37th Annual Conference

May 24 - 28, 2023
Albuquerque, New Mexico

Promoting Excellence in the Teaching of Human Anatomy and Physiology
Biopac Student Lab
for Inspired
Life Science Instruction

Engage Students with
Hands-on Practical Labs Using
Interactive, Multimedia Lessons

- Physiology
- Psychology
- Exercise Physiology
- Respiration
- Cardiovascular
- fNIRS
- Biology
- Nursing
- Pharmacology
- BME, Robotics & Engineering

biopac.com | info@biopac.com
# Table of Contents

Welcome from Jacquie Van Hoomissen, HAPS Executive Director .............. 5  
Letter from the Mayor of Albuquerque .......................................................... 6  
About HAPS .................................................................................................... 7  
HAPS Presidents & Conference Coordinators .............................................. 8  
HAPS Board of Directors ............................................................................. 9  
HAPS Committees and Chairs ..................................................................... 10  
HAPS Program Leads .................................................................................. 12  
Donor Recognition ...................................................................................... 13  
Exhibitor Layout ......................................................................................... 14  
Exhibitors List ............................................................................................. 15  
Sponsors ....................................................................................................... 23  
HAPS Regional Meeting ............................................................................. 24  
HAPS Institute ............................................................................................. 25  
HAPS Silent Auction, 2K & 5K Fun Run/Walk, and Yoga ............................ 26  
HAPS Conference Travel Award .................................................................. 27  
HAPS Sam Drogo Technology in the Classroom Award ............................... 32  
HAPS Gail Jenkins Teaching and Mentoring Award ..................................... 33  
HAPS John Martin Second Timers Award ................................................… 34  
Marieb, Hoehn, and Haynes Award for Diversity, Equity, and Inclusion ....... 36  
Schedule of Events ...................................................................................... 39  
Convention Center layout ........................................................................... 43  
Update Seminar Speakers .......................................................................... 44  
Poster Presentation Abstracts ...................................................................... 61  
Central New Mexico Community College Maps and Building Layouts ...... 83  
HAPS Committee Meetings ......................................................................... 84  
Workshop Shuttle Schedule ........................................................................ 85  
Workshop Schedules ................................................................................... 86  
Workshop Abstracts .................................................................................... 90  
Thank you .................................................................................................... 114
Brain food that's also good for your heart!

Available at
theAPprofessor.org/podcast
or wherever you listen to audio
Connect and Engage

With the summer months approaching, many of us are making plans for some much-needed rest and relaxation time after a busy academic year. As your new Executive Director, I am thrilled to see so many of you kicking off this upcoming season of renewal here in Albuquerque at our 2023 HAPS Annual Conference! Welcome! This gathering of HAPSters from around the globe is a wonderful and meaningful opportunity for all of us to connect and engage with each other as faculty, colleagues, and friends. It is also a great place to learn more about the amazing products offered by our partnering vendors who collectively support the excellent work we do in our classrooms.

This theme of “connect and engage” has been percolating in my mind from day one as your Executive Director. HAPS offers so many opportunities for everyone to connect in a way that works for you. It could be attending a Regional or Annual Conference in person, taking one of our continuing education courses, reading alongside colleagues in our Book Club, attending town halls and webinars, growing your skill set for success in our Leadership Academy, accessing Teaching Tips, the HAPS Exam, or HAPS Learning Outcomes to use in your classrooms, or deepening your knowledge of best practices with a warm cup of tea or coffee in one hand and the HAPS Educator journal in the other. We encourage you, our members, to not only connect through HAPS programming, but to also engage in our collective work. As an educational society, we aspire to provide offerings that are valued by you, our members, and we hold engaging members at the core of everything we do. There are so many ways to engage, from authoring publications and blogs, presenting workshops and posters, serving on committees, participating in social media, chiming in on our HAPS Listserv and much, much more. There is so much going on in HAPS, we hope you find your special place within our community.

We have an amazing array of opportunities that have been organized by our Conference Planning Committee and its Chair, Mark Danley. A big thank you to each and every member of this committee for their vision and organization of this week-long event. The first two days of the conference will be situated at the Albuquerque Convention Center and will feature eight update speakers. In the breaks between the update speakers, we will have over 100 poster presentations, and 26 dedicated exhibitors who are here to connect and engage with you, our members. This is a great time to intentionally seek them out and learn about their latest products that can assist you in your work as faculty. Please also consider joining the HAPS Leadership and all our members on Friday morning for our annual General Business Meeting. This is a meeting for all members, and we encourage everyone to attend. We will also celebrate Award Winners at this event, so there will be good energy all around!

For the workshop portion of the Conference, we will transition to Central New Mexico Community College. This year we have over 95 workshops to choose from over two days. This is more than any one of us can attend, so please plan ahead to get the most out of your experience. The 2023 App is again available for your use. It is an excellent way to connect and engage with conference attendees and find important information about the conference. Download it to your smartphone or tablet and check it out! The entire conference schedule is in the App and you can even build your own personal schedule for attending specific events and activities.

On behalf of the HAPS Leadership and staff, welcome to Albuquerque! We are glad you could make it. Please reach out to connect in the coming days….

With much appreciation for all you do supporting excellence in education,

Jacquie Van Hoomissen, PhD
Executive Director
March 29, 2023

Human Anatomy & Physiology Society (HAPS)
2023 Annual Conference

¡Bienvenidos!

On behalf of the City of Albuquerque, I would like to thank you for bringing the 2023 Human Anatomy & Physiology Society Annual Conference to our city.

While you are here, I hope you are able to explore all that our vibrant and diverse city has to offer. For example, you can take a stroll in Old Town or visit the Albuquerque Museum, The New Mexico Museum of Natural History and Explora! In our Downtown area, after a day of conferences, please take advantage of one of the many restaurants, coffee shops or brew pubs that are within walking distance of the Convention Center. You may also want to consider visiting the Indian Pueblo and National Hispanic Cultural Centers, The Albuquerque BioPark (Zoo, Aquarium and Botanic Gardens), or catch an Albuquerque Isotopes baseball game.

I hope that you enjoy your stay and look forward to your visiting again soon.

Sincerely,

Timothy M. Keller
Mayor
The Human Anatomy & Physiology Society (HAPS) was founded in 1989, after three successful national conferences promoting communication among teachers of human anatomy and physiology at the college level. HAPS is an organization of Human Anatomy & Physiology instructors who strive for excellence in undergraduate instruction in Anatomy & Physiology. Increased growth of the Society necessitated securing an Executive Director and an organizational management firm to assist in the day-to-day administration of HAPS. However, HAPS remains primarily a volunteer organization.

The **Board of Directors** makes the final policy decisions that steer the organization, but most of the work of HAPS is accomplished by the committees. All of these people (including the Conference Planning Committee) are unpaid volunteers. We encourage you to attend the meeting of any committee that interests you so you may discover first-hand how HAPS works and how you can get involved. **Check out page 85 to see when and where the committee meetings will take place during lunch on Saturday.**

<table>
<thead>
<tr>
<th>HAPS Board of Directors 2022 – 2023</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>President:</strong> Eric Sun</td>
</tr>
<tr>
<td><strong>Past President:</strong> Kyla Ross</td>
</tr>
<tr>
<td><strong>President Elect:</strong> Kerry Hull</td>
</tr>
<tr>
<td><strong>Secretary:</strong> Carol Britson</td>
</tr>
<tr>
<td><strong>Treasurer:</strong> Tracy Ediger</td>
</tr>
<tr>
<td><strong>Central Regional Director:</strong> Melissa Quinn</td>
</tr>
<tr>
<td><strong>Eastern Regional Director:</strong> Nanette Tomicek</td>
</tr>
<tr>
<td><strong>Southern Regional Director:</strong> Patrick Cafferty</td>
</tr>
<tr>
<td><strong>Western Regional Director:</strong> Hiranya Roychowdhury</td>
</tr>
<tr>
<td><strong>Executive Director:</strong> Jacqueline Van Hoomissen</td>
</tr>
<tr>
<td><strong>Business Manager:</strong> Caitlin Hyatt</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Standing Committees 2022 – 2023</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2023 Annual Host Committee Chair:</strong> Mark Danley</td>
</tr>
<tr>
<td><strong>Anatomical Donor Stewardship:</strong> Kelsey Stevens</td>
</tr>
<tr>
<td><strong>Awards &amp; Scholarship:</strong> Chasity O’Malley</td>
</tr>
<tr>
<td><strong>Communications:</strong> Larry Young</td>
</tr>
<tr>
<td><strong>Conference:</strong> Jennifer Burgoon</td>
</tr>
<tr>
<td><strong>Curriculum &amp; Instruction:</strong> Rachel Hopp</td>
</tr>
<tr>
<td><strong>Diversity, Equity, and Inclusion:</strong> Kathy Burleson</td>
</tr>
<tr>
<td><strong>Fundraising:</strong> Stacey Dunham</td>
</tr>
<tr>
<td><strong>Membership:</strong> Jacquie Van Hoomissen</td>
</tr>
<tr>
<td><strong>Steering Committee:</strong> Cindy Wingert</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Special Committees and Programs 2022 – 2023</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Educator Editor-in-Chief:</strong> Jackie Carnegie</td>
</tr>
<tr>
<td><strong>Exam Program Leads:</strong> Janet Casagrand, Valerie O’Loughlin, Dee Silverthorn</td>
</tr>
<tr>
<td><strong>Executive Committee:</strong> Eric Sun</td>
</tr>
<tr>
<td><strong>Finance Committee:</strong> Ron Gerrits</td>
</tr>
<tr>
<td><strong>Nominating Committee:</strong> Kerry Hull</td>
</tr>
<tr>
<td><strong>Presidents Emeriti Advisory Committee:</strong> Wendy Riggs</td>
</tr>
</tbody>
</table>

A list of contact information can be found on the governance area of the website [http://www.hapsweb.org/?page=BoardofDirectors](http://www.hapsweb.org/?page=BoardofDirectors)
HAPS Presidents & Conference Coordinators

