Christopher J. Arellano, Ph.D.

Curriculum Vitae Last Updated: 10/12/2017

1. CURRENT POSITION

2016- Assistant Professor, Department of Health and Human Performance, University of Houston

2. EDUCATION

2008-2012 University of Colorado Boulder, Ph.D. in Integrative Physiology
Thesis: Energetic cost and balance control mechanisms in human locomotion.
A*dvisor:* Rodger Kram, Ph.D.

2005-2007 University of Houston, M.S. in Exercise Science
Thesis: The independent effects of weight, gravity, and inertia on gait stability.
Advisor: Max J. Kurz, Ph.D.

1999-2003 University of Texas at Austin, B.S. in Mechanical Engineering with concentration in Biomedical Engineering

3. PROFESSIONAL APPOINTMENTS

05/13-06/16 **NIH Post-doctoral Associate**, Ecology and Evolutionary Biology Dept., Brown University, *Advisor:* Thomas J. Roberts, Ph.D.
04/12-04/13 **NIH Postdoctoral Fellow**, Integrative Physiology of Aging (T32), University of Colorado Boulder, *Advisor*: Roger M. Enoka, Ph.D.
01/12-04/12 **Research Assistant**, Integrative Physiology, University of Colorado Boulder
08/11-12/11 **Biomechanics Teaching Assistant**, Integrative Physiology, University of Colorado Boulder
08/08-08/11 **Fellow**, NASA-Harriett G. Jenkins Pre-Doctoral Fellowship Program
01/07-08/08 **Biomechanics Teaching Assistant**, Health and Human Performance, University of Houston
09/06-01/07 **Research Assistant**, Laboratory of Integrated Physiology, University of Houston
05/06-08/06 **Intern**, National Space Biomedical Research Institute (NSBRI), Anthropometrics and Biomechanics Facility, NASA Johnson Space Center
01/05-05/06 **Teaching Fellow**, Health and Human Performance, University of Houston
10/04-01/05 **Research Staff**, Health and Human Performance, University of Houston
08/99-08/04 **Laboratory Technical Supervisor I**, Physics Department Laboratory, University of Texas at Austin

4. PUBLICATIONS

a. Peer-reviewed Articles

Hoogkamer W, Kram R, & **Arellano CJ** (2017). Author's Reply to Candau et al.: Comment on: "How biomechanical improvements in running economy could break the 2-hour marathon barrier". *Sports Medicine*. 47 (11): 2405-2407

Hoogkamer W, Kram R, & **Arellano CJ** (2017). How biomechanical improvements in running economy can break the 2-hour marathon barrier. *Sports Medicine*. 47 (9): 1739-1750. ***Featured in the "New York Times" and other national/international media outlets.***

Arellano CJ, Gidmark NJ, Konow N, Azizi E, & Roberts TJ (2016). Determinants of aponeurosis shape change during muscle contraction. *Journal of Biomechanics*, 10.1016/j.jbiomech.2016.04.022

Arellano CJ, Caha D, Henessey JE, Ioannis, A, Baudry S, & Enoka RM (2016). Fatigue-induced adjustment in antagonist coactivation by old adults during a steadiness task. *Journal of Applied Physiology, doi*: 10.1152/japplphysiol.00908.2015

Arellano CJ, McDermott WJ, Kram R, & Grabowski AG (2015). Effect of running speed and leg prostheses on mediolateral foot placement and its variability. *PloS One*. doi: 10.1371/journal.pone.0115637

Arellano CJ & Kram R (2014). Partitioning the metabolic cost of human running: A task-by-task approach. *Integrative and Comparative Biology.* 54 (6): 1084-98.

Arellano CJ & Kram R (2014). On the metabolic cost of human running: is swinging the arms worth it? *Journal of Experimental Biology*. 217 (14): 2456-61. ***Featured in the "New York Times" and other national/international media outlets.***

Look NE, **Arellano CJ**, Grabowski A, McDermott B, Kram R, & Bradley E (2013). Nonlinear dynamics of running: Speed, stability, symmetry and the effects of leg amputations. *Chaos*. 23: 043131.

Arellano CJ & Kram R (2012). The energetic cost of maintaining lateral balance during human running. *Journal of Applied Physiology*. 112: 427-434.

