, and physical medicine. He has mentored over 100 undergraduate, graduate and medical students and several post-doctoral fellows.

## **Agenda**

### **Day One - August 26, 2024 (US Central Time)**

8:30 am	Breakfast
8:45 am	Welcome, Introduction to the course, Opening Remarks
9:00 am	Expanding Horizons: Harnessing Spinal Cord Stimulation for Restoring Motor Function from Legs to Hands Doug Weber, Ph.D.
10:00 am	The Human Element: A Clinical Discussion Allison Kessler, MD, MSc
10:15 am	Break
10:30 am	Restoring Motor Function of Individuals with Limb Loss via Bionic Prostheses* Helen Huang, Ph.D.
11:15 am	Finding the Perfect Fit: A Guide to Selecting Exoskeletons for Individual Patient Needs* Arun Jayaraman, PT, Ph.D.
11:45 am	The Human Element: A Clinical Discussion Kristen Hohl, PT, DPT, NCS

12:00 pm	Lunch
1:00 pm	Estimating Upper-Limb Impairment Level in Acute Stroke Survivors using Wearable Inertial Sensors and a Minimally-Burdensome Motor Task Ivan Lee, Ph.D.
1:15 pm	A New Paradigm in Personalized Aquatic Therapy and Rehabilitation Yeonsik Noh, Ph.D.
1:30 pm	Virtual Environments for Real Rehabilitation Derek Kamper, Ph.D.
2:15 pm	The Human Element: A Clinical Discussion Jason Barbas, PT, DPT
2:30pm	Break
2:45 pm	Tales From the Users: Real World Lived Experience Sara Prokup, PT, DPT
3:45	C-STAR Poster Preview
4:15	End of Day & Start of Poster Session & Reception <i>(No contact hours offered)</i>

\*This session is not eligible for ASHA CEUs.

## **Day Two - August 27, 2024 (US Central Time)**

8:30 am	Breakfast
8:45 am	Welcome/Introductions
9:00 am	Brain-controlled functional electrical stimulation for hand use in spinal cord injury: Opportunities and challenges” Lee Miller, Ph.D.
9:45 am	The Human Element: A Clinical Discussion
10 am	Break
10:15 am	Using Technology to Aggregate Large-Scale, Person-Centered Data Maggie French, Ph.D.
11:00 am	The Human Element: A Clinical Discussion James Cotton, MD, Ph.D.
11:15 am	Digital Phenotyping of Post-Stroke Cognition: Ecological Momentary Assessment Approach Alex W.K. Wong, Ph.D., DPhil, OT, CRC

11:30 am	Feasibility and Efficacy Study of Device-Facilitated Lingual Endurance Exercise in Treating Post-Stroke Dysphagia Brittany N Krekeler, PhD, CCC-SLP
11:45 am	Lunch
1:00 pm	Keynote – Sensorimotor Mechanisms to Inform Technology-based Interventions Jose Pons, Ph.D.
1:45 pm	The Human Element: A Clinical Discussion Elliot J Roth, MD
2:00 pm	Break
2:15 pm	Panel: Collecting Meaningful Feedback from Clinical and Community Advisors Moderator: Miriam Rafferty, PT, Ph.D. Panelists: Sara Becker, Ph.D, Nammi Kandula, MD, Melissa A. Briody, MOT, OTR/L, MS HSM
3:15 pm	Wrap up Discussion Megan K. O'Brien, Ph.D. & R. James Cotton, MD, Ph.D.
3:30 pm	End of Day Two

## **Registration Fee = \$50**

### **Cancellation Policy**

All cancellations must be requested by email at [academy@sralab.org](mailto:academy@sralab.org). Refunds less a 20 percent administrative charge will be given 30 days before the start date of the course. If the cancellation notice is received less than 30 days from the start date of the course, a credit towards a future continuing education program would be applied for one year from the start date of the canceled course. The Academy reserves the right to cancel or change any programs for due cause. The cancellation of a program by the Academy will result in a full refund of tuition.

### **Accommodations**

Shirley Ryan AbilityLab has a preferred rate at The Hyatt Centric Chicago Magnificent Mile which is located one block away. Hyatt Centric Chicago Magnificent Mile, 633 North St. Clair, Chicago, Illinois, 60611. You can reserve a room by clicking [HERE](#). The daily rate for parking at the Hyatt Chicago is \$76/day with in and out privileges.

For a list of other available lodging options near the hospital, please click [HERE](#).