Current President
Eric Sun, 2022-2023

President-Elect
Kerry Hull, 2023-2024

Past Presidents
Kyla Ross, 2021-2022
Wendy Riggs, 2020-2021
Mark Nielsen, 2019-2020
Judi Nath, 2018-2019
Ron Gerrits, 2017-2018
Terry Thompson, 2016-2017
Betsy Ott, 2015-2016
Tom Lehman, 2014-2015
Valerie O’Loughlin, 2013-2014
Dee Silverthorn, 2012-2013
Don Kelly, 2011-2012
Caryl Tickner, 2010-2011
John Waters, 2009-2010
Kevin Petti, 2008-2009
Margaret Weck, 2007-2008
Joseph Griswold, 2006-2007
Frederic Martini, 2005-2006
Sandra Lewis, 2004-2005
Philip Tate, 2003-2004
Michael Glasgow, 2002-2003
William Perrotti, 2001-2002
Henry Ruschin, 2000-2001
Christine Martin, 1999-2000
Steve Trautwein, 1998-1999
Kevin Patton, 1997-1998
Karen LaFleur-Stewart, 1996-1997
Robert Antony, 1995-1996
Wayne Carley, 1994-1995
Sandra Grabowski, 1993-1994
Gary Johnson, 1992-1993
Virginia Rivers, 1991-1992
Richard Steadman, 1989-1990

This Year
2023 – Albuquerque, NM (Mark Danley)

Coming Attractions
2024 – St. Louis, MO (Cinnamon Van Putte)
2025 – Pittsburgh, PA
(Burhan Ghaarbeh & Natasha Baker)

Previous HAPS Conferences
2022 - Fort Lauderdale, FL
(Chasity O’Malley and Cheryl Purvis)
2021 – Virtual Conference (Melissa Quinn)
2020 – Virtual Conference (Jacqueline Carnegie)
2019 – Portland, OR (Jacqueline Van Hoomissen)
2018 – Columbus, OH
(Jennifer Burgoon & Melissa Quinn)
2017 – Salt Lake City, UT (Mark Nielsen)
2016 – Atlanta, GA (Kyla Ross & Adam Decker)
2015 – San Antonio, TX
(Anita Moss & Jason LaPres)
2014 – Jacksonville, FL (Lourdes Norman)
2013 – Las Vegas, NV (Kebret Kebede)
2012 – Tulsa, OK (Karen McMahon)
2011 – Victoria, BC, Canada (Peggy Hunter)
2010 – Denver, CO (Terry Harrison)
2009 – Baltimore, MD (Ellen Lathrop-Davis)
2008 – New Orleans, LA (Judy Venuti)
2007 – San Diego, CA (Kevin Petti)
2006 – Austin, TX (Mary Lou Percy)
2005 – St. Louis, MO (Margaret Weck)
2004 – Calgary, AB, Canada (Izak Paul)
2003 – Philadelphia, PA (Lakshmi Atchison)
2002 – Phoenix, AZ (Philip Tate)
2001 – Maui, HI (Frederic Martini)
2000 – Charlotte, NC (Nishi Brysksa)
1999 – Baltimore, MD (Robert Smoes)
1998 – Fort Worth, TX (Theresa Page)
1997 – Toronto, ON, Canada (Henry Ruschin)
1996 – Portland, OR (John Martin)
1995 – St. Louis, MO (Kevin Patton)
1994 – Portsmouth, NN (Pam Langley)
1993 – Beaumont, TX (Wayne Carley)
1992 – San Diego, CA (Shirley Mulcahy)
1991 – Greenville, SC (Karen LaFleur-Stewart)
1990 – Madison, WI (Gary Johnson)
1989 – Reno, NV (Virginia Rivers)
1987/1988 – River Grove, IL (Robert Anthony)
HAPS Board of Directors

2022 - 2023

President
Eric Sun

Past President
Kyla Ross

President-Elect
Kerry Hull

Secretary
Carol Britson

Treasurer
Tracy Ediger

Central Regional Director
Melissa Quinn

Eastern Regional Director
Nanette Tomicek

Southern Regional Director
Patrick Cafferty

Western Regional Director
Hiranya Roychowdhury
HAPS Committees

2022 - 2023 Committee Chairs

HAPS uses committees to further the goals and strategic vision of the Society. Each committee has a Chair who leads the committee, and a number of members who help make sure the work gets done. Pick a committee that interests you and come to the meeting at lunch on Saturday, or just find a Committee Chair and ask them what the committee is like. Benefits of HAPS include the welcoming nature of the Society and the inclusive nature of leadership.

2023 Annual Host Committee
Mark Danley
Our committee oversees the coordination of the 2023 Annual Conference.

Anatomical Donor Stewardship Committee
Kelsey Stevens
We are charged with developing, reviewing, and recommending policies and procedures on the use of cadavers and human tissues and address issues pertinent to the development and maintenance of cadaver labs.

Awards & Scholarship Committee
Chasity O’Malley
We administer the HAPS Grants & Scholarships Program.

Communication Committee
Larry Young
We facilitate communication within HAPS, as well as outreach to non-members and potential members through various social media outlets.

Conference Committee
Jennifer Burgoon
We actively encourage HAPS members to host an Annual or Regional Conference. We also provide advice and assistance to members who do host a HAPS conference.

Curriculum & Instruction Committee
Rachel Hopp
We develop and/or compile resources that are useful for teaching A&P. Recent and ongoing projects include the development of learning outcomes and compilations of a list of useful software and websites. We also have subcommittees looking at A&P lab outcomes and accommodations for students with disabilities.
Diversity, Equity, and Inclusion Committee  
Kathy Burleson  
We develop best practices, resources, and professional development opportunities for inclusive education in anatomy and physiology. As well as advocate for and ensure inclusive practices within the organization and at HAPS events.

Membership Committee  
Jacqueline Van Hoomissen  
The Membership Committee has HAPS members and future members in mind. We are here to expand our membership base to include all Human Anatomy and Physiology educators and those individuals, institutions and corporations crucial to the HAPS mission statement of “Promoting Excellence in the Teaching of Human Anatomy and Physiology.”

Fundraising Committee  
Stacey Dunham  
The Committee organizes fundraising activities.

Steering Committee  
Cindy Wingert  
We provide communication among the various committees of HAPS and enhance the ability of the committees to collaborate in furthering the aims of the Society.

Many of the committees will meet during the annual conference, as well as present posters with information about their activities and projects. The annual conference is a great opportunity to learn more about this aspect of HAPS. Come see what we’re about!
HAPS Programs
2022 - 2023 Program Leads

**Executive Committee**
*Eric Sun*
We are the top administrators of HAPS, setting policies and governing the Society.

**Finance Committee**
*Ron Gerrits*
We are responsible for reviewing HAPS’ investments, disbursements and financial strategies in all programs and all accounts. Using this information, we make recommendations to the Board.

**HAPS Educator**
*Jacqueline Carnegie*
We oversee the peer-reviewed journal of HAPS, the *HAPS Educator*.

**Nominating Committee**
*Kerry Hull*
We assemble a list of qualified candidates for election to the HAPS Board of Directors.

**Presidents-Emeriti**

**Advisory Board**
*Wendy Riggs*

**Exam Program**
*Valerie O’Loughlin, Dee Silverthorn, & Janet Casagrand*

We develop, maintain and manage standardized HAPS exams.
Jan 1-Dec 31, 2022
Thank You for Your Donation!

WITH YOUR GIFT, YOU HAVE PLAYED AN IMPORTANT ROLE IN SUSTAINING AND BUILDING OUR HAPS COMMUNITY

$10,000+
Martini Welch Family
Kenneth Saladin

$1,000+
Anonymous
Collective Donors from HAPS Silent Auction
John Martin

$500+
Collective Donors from HAPS Fun Run
Elizabeth Pennefather O’Brien

$250+
Gary Johnson

$100+
Nahel Awadallah
Gaylen Edwards
Anne Geller
Betsy Ott
Bill Perrotti
Hiranya Roychowdhury
Kyla Ross

$50+
Tom Chelston
Mary Beth Davison
Valerie Harper
Leslie Hendon
Tom Lehman
Stephanie Muga
Mark Nielsen
Wendy Rappazzo

Up to $49
$706 contributed by 60 donors
### Exhibitor Layout

<table>
<thead>
<tr>
<th>804</th>
<th>803</th>
<th>802</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engage with HAPS</td>
<td>3B Scientific</td>
<td>HAPS Video Capture</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>701</th>
<th>700</th>
</tr>
</thead>
<tbody>
<tr>
<td>Science Interactive</td>
<td>3D Organon</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>604</th>
<th>603</th>
<th>602</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carolina Biological</td>
<td>CODON</td>
<td>Cengage</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>504</th>
<th>503</th>
<th>502</th>
</tr>
</thead>
<tbody>
<tr>
<td>NE College</td>
<td>Van-Griner</td>
<td>BioPac</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>404</th>
<th>403</th>
<th>402</th>
</tr>
</thead>
<tbody>
<tr>
<td>iWorx</td>
<td>AACA</td>
<td>Anatomy in Clay</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>304</th>
<th>303</th>
<th>302</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visible Body</td>
<td>AD Instruments</td>
<td>AD Instruments</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>204</th>
<th>203</th>
<th>202</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAA</td>
<td>Vernier Science</td>
<td>Anatomic Excellence</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>104</th>
<th>103</th>
<th>102</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primal Pictures</td>
<td>Pearson</td>
<td>Pearson</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>100</th>
</tr>
</thead>
<tbody>
<tr>
<td>HAPS Fundraising &amp; Silent Auction</td>
</tr>
</tbody>
</table>

---

Entrance

Posters, Food & Beverage, and sitting area located here.
HAPS 2023 Exhibitors

3B Scientific

3B Scientific was founded in 1948 in Hamburg, Germany and has grown to be one of the world’s leading manufacturers of Medical and Science Education solutions. The product portfolio covers a complete and comprehensive range of equipment for simulation and skill training, anatomy, healthcare, and patient education, and is continuously updated with new products and innovations.

2189 Flintstone Drive, STE O
Tucker, GA  30084
773.575.3640
derek.dudek@a3bs.com
3bscientific.com

3D Organon

Organon is the world’s leading XR medical anatomy platform. 3D Organon is a medical & healthcare education platform for teaching and learning anatomy across virtual reality, desktop, tablet, and mobile devices. 3D Organon VR Anatomy, 3D Organon’s prime solution, is the world’s first fully-featured VR anatomy software.

Jones Street, Berkeley
Berkeley, CA  94710, USA
0302108065526
marketing@3dorganon.com
www.3dorganon.com

ADInstructions

Silver Sponsor - First Timer’s Breakfast

At ADInstruments, we create simple, flexible tools, to help scientists and educators record and analyze data quickly and efficiently.