Kram R, **Arellano CJ**, & Franz JR (2011). The metabolic cost of locomotion: muscle by muscle. *Exercise and Sports Science Reviews*. 39(2): 57-58.

Arellano CJ & Kram R (2011). The effects of step width and arm swing on energetic cost and lateral balance during running. *Journal of Biomechanics*. 44(7): 1291-95.

Arellano CJ, Layne CS, O'Connor DP, & Kurz MJ (2009). The independent effect of added mass on the stability of the sagittal plane leg kinematics during steady-state human walking. *Journal of Experimental Biology*. 212(12): 1965-70.

Arellano CJ, Layne CS, O'Connor DP, Scott-Pandorf M, & Kurz MJ (2009). Does load carrying influence sagittal plane locomotive stability? *Medicine and Science in Sports and Exercise*. 41(3): 620-27.

Kurz MJ, Scott-Pandorf M, **Arellano CJ**, Olsen D, & Whittaker G (2008). The penguin waddling gait pattern has a more consistent step width than step length. *Journal of Theoretical Biology*. 252(2): 272-76.

Kurz MJ, Judkins TN, **Arellano CJ**, & Scott-Pandorf M (2008). A passive dynamic walking robot that has a deterministic nonlinear gait. *Journal of Biomechanics*. 41(6): 1310-16.

Kurz MJ, Pothakos K, Jamaluddin S, Scott-Pandorf M, **Arellano CJ**, & Lau YS (2007). A chronic mouse model of Parkinson's disease has a reduced gait pattern certainty. *Neuroscience Letters*. 429(1): 39-42.

b. Articles in progress

Hoogkamer W, Snyder KL, & **Arellano CJ**. The possibility of a sub-2-hour marathon using an optimal drafting approach (completing model simulations and manuscript in preparation, to be submitted to *Proceedings of the National Academy of Sciences* in early 2018).

Arellano CJ, Gidmark NJ, Konow N & Roberts TJ. Elastic shape change and mechanical behavior in the aponeurosis of jumping and landing turkeys (data analyses complete and manuscript in preperation, to be submitted to *Biology Letters* in early 2018).

McReynolds, OB & **Arellano CJ.** The economy of walking while carrying loads on the swinging arms (completing data collection, to be submitted to the *Journal of Experimental Biology* in early 2018).

Arellano CJ, Beale MT, & Kram R. Arm swing during human walking: Active and passive contributions to a hybrid system (in revision, to be resubmitted to *Proceedings of the Royal Society B: Biological Sciences*).

c. Selected Abstracts

Arellano CJ, Gidmark NJ, Konow N, Roberts TJ. Elastic shape change and mechanical behavior in the aponeurosis of jumping and landing turkeys. *American Society of Biomechanics*, Boulder, Colorado, August 2017 (Poster Presentation).

Arellano CJ, Hoogkamer W. Coasting to a sub-2-hour marathon using an optimal drafting approach. *American Society of Biomechanics*, Boulder, Colorado, August 2017 (Podium Presentation).

Arellano CJ, Hoogkamer W, Kram R. How biomechanical improvements in running economy can break the 2-hour marathon barrier. *International Society of Biomechanics in Sports*, Tsukuba, Japan, July 2016 (Podium Presentation).

Arellano CJ, Gidmark NJ, Konow N, Roberts TJ. Determinants of aponeurosis shape change during a muscle contraction. *American Society of Biomechanics*, Columbus, Ohio, August 2015 (Poster presentation).

Arellano CJ, Gidmark NJ, Konow N, Roberts TJ. Capturing dynamic shape changes in muscle and aponeurosis. *Northeast Joint DVM/DCB-SICB*, Dartmouth, Massachusetts, November 2014 (Podium Presentation).

Arellano CJ & Kram R. Partitioning the metabolic cost of human running: A task-by-task approach. *Society for Integrative and Comparative Biology*, Austin, Texas, January 2014 (Podium Presentation).

Gidmark NJ, Konow N, **Arellano CJ**, Roberts TJ. Determinants of muscle shape change during lengthening and shortening contractions. *Society for Integrative and Comparative Biology*, Austin, Texas, January 2014 (Poster Presentation).

Arellano CJ, Beale MT, & Kram R. Arm swing during human walking: Active and passive contributions to a hybrid system. *Dynamic Walking Conference*, Pensacola, Florida, May 2012 (Podium Presentation).