\*Room and parking rates may fluctuate and are subject to change

### **Technology Requirements**

To participate, you will need access to a computer with an internet connection. High-speed broadband access (LAN, Cable or DSL) is highly recommended.

- Internet connection: broadband wired or wireless (3G or better)
- Web browser with latest stable version. Recommended browsers are Apple Safari, Google Chrome, Mozilla Firefox and Microsoft Edge
- JavaScript and Cookies enabled
- Speaker or headset to listen to audio files and participate in Zoom calls
- Do NOT use Internet Explorer, as it is not supported

### **Accessibility**

Please contact the Academy if you require any special accommodations for this course.



## Continuing Education Credit

### Occupational Therapy



American Occupational Therapy Association

#### Approved Provider

Shirley Ryan AbilityLab is an AOTA Approved Provider of professional development. Course approval ID# 9060. This distance learning-interactive course is offered at 11.0 contact hours, 1.1 CEUs [intermediate level, foundational knowledge/OT service delivery]. The assignment of AOTA CEUs does not imply endorsement of specific course content, products, or clinical procedures by AOTA.

Shirley Ryan AbilityLab is an AOTA Approved Provider of professional development. Course approval ID# 9060. This distance learning-interactive course is offered at 11.0 contact hours, 1.1 CEUs [intermediate level, foundational knowledge/OT service

### Physical Therapy

This course has been approved by the Illinois Physical Therapy Board for 11.0 contact hours. Approval #216-000069

The Shirley Ryan AbilityLab is recognized by California and the New York State Education Department's State Board for Physical Therapy as an approved provider of physical therapy and physical therapist assistant continuing education. This course has been approved for 11.0 contact hours on 2/9/2024.

The following states require continuing education units with no state-specific approval: CT, IA, and WA

### Physician



Illinois State Medical Society

The Rehabilitation Institute of Chicago DBA Shirley Ryan AbilityLab is accredited by the Illinois State Medical Society (ISMS) to provide continuing medical education for physicians.

The Rehabilitation Institute of Chicago DBA Shirley Ryan AbilityLab designates this live activity for a maximum of 11.0 *AMA PRA Category 1 Credit(s)*<sup>™</sup>. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

### Speech-Language Pathology



ASHA CE  
APPROVED PROVIDER

Rehabilitation Institute of Chicago  
dba Shirley Ryan AbilityLab

Advanced Level  
0.95 ASHA CEUs

## Faculty and Planning Committee Disclosures

Course Director's and Planning Committee Members' Disclosure Information:

Rebecca Bagdy, MBA	Has nothing to disclose.
Melissa Briody, OTR/L	Has nothing to disclose.
Ronald Cotton, MD, Ph.D.	Has nothing to disclose.
Melissa Kolski, PT, DPT	Has nothing to disclose.
Megan O'Brien, Ph.D.	Has nothing to disclose.
Erin Walacsek, PT	Has nothing to disclose.

Speakers, Moderators and Panelists' Disclosure Information:

Jason Barbas, PT, DPT	Has nothing to disclose.
Sara Becker, Ph.D	Has nothing to disclose.
Brittany N Krekeler, PhD, CCC-SLP	Has nothing to disclose.
Maggie French, PhD	Has nothing to disclose.
Kristen Hohl, PT, DPT	Has nothing to disclose.
Helen Huang, PhD	Has nothing to disclose.
Arun Jayaraman, Ph.D.	Has nothing to disclose.
Derek Kamper, Ph.D.	Has nothing to disclose.
Nammi Kandula, MD	Has nothing to disclose.
Ivan Lee, Ph.D.	Has nothing to disclose.
Lee E. Miller, Ph.D.	Has nothing to disclose.
Yeonsik Noh, Ph.D.	Has nothing to disclose.
Jose Pons, Ph.D.	Has nothing to disclose.
Sara Prokup, PT, DPT	Has nothing to disclose.
Miriam Rafferty, PT, Ph.D.	Has nothing to disclose.
Elliot J Roth, MD.	Has nothing to disclose.
Doug Weber, Ph.D.	He discloses that he has Intellectual property and a patent with Reach Neuro
Alex W.K. Wong, Ph.D., DPhil, OT, CRC	Has nothing to disclose.

## Important Registration Information

Registrations will be taken in the order in which they are received for the in-person portion of this program. You will receive an email confirmation on the same day that you register. Please note that once the course has reached its maximum enrollment, no additional spots will become available.