4360 Arrowwest Dr
Colorado Springs, CO  80907
719.306.0382
a.frank@adinstruments.com
www.adinstruments.com

American Association for Anatomy

The American Association for Anatomy is the professional home for more than 2,000 students, teachers, and practitioners of the anatomical sciences. We are that “one place” you can turn to, time and time again, to grow your career, keep informed, build relationships, and challenge your perceptions.

6120 Executive Blvd. Ste 725
Rockville, MD 20852
301-634-7951
lphares@anatomy.org
www.anatomy.org

continued on next page
American Association of Clinical Anatomists ...........................................................................403
The American Association of Clinical Anatomists advances the science and art of clinical anatomy. It encourages research and publication in the field and maintaining high standards in the teaching of anatomy.

P.O. Box 2945
LaGrange, GA 30241
706.298.0287
aaca@clinical-anatomy.org
www.clinical-anatomy.org

Anatomage Inc. ..................................................................................................................400
Anatomage Inc. transforms standard anatomy learning through an ecosystem of 3D anatomy software and hardware by allowing users to visualize anatomy at the highest level of accuracy.

3350 Thomas Rd
Santa Clara, CA 95054
415.283.9856
tracy.tang@anatomage.com
www.anatomage.com

Anatomic Excellence ........................................................................................................202
Silver Sponsor – Update Seminar Break
Anatomic Excellence is the exclusive, full range agent for Dr. Gunther von Hagens Plastinated Human Tissue Specimens in the USA, Canada & Caribbean. We are committed to working with our customers to help them establish a collection of ethically prepared specimens that meet the anatomical needs of your program and enhances learning opportunities for your students.

22 Angel Oaks Drive
Savannah, Ga 31410
912.661.8655
graham@anatomicexcellence.com
www.anatomicexcellence.com

Anatomy in Clay® ...........................................................................................................402
Anatomy in Clay® Learning System’s hands-on teaching/learning models allow students to “build” body systems from the inside out, leading to improved student understanding and knowledge retention.

2198 West 15th Street
Loveland, CO 80538
970.667.9047
stephanie@anatomyinclay.com
www.anatomyinclay.com

continued on next page
BIOPAC .........................................................................................................................502

BIOPAC lets you measure physiology anywhere with innovative, compatible solutions that can be used by anyone for meaningful discovery. We make high-quality scientific tools for physiology measurement and interpretation with superior compatibility and world-class customer service and support.

42 Aero Caminio
Coleta, GA  93117
805.685.0066
carolines@biopac.com
www.biopac.com

Carolina Biological Supply Company .........................................................................604

Effective anatomy and physiology education starts with the right tools. Carolina provides the high quality models, DVDs and preserved specimens needed for success.

2700 York Rd
Burlington, NC  27215
336.538.6231
penny.canady@carolina.com
www.carolinadistancelearning.com

Carolina Distance Learning .........................................................................................704

Carolina offers model skeletons that provide teachers with the most anatomically accurate and effective teaching aids on the market. The Anatomy and Physiology series from Carolina Distance Learning include 23 lab investigations covering topics such as cell structure and function.

2700 York Rd
Burlington, NC  27215
336.538.6231
penny.canady@carolina.com
www.carolinadistancelearning.com

Cengage ....................................................................................................................... 602

Cengage is the education and technology company built for learners. We embrace innovation to create affordable, quality learning experiences and are committed to providing unrivaled access and support for every learner.

5191 Natorp Blvd
Mason, OH  45040
937.397.6574
gia.daughertyhouston@cengage.com
www.cengage.com
**Codon Learning**

Designed for pre-health and biology students, Anatomy and Physiology by Justin Shaffer replaces traditional textbooks and online homework systems with a more engaging and interactive learning platform in which students develop better study habits and metacognitive skills.

607 10th Street  
Golden, CO 80401  
303.594.2221  
ben@codonlearning.com  
www.codonlearning.com

**HAPS 2024 Conference**

Stop by and learn about what’s coming up for HAPS in 2024 next year at the 38th Annual Conference in St. Louis, Missouri

**HAPS Fundraising & Silent Auction**

Donations to HAPS are tax-deductible contributions to projects that support professional development programs for A&P teachers that enhance the quality of human A&P instruction. Why donate? Here’s just one of many reasons: Your support of HAPS will help fund a deserving graduate student to attend and present at the HAPS Annual Conference. Awards and Scholarships include: HAPS Conference Travel Award, John Martin Second Timers Award, Sam Drogo Technology in the Classroom Award, Gail Jenkins Teaching and Mentoring Award, and the Marieb, Hoehn, and Haynes Award for Diversity, Equity, and Inclusion.

**HAPS Leadership Booth**

The HAPS Leadership welcomes all members to join them at their table. Come learn about HAPS programming, connect with the leadership, and how to engage with the broader HAPS community. Plus...there is free HAPS bling

**HAPS Video Capture Booth**

Do you have a great HAPS story? What do you love about the HAPS Annual Meeting? What do you want to tell others about HAPS? HAPS is capturing video of interviews with conference attendees regarding their positive interactions with HAPS in order to spread the word about HAPS! If you are willing to donate a few minutes of your time, please stop by the HAPS Video Capture Booth and record your HAPS story! We want to hear it!

**Holt Anatomical**

Holt Anatomical is distributor of Somso, #B and Denoyer Models. Been in business for over 25 years and guarantees the best prices.

P. O. Box 370749  
Miami, FL 33137  
800.642.4658  
buy@holtanatomical.com  
www.holtanatomical.com

continued on next page
iWorx provides lab teaching kits for human physiology that include everything you need to conduct a comprehensive lab course. The kits are complete and easy to use so faculty and students can concentrate on concepts along with creative learning and conducting student research.

62 Littleworth
Dover, NH 03820
603.617.2575
judid@iworx.com
www.iworx.com

McGraw Hill

Bronze Sponsor – Lanyards
McGraw Hill is a leading global education company that partners with millions of educators, learners and professionals around the world. Recognizing their diverse needs, we build trusted content, flexible tools, and powerful digital platforms to help them achieve success on their own terms. Through our commitment to equity, accessibility, and inclusion, we foster a culture of belonging that respects and reflects the diversity of the communities, learners and educators we serve.

501 Bell Street
Dubuque, IA 52001
563.235.3018
april.wolter@mheducation.com
www.mheducation.com/highered/home-guest.html

Northeast College of Health Sciences

For more than a century, Northeast College of Health Sciences has provided a rigorous, evidence-informed education fueled by science and transformed by experience. Professionals seeking careers in health science education graduate with knowledge in science-based techniques, pedagogy and a deep understanding of human structure and function, and are powerfully prepared to be effective educators in the classroom.

2360 State Route 89
Seneca Falls, NY 13148
cpluretti@northeastcollege.edu
www.northeastcollege.edu

Celebrating 20 Years of APR!

Please join us in the celebration of this important milestone at the McGraw Hill Booth (Booth #500) for your chance to win several prizes!

Learn about the new updates to APR including:

Interactive 3D models
Timed lab practical quizzes
Pre-built assignments with detailed reports
Silver Sponsor – Second Timer’s Breakfast
At Pearson, our purpose is simple: to add life to a lifetime of learning. We believe that every learning opportunity is a chance for a personal breakthrough. That’s why our c.20,000 Pearson employees are committed to creating vibrant and enriching learning experiences designed for real-life impact. We are the world’s leading learning company, serving customers in nearly 200 countries with digital content, assessments, qualifications, and data. For us, learning isn’t just what we do. It’s who we are.

2763 Starling Circle
Duluth GA  30096
770.403.2804
staci.castleberry@pearson.com
www.pearson.com

Gold Sponsor
Powering Anatomy.tv, Primal Pictures is the only complete and medically accurate digital human 3D model based on real body scans and imaging data. For more than 30 years, Primal’s pioneering and award-winning human anatomy software has been used by millions of educators, students, and practitioners in over 1,500 institutions across more than 150 countries.

605 3rd Avenue 20th Floor
New York, NY  10158
716.481.0476
nate.leskovic@informa.com
www.primalpictures.com

Silver Sponsor
Science Interactive makes science education accessible to all students, no matter how far they are from campus. Our complete lab solution combines customizable kits, a rigorous digital curriculum, and cutting-edge technology to make it easier to create and deliver a hands-on lab experience for students in online courses. Over 800 institutions nationwide partner with Science Interactive to expand their online science programs, increase student engagement, and improve success rates.

750 West Hampden Ave, Suite 100
Englewood, Colorado
203-767-1179
Lauren.obrien@scienceinteractive.com
www.scienceinteractive.com

continued on next page
SynDaver .......................................................... 701
The world's leading manufacturer of synthetic human + animal models for anatomical and educational training.
8506 Benjamin Road
Tampa, FL 33634
813.600.5530
c.revilla@syndaver.com
www.syndaver.com

Top Hat .......................................................... 401
Top Hat's dynamic courseware empowers educators to give students personalized, relevant, and equitable learning.
151 Bloor Street West, Suite 200
Toronto, Ontario, Canada M5S 1S4
647.993.1595
Danielle.leboff@tophatmonocle.com
www.tophat.com

Touch of Life Technologies .......................... 300/301
Touch of Life Technologies (ToiTech) is focused on improving healthcare through better education and training. Since 1998, ToiTech has been developing and selling solutions for anatomy education and VR-based medical procedure simulators.
12635 E Montview Blvd., Suite 350
Aurora, CO 80045
720.505.2830
pat.scherzinger@toltech.net
www.toltech.net

Van Griner ...................................................... 503
Need an affordable lab solution? Van Griner is a full service provider of digital, print, or hybrid lab manuals. 3-D models and custom illustrations are available.
1716 Madison Rd
Cincinnati, OH 45206
513.703.4709
dreis@van-griner.com
www.labrightlearning.com

continued on next page
Vernier Science Education

For more than 40 years, Vernier Science Education has been committed to using our experience, knowledge, and passion to create the best and most reliable solutions for biology and human physiology education. Our comprehensive solutions include hardware, software, content, assessment, professional development, and technical support.

13979 Millikan Way
Beaverton, OR  13979
888.837.6437
aharr@vernier.com
https://www.vernier.com

Visible Body

Visible Body creates interactive A&P and biology products for the web and mobile devices. We provide students everything they need to succeed in life science courses and help instructors create engaging content.

492 Old Connecticut Path Suite 501
Framingham, MA  01701
616.761.9889
danielle.glaitti@visiblebody.com
www.visiblebody.com

Bring the lab to your students. Anytime. Anywhere.

Reach more students with engaging, hands-on lab experiences no matter where they’re learning from.