Arellano CJ & Kram R. How do step width and arm swing affect energetic cost and lateral balance during running? *American Society of Biomechanics*, Providence, Rhode Island, August 2010 (Podium Presentation). ***Voted runner-up for "Best Paper Award"***

d. Invited Talks

International Society of Biomechanics in Sport, **Title**: "How biomechanical improvements in running economy can break the 2-hour marathon barrier", Applied Session on Running Economy. University of Tsukuba, Japan. July 2016

Harvard University, **Title:** "Dynamic shape change in the aponeurosis: evidence for a soft and hard biological spring", Concord Field Station. April 2016

Brown University, **Title:** "Muscle-tendon mechanics and function." Department of Engineering, Instrumentation Design (Undergraduate course). Nov 2015

Brown University, **Title:** "Spring-mass mechanics and the design of running-specific prostheses." Department of Ecology and Evolutionary Biology, Biological Design: Structural Architecture of Organisms (Undergraduate course). Sept 2015

Future Research Leaders Conference, **Title:** "Muscle- tendon function in the context of locomotion." National Institutes of Health, Sept 2015

University of Massachusetts Amherst. **Title: "**Balance, metabolic cost, and muscle-tendon function during locomotion." Department of Kinesiology. Mar 2015

Massachusetts Institute of Technology Lincoln Laboratory. **Title:** "Explaining the metabolic of human running: The cost of generating force and task-by-task approach." Mar 2014

Society for Integrative and Comparative Biology. **Title:** "Partitioning the Metabolic Cost of Human Running: A task-by-task approach." Terrestrial Locomotion Symposium. Jan 2014

Colloquium for the Department of Integrative Physiology. **Title:** "Lateral balance in sprinters with and without transtibial amputations." University of Colorado Boulder. Apr 2012

5. RESEARCH GRANTS

a. Completed grants

2016-2017 Research Progress Grant, *Muscle and aponeurosis mechanics in landing and jumping turkeys*, (Principal Investigator at University of Houston).
Funding Amount: $4000.

2013-2016 National Institutes of Health's Diversity Supplement, *Elastic Mechanisms in Locomotion*, (Postdoctoral trainee at Brown under TJ Roberts).
Funding Amount: $251,177.

2012-2013 "Integrative Physiology of Aging" Training Grant (T32), *Control strategies in young and older adults*, (Postdoctoral trainee at CU Boulder under RM Enoka).
Funding Amount: $44,496.

2008-2011 NASA-Harriett G. Jenkins Pre-doctoral Fellowship, *Energetic cost and balance control mechanisms in human locomotion*, (Principal Investigator).
Funding Amount: $97,500.

2007-2008 NASA-Texas Space Grant Consortium, *Independent effects of weight, gravity, and inertia on gait stability*, (Principal Investigator).
Funding Amount: $5000.

b. Proposals submitted

NIH R01
University of Houston (Principal Investigator)
Funding Amount Requested: $1,574,087
Submitted: June 2017

American College of Sports Medicine Foundation Grant
University of Houston (Principal Investigator)
Funding Amount: $10,000.
Awarded: March 2017. Start Date: July 2017

NIH Pathway to Independence Award (Parent K99/R00)
Brown University (Primary Mentor: TJ Roberts; Co-Mentor: RL Marsh).
Funding Amount Requested: $932,572.22.
Submitted June 2015. Not Awarded.

The Burroughs Wellcome Fund - Postdoctoral Enrichment Program,
Brown University.
Funding Amount Requested: $50,000.
Submitted Jan 2014. Not Awarded May 2014.

6. TEACHING EXPERIENCE

a. University of Houston (Assistant Professor)

Biomechanics course, *Responsibility*: Design course materials, lectures, and exam materials for 64 students. Class is designed with an active learning approach emphasizing in-class discussion and problem solving. Fall 2017. Teaching Assistant: David Temple, PhD student.

b. Brown University (Postdoc)

Animal Locomotion course taught by Professor Sharon Swartz, *Responsibility:* Participated in teaching activities, lectures, and grading. Spring 2015.