Visit us at Booth #801
Our Conference Sponsors
HAPS would like to thank all of our Annual Conference sponsors for their generous support.

Gold Level

PRIMAL PICTURES
POWERING ANATOMY.TV

Silver Level

AD INSTRUMENTS
making science easier

Anatomic Excellence

hhmi BioInteractive

Pearson

Science Interactive

WILEY

Bronze Level

McGraw Hill Education

Speaker Sponsors

American Association for Anatomy

American Association of Clinical Anatomists

American Physiological Society
Don’t forget to attend our upcoming Regional Meetings!

Central Regional Meeting
September 23, 2023
Edgewood College
Madison, Wisconsin

Southern Regional Meeting
November 18, 2023
Nash Community College
Rocky Mount, NC

Engage your students

Mastering™ is a flexible, digital platform that combines trusted content with customizable features so you can teach your course your way, make students active participants in their learning and improve results.

Give students 24/7 access to lab specimens

Practice Anatomy Lab 4.0, the latest version of Pearson’s virtual anatomy tool, gives students 24/7 access to lab specimens including human cadaver, anatomical models, 3D interactive models, histology, cat, and fetal pig. PAL 4.0 is accessible on mobile devices for access anytime, anywhere.

Fundamentals of Anatomy & Physiology, 12th edition
Martini, Nath, Bartholemew

Fundamentals of Anatomy & Physiology 12th Edition addresses the needs of today’s A&P students with an easy-to-understand narrative, precise visuals and steadfast accuracy. The new edition includes updated content, enhanced art and figures to support student learning.

Visit the Pearson booth to learn more about digital solutions for your course
Welcome to the Seventeenth Season of HAPS Institute!

HAPS Institute is the branch of HAPS that offers online courses for graduate credit or professional development. Throughout the year, participants have the opportunity to explore a variety of concepts at a deeper level and in a variety of flexible formats tailored to the busy schedule of working A&P professors.

HAPS-I focuses on concepts that are hard to understand, hard to learn, and hard to teach. Our short courses include both subject-specific content as well as practical teaching and learning methodology.

Participants who successfully complete HAPS-I courses earn either graduate biology credit through Alverno College in Milwaukee, WI, or choose to earn professional development certificates.

Why would you want to participate in HAPS-I courses?

Because you want to . . .

- Become a more effective teacher
- Brush up on a particular topic
- Get documented credit for your experience
- Gain access to expert faculty, presenters, and top-notch resources
- Strengthen your credentials in teaching A&P
- Improve chances for funding travel to a HAPS Conference
- Show students that you care about learning
- Learn new ways to teach the topics of A&P
- Enjoy the opportunity to contribute to a peer-reviewed publication

You have a lot of questions, don’t you?

Great! The HAPS-I staff is anxious to talk to you about our current offerings and future plans. This is YOUR professional development program, so please help us to make sure that we are meeting your needs! Contact info@hapsconnect.org with your comments, questions, or suggestions.

There’s also plenty of information about HAPS Institute on the HAPS website – look for the tab called “Graduate Credit Courses.”
Join us for the **HAPS Silent Auction, Yoga, and 2K & 5K Fun Run/Walk**

Sponsored by the HAPS FUNDRAISING Committee!

The *Silent Auction* will open on **Thursday, May 25 in the Exhibit Hall.**
You’ll have **until 6:15 PM** to bid on your favorite item.

Items can be paid for at the registration desk (Ballroom Foyer) and picked-up in the Exhibit Hall on Friday, May 26 from 8:00 AM until 3:00 PM. Any item not claimed by 3:00 PM will be forfeited and saved for a future Silent Auction event.

The **Fun Run/Walk** is scheduled for **Friday, May 26th from 7:00 – 8:30 AM.**
To register, please visit the HAPS Donation Table in the Exhibit Hall.
Once registered, everyone will meet in the lobby of the Clyde Hotel and be given a map of the route. The run/walk will start and finish at the Clyde Hotel.

**NEW!** **Yoga** will be offered (at the same time as the Fun Run/Walk),
on **Friday, May 26th from 7:00 – 8:30 AM.**
To register, please visit the HAPS Donation Table in the Exhibit Hall. Once registered, everyone will meet at the convention center in Civic Plaza to participate.

**All proceeds from the auction, yoga, and fun run/walk go towards supporting the education and awards programming of the Society!**

**Donations to HAPS help us provide scholarships to attend Annual Conferences!**
This year, HAPS awarded 16 scholarships totaling $23,970.
These awards are funded primarily by member donations to HAPS.
Make sure to visit the HAPS Fundraising Booth in the Exhibit Hall! Help us continue to support our colleagues by making a donation or pledge.
No amount is too small (or too large). You can also donate at any time on the HAPS Fundraising webpage ([http://www.hapsweb.org/page/HAPSFundraising](http://www.hapsweb.org/page/HAPSFundraising)).
The Human Anatomy & Physiology Society is happy to announce the following winners of the HAPS Conference Travel Award.

**Sarah Beam** is a 3rd year Education Track, Anatomy Ph.D. student at The Ohio State University. Her dissertation research focuses on the development and evaluation of a training program for anatomy undergraduate teaching assistants. Sarah strives for continuous improvement in her teaching abilities. She is always looking for new ideas and methods to ensure her students not only learn but truly understand anatomy. HAPS has been a great resource for Sarah to keep updated on the latest ideas and network with other professionals in the field. Sarah has enjoyed teaching a variety of courses at Ohio State, including her assignment as the lecture GTA for the large enrollment undergraduate gross anatomy course for the past two years.

**Poster:**
**Poster 123**
**Investigation of lecture modalities in student performance in anatomy**
The pandemic has been a catalyst for change in many courses. This study investigates how lecture modalities in a hybrid anatomy course affected student exam performance. Undergraduate human anatomy students were given the option to attend synchronous Zoom lectures or watch the recording later. Student exam scores were collected over the course of four exams and compared for statistical differences. Additionally, we compared didactic verbal lectures with active note-taking lectures and encouragement of active study techniques to see the effect on student exam performance. Student exam scores were collected over the course of seven semesters and compared for statistical differences.

**Emily Bradshaw** (she/her/hers) is an Associate Professor in the Department of Medical Education at the University of Central Florida College of Medicine where she teaches Gross Anatomy, Histology, and Embryology to first-year medical students and Neuroanatomy to second-year medical students. She has been recognized for teaching with multiple outstanding educator awards. Dr. Bradshaw’s research includes innovations in pedagogy, student engagement, and interprofessional education. She has served as a mentor to over 80 undergraduate students as well as several medical students and graduate students, reflecting a true passion for her students.

**Poster:**
**Poster 205**
**Biomedical Engineering Students Investigate the Cardiovascular System in the Gross Anatomy Lab**
Biomedical engineering (BME) students may be asked to understand blood pressure and cardiomyocyte function in the human body, yet typically have little exposure to the biological sciences or anatomy. To address this, we developed a series of labs where BME graduate students examined normal and diseased human hearts, examined cardiac hypertrophy, measured wall thickness and vessel diameters, and calculated Reynold’s number. This project describes the labs and student opinions. Overall, students reported more satisfaction working with and examining human specimens than plastic models, particularly for those with pathologies. Future directions include providing more time for discussion and data interpretation.
Kathy Burleson is a Senior Lecturer of Biology and a Public Health Faculty Affiliate at Hamline University in St. Paul, Minnesota. Dr. Burleson's teaching, service, and research explore the intersection of science and society, with a focus on inclusive pedagogy and diversifying STEM. At Hamline, she serves as the Director of Undergraduate Curriculum, and chairs the Diversity, Equity, and Inclusion (DEI) Committee for HAPS.

Workshop:
A206: SB 207
Who do we represent? Student choice and diversity content analysis of A&P textbook images
We performed a content analysis on diversity of body representations in anatomy and physiology textbooks. Next, students indicated their preferences from a series of textbook images. Finally, we interviewed authors to explore textbook production. We found disparities in representation of race, sex, body size, age, and ability across books and organ systems, and student biases toward marginalized groups significantly associated with perceptions of textbook images. As publishers commit to diversity in their texts, incorporating a broader range of body types in images and supplementing with discussions in the classroom may help address gaps in representation and students’ sense of belonging.

J.T. Cornelius is a first-year Anatomy Education Ph.D. student at Indiana University School of Medicine – Bloomington. He is originally from a suburb of Kansas City, Missouri. Go Chiefs! He graduated with a B.S. in organismal biology with minors in educational studies and exercise science from Rockhurst University in May of 2022. His research interests include the use of qualitative methodologies, assessment techniques, and curriculum studies. Currently, he is an associate instructor for the undergraduate basic human anatomy lab at IU Bloomington.

Poster:
Poster 226
Analysis of assessment data to examine a correlation between Cumulative Block Practice Exam (BPE) usage and HAPS exam scores in ANAT-A215
The HAPS Anatomy Exam is offered as an optional cumulative final to our undergraduates each semester. To prepare for this exam, students used past formative assessments known as Block Practice Exams (BPEs). These BPEs were used throughout the semester for students to check their knowledge. BPEs could be completed an unlimited number of times and integrated with both lecture and lab content. Thus, we investigated the correlation between the BPE scores and performance on the HAPS exam. We hypothesized that frequent BPE usage would correspond with increased HAPS exam scores compared to students who did not utilize BPEs throughout the course.

continued on next page
Caroline Hanson is a Lecturer of Biology at Georgia Gwinnett College and has taught Anatomy and Physiology at GGC since 2014. Dr. Hanson’s interests extend to implementation of methods/strategies to ensure the success and support of students in A&P. She collaborates with other A&P faculty to provide multiple interventions for the course, such as the introduction of Peer Supplemental Instruction (PSI) to A&PI. Dr. Hanson has been a member of HAPS since 2018.

**Poster:**
**Poster 411**
**Student Participation and Experience in Peer Supplemental Instruction for Anatomy and Physiology at a Minority Serving Institution**
Peer Supplemental Instruction (PSI) supports student academic success and provides service learning opportunities for junior/senior level students. A PSI program was developed for Anatomy/Physiology I (API) to offer practical activities on difficult topics. API students were surveyed to determine reasons for non-attendance and perceptions of assistance for those who attended. 94 students responded. 81% of responses cited time conflicts for non-attendance. Of the 29% of students who attended, as a result of PSI sessions, they were able to study more effectively (54%), had increased interest and skill level in course material (56%), and were becoming more independent learners (50%).

Trey Shupp is a 1st year graduate student in the Anatomy Education Ph.D. Program at Indiana University Bloomington. He is originally from Southern Missouri and obtained his Bachelor of Science degree in Biochemistry at Evangel University before earning his Masters of Science in Cell and Molecular Biology from Missouri State University. Trey is currently working on researching effects of flipped classrooms in undergraduate anatomy courses on assessments and student understanding.

**Poster:**
**Poster 308**
**Evaluating the Quality of Medical School Canvas Pages, Pre-Pandemic Through Today**
Within higher education there is a reliance on learning management systems such as canvas. During the COVID-19 pandemic, many of these systems were leaned on more heavily and the organization of pages were changed to increase usability and functionality. Our research sought to evaluate canvas pages in undergraduate medical school courses pre-pandemic through today. We hypothesized that canvas pages increased in functionality as time progressed as a result of changes from the COVID-19 pandemic. Using a pre-made rubric, canvas pages within the course Human Structure in the Indiana University Medical School was evaluated from 2019 to 2022.

continued on next page
Lola Smith has been teaching in academia for over 20 years. Since 2012 she has been teaching at The Pennsylvania State University DuBois campus where she teaches and engages students in courses of anatomy & physiology, ecology, developmental biology, and medical terminology. She earned an Associate degree in Wildlife Technology from The Pennsylvania State University, a Bachelor of Biology, and Master’s in Science from Edinboro University in Pennsylvania and completed all course work for a Bachelor’s in Secondary Education also at Edinboro University. She is continuing to learn through participation in the Gross Anatomy for Teacher Education (GATE) program at the University of Alabama at Birmingham Department of Cell, Developmental, and Integrative Biology. She has attended and presented at HAPS conferences since 2016. Lola enjoys kayaking, hiking, cross country skiing, reading, and gardening. She is trained fire police and general volunteer member for her local fire department and recently became a certified Pennsylvania Forest Steward for the Pennsylvania Center for Private Forests.

Workshop:
A303: SB 108
Create a Treasure Hunt Within Your Course Management System.
Course Management System (CMS) treasure hunts can be adapted to any course modality, subject, or academic level. This is an innovative use of QR codes, CMS, and cell phones. There are three objectives for this presentation: 1) learn to create a course treasure hunt within a CMS or in person, 2) engage in a mini treasure hunt, and 3) gain knowledge about eight technologies that will shape future classrooms. The presentation will convey directions for creating a CMS treasure hunt. During intervals between slides participants will use their cell phones to read embedded QR codes, navigate to websites, and record the future technology.

Melissa Thompson has been involved in some form of education, health care, and/or service for over 20 years. She has had the privilege to utilize her professional skills in a variety of settings and currently serves as an Assistant Professor of Professional Practice for the School of Kinesiology at Louisiana State University. Her experience as a certified athletic trainer in clinic, high school and college settings is the foundation of her teaching values and clinical anatomy knowledge. Melissa currently serves as the Director of the Kinesiology Cadaver Lab, faculty advisor within the School of Kinesiology, Faculty Fellow in the Ogden Honors College, faculty advisor for multiple LSU student professional organizations, and Clinical Preceptor for Baton Rouge Sports Medicine Fellowship. Her favorite role is being a wife and mom.

Poster:
Poster 416
Fistula Discovery in Undergraduate Cadaver Dissection Course
Timeline of a student led discovery of a brachiocephalic arteriovenous fistula in undergraduate human cadaver dissection course. Continued student-led inquiry related to cardiovascular and renal systems and clinical procedures and outcomes for pathologies associated with these systems. Background information relative to brachiocephalic arteriovenous fistulas and vascular access for hemodialysis in patients and cadavers.
Larry Young is an Instructor of Anatomy & Physiology and Biology for Florida Southern College, in Lakeland, Florida. In addition to teaching Anatomy & Physiology I and II, Larry teaches courses focused on human biology for the department’s biology majors. In the classroom, Larry strives to create an environment focused on active learning that supports academic growth and student success while encouraging students to see themselves in the content covered, making connections between the science and their society and surrounding community.

Larry has been an active member of HAPS since 2016. Larry currently serves as the HAPS Communication Committee Chairperson. He is also active on the DEI Committee leading various DEI Town Hall events and co-leading the HAPS Book Club.

Workshop:
A406: SB 207
Unwrapping Exam Wrappers
Why are we wrapping our exams? After all, students really do not consider them gifts! But Exam Wrappers can be the greatest gift a student receives from you through A&P. During this session we will understand what an exam wrapper is and varying examples of exam wrappers. How exam wrappers can be used to increase student success on exam performance through metacognitive reflection will be considered through the lens of student feedback and data gleaned from using exam wrappers within my courses.
The Human Anatomy & Physiology Society is happy to announce the following winner of the Sam Drogo Technology in the Classroom Award.

This award is sponsored by ADInstruments.

Ranya Taqieddin is an Assistant Professor of Biology at Saint Charles Community College (SCC) in Cottleville, Missouri. She earned her Bachelor of Dental Surgery and Master of Science in Public Health (Epidemiology) from the Jordan University of Science and Technology in Jordan. Later, she earned her PhD in Biology with a minor in Research Methodology from Saint Louis University in Missouri, where she was trained as a Biology Education Researcher and earned the Certificate for University Teaching Skills (CUTS). She is a certified Quality Matters (QM) Peer Reviewer.

Ranya has taught a variety of courses such as Integrated Dental Sciences, Human Biology, and Anatomy and Physiology. She has created various innovative courses at SCC including an online Human Biology lab. Guided by Vision and Change curricular recommendations and her interest in incorporating diversity, inclusion, and equity (DEI) to facilitate the development of scientific literacy for students, she designed two courses: an Interdisciplinary Honors course “Humans, Science, and Medicine” that unites English Composition and Biology course objectives and an OER-based course “Fundamentals of Health and Disease”.

Her research interests include evidence-based integrative models in STEAM, integration of DEI in biology course design, and educational technology in curricular design. In her free time, she enjoys spending time with her family, listening to traditional Arabic music, and hiking in nature.

Workshop:
A104: SB 109
Incorporating Interactive Digital Technology for Equitable Learning in Labs

This workshop will feature a collection of online interactive digital tools that have been developed to actively engage learners in meaningful learning experiences and to ensure all students have equitable access to learning resources that support their success. I will discuss best practices in selection and implementation of technology for educational use in online labs and courses that are designed in an interdisciplinary approach.

About the Sam Drogo Technology in the Classroom Award: In September 2010, HAPS lost a great friend. Our colleague Sam Drogo died shortly after doing one of the things he loved the most—teaching a lab full of Anatomy and Physiology students.

Sam’s death has left an empty space at Mohawk Valley Community College, his home institution for over three decades. It has also left an empty space in HAPS. Sam was a long-time, devoted HAPS member, an active participant in the development of the HAPS Comprehensive Competency Test, and a consistent proponent of the use of technology in the classroom and laboratory.

In Sam’s honor, ADInstruments established the Sam Drogo Technology in the Classroom Award. This is an annual award for a HAPS member who demonstrates the innovative use of technology to engage undergraduates in Human Anatomy and Physiology. The award is intended to encourage recipients to present a workshop at the HAPS Annual Conference on this innovative technology or on the use of technology in the classroom or laboratory.

Sam was a wonderful man. This award is a fitting tribute to him and we look forward to implementing it. Our thanks to ADInstruments for their generosity and our lasting thanks to Sam as colleague, mentor and teacher.
The Human Anatomy & Physiology Society is happy to announce the following winner of the Gail Jenkins Teaching and Mentoring Award.

This award is sponsored by Wiley.

WILEY

Catharine Whiting is a Professor of Biology at the University of North Georgia. She earned an AS in Biology from Waycross Junior College, a BS in Biology from the University of Georgia and both an MST and a PhD in Zoology from the University of Florida. She began her career as a college professor at Wingate University in North Carolina prior to moving to Georgia and joining the faculty at Gainesville State College which later consolidated with North Georgia College and State University to become the University of North Georgia. Her primary teaching responsibilities include human anatomy and physiology as well as animal physiology. In addition to teaching, Dr. Whiting mentors undergraduate research students and actively engages in the scholarship of teaching and learning. She also serves as the co-director of a peer-based, collaborative learning program called Biology Boot Camp designed to engage students in active learning as they strengthen their metacognitive skills and build a growth mindset. Dr. Whiting loves to challenge her students to engage in deep, meaningful learning as she encourages them to transition from “study” mode to “learn” mode. She believes that passionate teaching leads to passionate learning and that students do not care how much you know until they know how much you care. The recipient of several teaching and mentoring awards including Faculty Member of the Year, Master Teacher Award, and Excellence in Academic Advising, she considers her greatest reward to be the privilege of teaching and impacting the lives of her students. In her spare time, she enjoys spending time with her amazing husband and three grown kids, reading, watching collegiate sports, and hanging out with her oodles – a poodle, a schnoodle, and a couple of doodles!

Workshop:
B404: SB 111
Demystifying the hypothalamo-hypophyseal axis using active learning strategies and “study hacks”

Join us in this interactive workshop as we present several active learning strategies designed to help students master the hypothalamo-hypophyseal axis. We will create an engaging learning environment as workshop participants review key principles of endocrinology and explore the structure and function of the axis. We will also share an effective set of “study hacks” that can be used by students to build their metacognitive skills as they monitor and evaluate their levels of understanding and performance. In summary, we will demonstrate a tactical approach for developing a growth mindset-oriented classroom that facilitates collaboration and leads to deep, meaningful learning.

About the Gail Jenkins Teaching and Mentoring Award:
Gail was a dynamic and engaging instructor of anatomy & physiology and avid supporter of HAPS and its goals. Her death has left a hole in the hearts of many - her colleagues at Montgomery College, her publishing colleagues at Wiley, her HAPSter colleagues, her family and many friends. Gail loved teaching, and most of all, she loved being able to bring clarity to often difficult concepts for students to grasp. One of her favorite phrases with students was, “Let’s KISS this”. It meant - let’s “Keep it Simple, Sweetie”. When faced with a challenging concept, Gail would help her students KISS the topic by employing everyday analogies and/or props to visualize or un-pack the information. She provided a simple foundation on which the students could build and remember their newly acquired knowledge. No one got more use out of an old tube of toothpaste, a hot dog, a big red balloon, or a plate of chocolate chip cookies! Her students loved her for it.