Teaching Certificate #1, Sheridan Center for Teaching and Learning, *Responsibility*: Completed 5 core modules covering fundamental reflective teaching components. Completed in April 2015.

c. University of Colorado Boulder (PhD student)

Biomechanics course taught by Professor Rodger Kram, *Responsibility:* TA to class (64 students) and direct a lab section (16 students). Student Evaluation: 5.7/6.0

7. SERVICE TO THE:

a. University

STEM Panel Discussant, *STEM for All: Broadening Participation in STEM Education & Careers*, Brown University, February 2016

Keynote Speaker, *Colorado Advantage Graduate Preview*, "My Experience as a Graduate Student at CU Boulder", November 2012

Graduate Student Panel, *Colorado Advantage Graduate Preview*, "Graduate Student Life at CU Boulder", November, 2012

Graduate Mentor, *Summer Multicultural Access to Research Training (SMART) program*, University of Colorado Boulder, 2009-2012

Graduate Mentor, *Alliance for Graduate Education and the Professoriate (AGEP) program*, University of Houston, 2007-2008

b. Profession

Scientific Review Board: International Society of Biomechanics in Sport

Journal Reviewer: Annals of Biomedical Engineering, Human Movement Sciences, Journal of Biomechanics, Journal of Neurophysiology, PLoS One, Royal Society Interface, Medicine & Science in Sports & Exercise, Journal of Applied Physiology, Gait & Posture

c. Community

Biomechanics Workshop, *Breakthrough Providence Arts and Sciences Exploration Day,* Wheeler School. Taught $7^{th}/8^{th}$ graders principles of projectile and rotational motion to understand throwing mechanics. July 18, 2014.

Mentor, *CasaMESA Robotics at Casa de la Esperanza Community Center*, Taught middle and high school students engineering principles, basic computer programming skills, and use of technology through the *FIRST* Robotics program. Nov 1, 2011-May 1, 2012

Guest Speaker, *STEMsation Mentoring Program*, University of Colorado Boulder, April 6, 2012

Volunteer, *Science Discovery*, University of Colorado Boulder, June 28, 2009

8. ACADEMIC HONORS, FELLOWSHIPS, AND PROFESSIONAL MEMBERSHIPS

a. Honors/Awards

Brown University, Division of Biology and Medicine's Postdoc Travel Award to attend the *American Society of Biomechanics Annual Meeting*, 2015

Student Travel Grant, *Dynamic Walking Conference*, 2012

APS/NIDDK Minority Travel Fellowship, *Experimental Biology Conference*, 2012

Teaching and Mentoring Award (Science Category), 23^{rd} Annual Multicultural Event, *Community Action Programs*, Boulder, Colorado, 2011

Volunteer Service Award, *CU Boulder's Volunteer Resource Center*, 2011

Runner-up, *Journal of Biomechanics Best Paper Award*, American Society of Biomechanics Annual Meeting, 2010

University of Houston AGEP Summer Research Program, 2007

Outstanding Member, Community Service, American Society of Mechanical Engineers, 2000

b. Fellowships/Scholarships

Awarded, *NIH Postdoctoral Fellow*, Integrative Physiology of Aging (T32), 2012
Awarded, *NASA-Harriett G. Jenkins Pre-Doctoral Fellowship Program*, 2008
Awarded, *University of Houston College of Education Alumni Scholarship*, 2008
Awarded, *NASA-Texas Space Grant Consortium Fellow*, 2008
Semifinalist, *NASA-Harriett G. Jenkins Pre-doctoral Fellowship Program*, 2007
Awarded, *NASA-Texas Space Grant Consortium Fellow*, 2007
Awarded, Summer Internship, *National Space Biomedical Research Institute,* 2006
Awarded, *Congressional Hispanic Caucus Institute* (CHCI) Scholarship, 2005
Awarded, *League of United Latin American Citizens* (LULAC) Scholarship, 1999

c. Memberships

Society for the Advancement of Hispanics/Chicanos and Native Americans in Science (SACNAS), Brown University, 2014-Present
Sigma Xi, 2014-Present
Society for Integrative and Comparative Biology, 2013-Present
The American Physiological Society, 2011-Present
American College of Sports Medicine, 2011-Present
Alliance for Graduate Education and the Professoriate, 2007-2012
American Society of Biomechanics, 2006-Present
American Society of Mechanical Engineers, 1999-2000
Society of Hispanic Professional Engineers, 1999-2001
Emerging Scholars Program, University of Texas at Austin, 1999-2000