In Gail’s honor, Wiley publishers in partnership with HAPS has established the Gail Jenkins Teaching and Mentoring Award. This is an annual award for a HAPS member who demonstrates use of engaging learning activities to help students truly understand and retain the more difficult Anatomy and Physiology concepts with kinesthetic and active learning strategies using inexpensive everyday props. The award is also designed to recognize those willing to mentor other instructors to also incorporate active learning to benefit more students.
The Human Anatomy & Physiology Society is happy to announce the following winners of the John Martin Second Timers Award.

**Janice Fritz** trained for a career as a research scientist with a Ph.D. in Biological Sciences from Wayne State University and postdoctoral training focusing on mechanisms of hearing at the University of Iowa. The opportunity (or, more accurately, necessity) to teach as graduate teaching assistant uncovered a hitherto unknown love of teaching. Upon returning from Iowa to her home state of Michigan, Janice taught part-time at Wayne State University and Lansing Community College and discovered that community college teaching is her calling. She is now a full-time professor at St. Clair County Community College where she teaches Anatomy and Physiology, coordinates the SC4 Faculty DEI Panel, and serves as president of the faculty union, among other roles. In her free time, Janice enjoys tending living things, including her gardens and her five children.

**Workshop:**
B206: SB 209
**Getting Students On Board With Active Learning**
Active learning improves student retention and understanding, but it can be hard to overcome student resistance to these techniques. Learn more active learning strategies and improve student buy-in with better explanation, facilitation, and reflection on activities.

**Catherine Kirn-Safran** is an assistant professor in the Department of Biology at Widener University in Chester, Pennsylvania. She teaches the two semester A&P sequence and various introductory biology courses to students majoring in biology and pre-health professional programs. Through these foundational courses, she introduces students (sometimes for the first time) to essential concepts related to the functioning of life on Earth. She loves to use analogies between different types of living organisms and everyday life scenarios to facilitate comprehension and retention of difficult concepts. She constantly looks for new ways to support her students during and after class by placing special emphasis on active learning, peer-mentoring, and student equity and well-being. Catherine has been an active member of HAPS since 2018 and currently serves as a reviewer on the HAPS Educator. She enjoys learning from other instructors’ teaching pedagogies and finds that the supportive environment of HAPS has been truly influential in her overall growth as an A&P instructor. Her current research in Science Education focuses on the effect of peer learning assistants on student success in A&P courses.

**Poster:**
Poster 407
**The Implementation of Structured Office Hours as a Central Component of Student Success in A&P courses**
The A&P two-semester sequence is perceived as hard to master, and higher-than-average D, F, and withdrawal grades often prevent pre-health majors from maintaining the GPA required to progress in the program of their choice. In this poster, a student who attended most regular office hours will share her experiences working with the instructor and peers to utilize office hours efficiently and improve performance on higher-order assessments. In addition, strategies on how students who attend office hours can become study group leaders who influence social factors such as student-instructor trust and classroom community sense of belonging will be presented.

continued on next page
Trisha Waldman is an Associate Professor at the University of Saint Mary in Leavenworth, KS. Her love of education and anatomy began when she had the opportunity to be an undergraduate teaching assistant in the anatomical donor-based Anatomy and Physiology Lab. She went on to pursue her Master of Science in Biology from the University of Saint Joseph in West Hartford, CT, and then on to pursue her Doctorate of Education in Higher Education Leadership from Concordia University-Portland. She taught at her alma mater, Presentation College, for 14 years, teaching a variety of classes in the biological sciences. She has been teaching anatomy and physiology to healthcare students for most of her teaching career, with an emphasis on laboratory instruction. In addition to teaching, she has served in an administrative capacity in roles such as Biology Program Director, Allied Health Department Chair, and the Dean of Health and Natural Sciences. Currently, she serves as the Human Anatomy Lab Coordinator, working with undergraduate and graduate anatomy curricula, and assisting in the design and implementation of the University’s new human anatomy lab.

**Poster:**
**Poster 120**
**Presentation of a Persistent Metopic Suture in a Human Anatomical Donor**
Upon dissection, the skull of a human anatomical donor presented with a persistent metopic suture. Metopic sutures, or frontal sutures, most often fuse and obliterate within youth, approximately by the age of seven. If the suture persists, it is referred to as metopism. Metopic sutures can be associated with frontal sinus deformities and are considered a clinically significant presentation.
The Human Anatomy and Physiology Society is happy to announce the following winners of the Marieb, Hoehn, and Haynes Award for Diversity, Equity, and Inclusion.
This award is sponsored by Pearson.

Dalia Salloum is a Palestinian-American born and raised in New Jersey with a loud, large, and loving family standing behind me. She received a PhD in Biology from the Federated Department of Biological Sciences at Rutgers-Newark and New Jersey Institute of Technology – her research focuses included regulation of biophysical properties of neurons in Central Pattern Generating (CPG) networks. Currently, Dalia is a full-time faculty member at Salt Lake Community College where she teaches College Biology, Human Anatomy, and Human Physiology. She is passionate about an inclusive and accessible education for the diverse student population we serve. Dalia loves finding new ways to explain complex processes and using pedagogical approaches that are effective in helping all students succeed and achieve their goals. She is invested in her students both inside and outside the classroom. It brings her great joy to see them become healthcare professionals.

Poster:
Poster 321
How Does Gamification using Classroom Response System (CSR) Affect Test-Taking Anxiety in Human Anatomy Students in a Flipped Classroom?

The existing research on the effectiveness of the flipped classroom suggests that it is effective in increasing student performance in anatomy and physiology courses, as well as across various disciplines in higher education. It has been shown that the successes in the flipped classroom are attributed to active learning strategies that allow students to be engaged with their peers and instructors, reflect on their own thinking process, and deconstruct difficult concepts in the classroom. One active learning strategy that this research focuses on is the use of a live classroom response system (CSR), which allows students to use their smartphones, laptops, or tablets as the response device.

continued on next page
Juliza Abrego is a teen mother and a first-generation Latina student at the University of North Georgia. At UNG, Juliza and her colleagues developed a Boot Camp Coaching program in A&P that strives to engage students in developing critical thinking skills in a peer-led active learning session. As the Lead Coach for the program, she focused on helping students transform their A&P engagement through collaborative learning and help other Coaches improve their teaching and facilitate the development of critical thinking skills. Juliza is also involved in undergraduate research at UNG. One of the projects she is currently working on is a scientific research project that examines the role of polypeptide growth factors in reptilian reproduction. Juliza is also a part of a pedagogical research project investigating the impact peer collaboration and active learning have on the success of A&P students. Being a part of these research teams and being an A&P coach has transformed her learning journey immensely. Juliza developed a passion for teaching A&P to other students who may have setbacks as she has throughout her college journey. A&P and pedagogy have taught her the most valuable lesson: pursuing a college education is about finding your passion and becoming a lifelong learner. Juliza hopes that these values will one day be translated into my daughter as well.

Workshop:
B303: SB 108
Reaching A&P Students from Diverse Communities through Collaborative Peer-Led Instruction

We invite you to listen in as we share about our learning journeys as A&P Boot Camp Coaches for a collaborative, peer-led program that engages students in an active learning environment. Additionally, coaching provides us with a sense of belonging as students from underrepresented communities. We have learned the importance of having a growth mindset and developing critical-thinking skills, both of which have transformed our academic experiences. Thus, we strive to have a similar impact on our current A&P students, and we hope that A&P instructors will recognize the benefits of implementing similar teaching strategies.
The world’s most detailed and accurate 3D reconstruction of human anatomy

Visit primalpictures.com to learn more about our catalog of interactive learning tools, created from real body scans and imaging data – bringing the complexity of anatomy to life.
## Schedule of Events

### Wednesday, May 24

**Albuquerque Convention Center**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 AM – 5:00 PM</td>
<td>Exhibitor Set up: Ballroom B &amp; C (Upper Level)</td>
</tr>
<tr>
<td>8:00 AM – 12:00 PM</td>
<td>Board of Directors &amp; Steering Committee Join Meeting: Tesuque &amp; Zuni (Lower Level) (Board of Directors Only)</td>
</tr>
<tr>
<td>12:00 PM – 1:00 PM</td>
<td>Board of Directors and Steering Committee Luncheon: Acoma (Lower Level) (Board of Directors and Steering Committee Chairs Only)</td>
</tr>
<tr>
<td>1:00 PM – 3:30 PM</td>
<td>Board of Directors Meeting: Tesuque (Lower Level) (Board of Directors Only)</td>
</tr>
<tr>
<td>1:00 PM – 3:30 PM</td>
<td>Steering Committee Meeting: Zuni (Lower Level) (Steering Committee Chairs Only)</td>
</tr>
<tr>
<td>1:00 PM – 5:00 PM</td>
<td>Registration: Ballroom Foyer (outside Ballroom A, B, C) – Upper Level</td>
</tr>
<tr>
<td>6:00 PM – 8:00 PM</td>
<td>Welcome Reception: La Sala (Lower Level)</td>
</tr>
</tbody>
</table>

### Thursday, May 25

**Albuquerque Convention Center**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>7:00 AM – 5:00 PM</td>
<td>Registration: Ballroom Foyer (outside Ballroom A, B, C) (closed from 12:00 PM – 1:00 PM)</td>
</tr>
<tr>
<td>7:30 AM – 8:30 AM</td>
<td>First Timer’s Breakfast: Cochiti &amp; Taos (Lower Level)</td>
</tr>
<tr>
<td></td>
<td>Sponsored by AD Instruments and HHMI</td>
</tr>
<tr>
<td>7:30 AM – 8:30 AM</td>
<td>Second Timer’s Breakfast: Tesuque, Zuni and Acoma (Lower Level)</td>
</tr>
<tr>
<td></td>
<td>Sponsored by Pearson</td>
</tr>
<tr>
<td>7:30 AM – 8:30 AM</td>
<td>Continental Breakfast (for all other attendees): Ballroom B &amp; C (Upper Level)</td>
</tr>
<tr>
<td>Time</td>
<td>Event</td>
</tr>
<tr>
<td>--------------------</td>
<td>-------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>7:30 AM – 6:15 PM</td>
<td>Silent Auction Open: Ballroom B &amp; C (Upper Level)</td>
</tr>
<tr>
<td>7:30 AM – 6:15 PM</td>
<td>Exhibits: Ballroom B &amp; C (Upper Level)</td>
</tr>
<tr>
<td></td>
<td>(Exhibits are closed from 12:00 PM - 1:00 PM)</td>
</tr>
<tr>
<td>8:30 AM – 9:00 AM</td>
<td>Welcome and Opening Remarks: Ballroom A (Upper Level)</td>
</tr>
<tr>
<td>9:00 AM – 10:00 AM</td>
<td>Update Seminar I: Ballroom A (Upper Level)</td>
</tr>
<tr>
<td></td>
<td>Philip Lister, Ph.D.</td>
</tr>
<tr>
<td></td>
<td><em>Sponsored by HAPS</em></td>
</tr>
<tr>
<td></td>
<td>“The Evolution of Antibacterial Resistance Among Bacteria: Are We Entering the Post-Antibiotic Era?”</td>
</tr>
<tr>
<td>10:00 AM – 11:00 AM</td>
<td>Refreshment Break &amp; Exhibits: Ballroom B &amp; C (Upper Level)</td>
</tr>
<tr>
<td></td>
<td><em>Sponsored by Anatomic Excellence</em></td>
</tr>
<tr>
<td>10:00 AM – 11:00 AM</td>
<td>Poster Session 1: Ballroom B &amp; C (Upper Level)</td>
</tr>
<tr>
<td></td>
<td>(Posters for session 1 should be set-up by 9:00 AM and taken down by 12:00 PM)</td>
</tr>
<tr>
<td>11:00 AM – 12:00 AM</td>
<td>Update Seminar II: Ballroom A (Upper Level)</td>
</tr>
<tr>
<td></td>
<td>Vince Clark, Ph.D.</td>
</tr>
<tr>
<td></td>
<td><em>Sponsored by HAPS</em></td>
</tr>
<tr>
<td></td>
<td>“Transcranial Brain Stimulation to Improve Memory in Humans”</td>
</tr>
<tr>
<td>12:00 PM – 1:15 PM</td>
<td>Lunch on your own</td>
</tr>
<tr>
<td></td>
<td>Registration &amp; Exhibits closed from 12:00 PM - 1:00 PM</td>
</tr>
<tr>
<td>1:15 PM – 2:15 PM</td>
<td>Update Seminar III: Ballroom A (Upper Level)</td>
</tr>
<tr>
<td></td>
<td>Katie T. Kivlighan, Ph.D.</td>
</tr>
<tr>
<td></td>
<td><em>Sponsored by HAPS</em></td>
</tr>
<tr>
<td></td>
<td>“Perinatal Oxytocin and Lactation Outcomes”</td>
</tr>
<tr>
<td>2:15 PM – 3:15 PM</td>
<td>Refreshment Break &amp; Exhibit: Ballroom B &amp; C (Upper Level)</td>
</tr>
<tr>
<td>2:15 PM – 3:15 PM</td>
<td>Poster Session 2: Ballroom B &amp; C (Upper Level)</td>
</tr>
<tr>
<td></td>
<td>(Posters for session 2 should be set-up by 1:00 PM and taken down by 4:00 PM)</td>
</tr>
<tr>
<td>2:45 PM – 3:15 PM</td>
<td>HAPS Fundraising – Chair Yoga: Ballroom B &amp; C (Upper Level)</td>
</tr>
<tr>
<td></td>
<td>Attendees can participate for a small donation</td>
</tr>
<tr>
<td>3:15 PM – 4:15 PM</td>
<td>Update Seminar IV: Ballroom A (Upper Level)</td>
</tr>
<tr>
<td></td>
<td>Thomas R. Gest, Ph.D.</td>
</tr>
<tr>
<td></td>
<td><em>Sponsored by the American Association of Clinical Anatomists</em></td>
</tr>
<tr>
<td></td>
<td>“Teaching the Anatomical Dogma New Tricks: Truth that turns out to be untrue.”</td>
</tr>
<tr>
<td>4:15 PM – 5:15 PM</td>
<td>Update Seminar V: Ballroom A (Upper Level)</td>
</tr>
<tr>
<td></td>
<td>Katie Zychowski, Ph.D.</td>
</tr>
<tr>
<td></td>
<td><em>Sponsored by the American Physiological Society</em></td>
</tr>
<tr>
<td></td>
<td>“Sex-Dependent Inflammatory Sequelae and Biological Mechanisms following Acute Wood Smoke Exposure”</td>
</tr>
<tr>
<td>5:15 PM – 6:15 PM</td>
<td>Drinks with Exhibitors: Ballroom B &amp; C (Upper Level)</td>
</tr>
<tr>
<td>6:15 PM</td>
<td>Silent Auction Closes: Ballroom B &amp; C (Upper Level)</td>
</tr>
</tbody>
</table>

*Free Night!*
<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
</table>
| 7:00 AM – 8:30 AM | HAPS Fundraising Run/Walk: The Clyde Hotel  
Pre-registration or onsite registration required. Not included in Conference registration. |
| 7:00 AM – 8:30 AM | HAPS Fundraising Yoga: Albuquerque Convention Center – Civic Plaza  
Pre-registration or onsite registration required. Not included in Conference registration. |
| 7:30 AM – 8:30 AM | Continental Breakfast: Ballroom B & C (Upper Level)                                           |
| 7:30 AM – 5:00 PM  | Exhibits: Ballroom B & C (Upper Level)  
(Exhibits are closed from 12:00 PM – 1:00 PM)                                                   |
| 8:00 AM – 3:00 PM  | Silent Auction Item Collection & Payment                                                        |
| 8:00 AM – 5:00 PM  | Registration: Ballroom Foyer (outside Ballroom A, B, C) (Upper Level)  
(Closed from 12:00 PM – 1:00 PM)                                                               |
| 8:30 AM – 9:45 AM  | HAPS Annual General Membership Meeting: Ballroom A (Upper Level)                               |
| 9:45 AM – 10:45 AM | Refreshment Break & Exhibits: Ballroom B & C (Upper Level)                                     |
| 9:45 AM – 10:45 AM | Poster Session 3: Ballroom B & C (Upper Level)  
(Posters for session 3 should be set-up by 9:00 AM and taken down by 12:00 PM) |
| 10:45 AM – 11:45 AM | Update Seminar VI: Ballroom A (Upper Level)  
Allison Nesbitt, PhD  
*Sponsored by the American Association for Anatomy*  
“Climate change and human phenotypic plasticity”                                            |
| 11:45 AM – 1:15 PM | Lunch on your own  
Registration & Exhibits close for lunch from 12:00 PM-1:00 PM                                |
| 1:15 PM – 3:15 PM  | Update Seminar VII: Ballroom A (Upper Level)  
Joe Alcock, MD  
*Sponsored by HAPS*  
“Progress in sepsis - an evolutionary medicine approach.”                                    |
| 3:15 PM – 4:15 PM  | Refreshment Break & Exhibits: Ballroom B & C (Upper Level)                                     |
| 2:15 PM – 4:15 PM  | Poster Session 4: Ballroom B & C (Upper Level)  
(Posters for session 4 should be set-up by 1:00 PM and taken down by 4:00 PM)               |
| 3:15 PM – 4:15 PM  | Update Seminar VIII: Ballroom A (Upper Level)  
Matthew J. Campen, PhD, MSPH  
*Sponsored by HAPS*  
“Gestational complications associated with environmental toxicants: specific studies of microplastics and inhaled pollutants” |
| 4:15 PM – 5:00 PM  | Door prizes: Ballroom B & C (Upper Level)                                                      |
| 6:00 PM – 8:00 PM  | HAPS Social: La Sala (Lower Level)                                                              |
### Saturday, May 27

**Central New Mexico Community College**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
</table>
| 7:00 AM – 9:00 AM | Transportation to from Clyde Hotel to Central New Mexico Community College  
717 University Blvd SE, Albuquerque, NM 87106 |
| 7:30 AM – 8:30 AM | Welcome Breakfast                                                   |
| 8:30 AM – 12:00 PM | Workshops                                                          |
|                | Session A1: 8:30 – 9:30 AM                                          |
|                | Session A2: 9:45 – 10:45 AM                                         |
|                | Session A3: 11:00 AM – 12:00 PM                                     |
| 12:00 PM – 1:00 PM | Lunch (lunch is provided)                                          |
|                | Committee Meetings – 12:30 PM – 1:00 PM                             |
| 1:15 PM – 4:45 PM | Workshops                                                          |
|                | Session A4: 1:15 – 2:15 PM                                          |
|                | Session A5: 2:30 – 3:30 PM                                          |
|                | Session A6: 3:45 – 4:45 PM                                          |
| 4:45 PM        | Bus transportation back to the Clyde Hotel                        |
|                | 330 Tijeras Ave NW, Albuquerque, NM 87102                           |

### Sunday, May 28

**Central New Mexico Community College**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
</table>
| 7:00 AM – 9:00 AM | Transportation from Clyde Hotel to Central New Mexico Community College  
717 University Blvd SE, Albuquerque, NM 87106 |
| 7:30 AM – 8:30 AM | Breakfast                                                           |
| 8:30 AM – 12:00 PM | Workshops                                                          |
|                | Session B1: 8:30 – 9:30 AM                                          |
|                | Session B2: 9:45 – 10:45 AM                                         |
|                | Session B3: 11:00 AM – 12:00 PM                                     |
| 12:00 PM – 1:00 PM | Lunch (lunch is provided)                                          |
| 1:15 PM – 3:30 PM | Workshops                                                          |
|                | Session B4: 1:15 – 2:15 PM                                          |
|                | Session B5: 2:30 – 3:30 PM                                          |
| 3:30 PM        | Bus transportation back to the Clyde Hotel                        |
|                | 330 Tijeras Ave NW, Albuquerque, NM 87102                           |
Convention Center Layout

**Upper Level**

- Stage
- Kiva Auditorium
- Press Room
- Conference Room
- Box Office
- Ballroom A
- Ballroom B
- Ballroom C

**West Complex**

West Complex is west of 2nd Street and comprises three levels — upper, ground & lower.

- Convention Center Parking Structure – 718 Spaces

**East Complex**

East Complex is east of 2nd Street and comprises two levels — upper & ground only.

- To Parking Structure
- To Plaza Way

**Ground Level**

- DoubleTree Hotel
- 201 Marquette Avenue NW

**Lower Level**

- Civic Plaza
- Hyatt Regency
- 330 Tijeras Avenue NW
- Convention Center Loading Area
- Convention Center Lobby
- Convention Center Banquet Hall

**Legend**

- Pedestrian Entrance
- Main Passageways
- Rentable Rooms
- Men’s Restroom
- Women’s Restroom
- Vending
- Courtesy Phones
- Elevator
- Freight Elevator
- Escalator
- Stairs
- Loading Dock
- All areas of the Albuquerque Convention Center are accessible to people with mobility impairments
Evolution of Antimicrobial Resistance Among Bacteria: Are We Entering the Post-Antibiotic Era?

Abstract: Through the centuries, the morbidity and mortality of infectious diseases have played an important role in the shaping of our society. However, the “Golden Age of Antimicrobial Discovery” that spanned much of the 20th century promised to usher in a new era free from the excessive morbidity and mortality of past plagues. However, the bacterial pathogens we are fighting have remained one step ahead and have evolved mechanisms of resistance faster than the pharmaceutical industry can develop new drugs. Even more concerning, the evolution and sharing of resistance mechanisms between bacterial species have created pathogens resistant to all available antibacterial drugs. This has led many in the healthcare community to consider the chilling thought of our society moving into the “post-antibiotic era” with infectious diseases untreatable by antibacterial drugs.

BIO: Philip Lister received his Ph.D. in Medical Microbiology and Immunology from Creighton University in 1992 and was a Professor of Medical Microbiology for the Schools of Medicine and Pharmacy at Creighton University from 1994 to 2011. During his tenure at Creighton University, Philip was the Associate Director of the Center for Research in Anti-Infectives and Biotechnology and served as an Editor and Editorial Board Member for several international infectious disease and antimicrobial chemotherapy journals. Philip's research programs focused on understanding the pharmacodynamic interactions of antibacterial drugs with bacterial pathogens to guide the optimal treatment of bacterial infections. Philip also studied the molecular mechanisms of bacterial resistance to antibacterial drugs and the development of novel drug combinations and dosing strategies to minimize the emergence antibacterial resistance. Philip moved to New Mexico in 2011 and joined the Department of Biology faculty at Central New Mexico Community College. Philip served as Faculty Chair for Biology from 2013 to 2018 and Interim Associate Dean for the School of Math, Science and Engineering from 2018 to 2020. Philip stepped into the role of Dean at the start of the CoVid pandemic in 2020.
Transcranial Brain Stimulation to Improve Memory in Humans

Abstract: Memory is a vital resource needed throughout our lives, and methods to improve memory would benefit not only in those with progressive dementias such as Alzheimer’s disease, but in healthy people to improve success in school and later in career advancement. Our initial attempts have used transcranial direct current stimulation (tDCS), with electrode placement planned using anatomical data derived from fMRI studies. Participants were able to find twice the number of objects hidden in complex scenes while receiving tDCS vs. sham, which has been replicated in multiple subsequent studies, and nearly four times improvement in learning to group pictures taken from different locations around the world. We are currently using this same method in an NIH-funded double blind randomized clinical trial in older adults with and without mild dementia, and finding an average 270% improvement in learning with tDCS vs. sham in the 80 participants tested so far. Working with collaborators at HRL Laboratories and at NeuroGeneces Inc, we have also developed novel methods using closed-loop alternating current stimulation (CL-tACS) and closed loop auditory sound stimulation (CLASS) respectively, both patterned in real time using EEG recorded during sleep. Both methods increased memory consolidation during sleep, with participants recalling more material learned the night before CL-tACS or CLASS vs. sham, and also reporting an improved quality of sleep. We are studying the cognitive and neural mechanisms of these tDCS, CL-tACS, CLASS and other stimulation methods using neuroimaging, and working to make these methods available to the community to improve education and training, and to reduce memory deficits associated with dementia.

BIO: Dr. Vince Clark received his BS in Psychobiology with Honors in Psychology from UCLA, and his PhD in Neuroscience from UCSD. He then completed a postdoc with Drs. James Haxby and Leslie Ungerleider at NIH in the National Institutes of Health, and was recruited by UNM in 2002 to help build the Mind Research Network (https://www.mrn.org), where he was Scientific Director. He is now Director of the Psychology Clinical Neuroscience Center (https://pcnc.unm.edu/) and is Professor of Psychology and Neuroscience at the University of New Mexico. He is also founding Chair of the Brain Stimulation and Imaging meeting (http://brainstim-meeting.org), an international meeting focused on the combination of brain imaging and stimulation meeting shortly in Helsinki for its seventh year. His research involves the study of both healthy cognition and clinical disorders, and he employs a combination of imaging tools including MRI, EEG and fNIRS, and a variety of brain stimulation methods. His group is looking for new ways to combine brain imaging and different forms of energy (including electrical, magnetic, infrared light, physical pressure and ultrasound) together to increase learning and performance in healthy people, and to treat symptoms of dementia, addiction, schizophrenia, chronic pain and other disorders.
Update Seminar III: Ballroom A
Thursday, May 25 from 1:15 – 2:15 PM

Katie T. Kivlighan
Sponsored by HAPS

Perinatal Oxytocin and Lactation Outcomes

Abstract: Exclusive breastfeeding is recommended by the American Academy of Pediatrics for the first six months of life. However, early unplanned weaning is prevalent with 60% of new parents not achieving their own breastfeeding goals. Insufficient milk supply is often cited as a contributing factor and therefore, it is essential to understand the physiologic mechanisms underlying suboptimal lactation outcomes. The birth process primes the body for lactation and interventions employed during childbirth have the potential to disrupt the complex hormonal interplay required to initiate mature milk. Synthetic oxytocin is a life-saving medication used for labor induction and augmentation as well as the prevention and treatment of postpartum hemorrhage. Higher doses of synthetic oxytocin during labor have been associated with a lower likelihood of both any and exclusive breastfeeding. It is hypothesized that exposure to supraphysiologic oxytocin levels during labor may affect regulation of the oxytocin system in both parent and infant. Preliminary findings examining associations between levels of oxytocin in human milk and early lactation outcomes appear to support this hypothesis.

BIO: Katie Kivlighan, PhD, CNM is an assistant professor at the University of New Mexico (UNM) College of Nursing. Her translational research program focuses on incorporating objective measures of lactation performance into the screening and management process for suboptimal lactation outcomes. She has practiced as a certified nurse midwife since 2014 and currently teaches in the Nurse Midwifery Program in the UNM College of Nursing. Dr. Kivlighan earned a PhD in Biobehavioral Health from Penn State University and completed a Postdoctoral Fellowship at the Johns Hopkins Bloomberg School of Public Health. She earned a Master’s of Science in the Clinical Nurse Leader Program at the University of Maryland Baltimore and a Post-Master’s Certificate in Nurse-Midwifery from UNM.
Update Seminar IV: Ballroom A
Thursday, May 25 from 3:15 – 4:15 PM

Thomas R. Gest
Sponsored by the American Association of Clinical Anatomists

The Anatomical Dogma New Tricks: Truth that Turns Out to be Untrue

Abstract: There are certain “facts” of anatomy that are often repeated in anatomical atlases and become accepted “truths” that are, upon closer examination, false or not true. Several examples of anatomical “facts” that are commonly depicted in a majority of anatomical atlases are demonstrated. The inaccuracies that are often repeated in the art of anatomical atlases should warn anatomists to question some of the knowledge that is gained solely from examination of anatomical artwork rather than that revealed through dissections of the human body.

BIO: Thomas R. Gest, PhD, is a Professor of Anatomy and Embryology for the University of Houston Tilman J. Fertitta Family College of Medicine. Dr. Gest is co-director for two courses, Clinical Anatomy and Human Development and the Musculoskeletal System. Dr. Gest teaches gross anatomy and embryology in Years 1 and 2, and electives in clinical anatomy in Year 4. He also directs the Distinction in Anatomy program at UHCOM. Dr. Gest spent the bulk of his career at the University of Michigan as director of anatomy and the willed body program, and where he received numerous teaching awards including the university-wide Golden Apple Award. He currently serves as President of the American Association of Clinical Anatomists, the Coordinator of the Gross and Clinical Anatomy Working Group for the Federative International Programme for Anatomical Terminology, and Treasurer of the International Federation of Associations of Anatomists. Dr. Gest received his bachelor’s and master’s degrees from The Florida State University and his doctoral degree from the University of Pittsburgh.
**Update Seminar V: Ballroom A**

**Thursday, May 25 from 4:15 – 5:15 PM**

*Katie Zychowski*

*Sponsored by the American Physiological Society*

Assistant Professor
University of New Mexico
Albuquerque, New Mexico

**Sex-Dependent Inflammatory Sequelae and Biological Mechanisms Following Acute Wood Smoke Exposure**

**Abstract:** Episodic wildfire events are a growing public health issue due to climate change and drier weather conditions. The full-scope of sex-dependent, immune consequences and mechanisms following woodsmoke (WS) exposure is currently under investigation. In this study, we exposed male and female C57BL/6 mice to either filtered air (FA, control) or WS for 4h/d for 2 d, to simulate an acute, wildfire event in a pre-clinical rodent model (n=8 per group). In a second set of studies, we ovariectomized female mice to evaluate acute WS toxicity in a model of ovarian hormone depletion/menopause. Woodsmoke exposures averaged 0.575±0.12mg/m3 per day, with significantly increased (p<0.05) levels of Ni, Ag, W and U in analyzed WS particulate matter, compared to FA. Several inflammatory markers tested were statistically significantly dependent on ovarian presence based on a series of lung, brain and bone marrow biomarkers. These inflammatory impacts demonstrate statistically significant interactions, between sex and exposure treatment (WS or FA), which may be mechanistically based on ovarian presence in females.

**BIO:** Katherine (Katie) Zychowski, PhD is an assistant professor in The University of New Mexico (UNM) College of Nursing. She is a trained toxicologist and environmental health scientist, interested in biological mechanisms following inhaled toxic exposures. After completing her degrees at Baylor University and Texas A&M University, she accepted a Postdoctoral Fellowship at UNM where she studied vascular effects of air pollution. She was awarded the Institutional Research and Academic Career Development Awards (IRACDA) Postdoctoral Fellowship (an NIH/NIGMS-sponsored program) in 2016 and in addition to research, she committed a significant portion of her time to pedagogical training and developing active learning strategies in the classroom. The Zychowski lab has received funding from both the NIH/NIEHS and CDC/NIOSH.
Climate Change and Human Phenotypic Plasticity

Abstract: Humans live in a variety of habitats on different continents with diverse environments. In response to changes in environmental conditions, humans have many physical traits that can vary in individuals over a lifetime or traits that have adapted in populations over generations. Plasticity may play an important role in the human response to climate change. Phenotypic plasticity is the ability of an individual to express different phenotypes in response to the environment. Human-induced climate change impacts all aspects of life on earth including the natural environment and human health. Plasticity can be beneficial if it allows an individual to respond to a changing environment during their life, acclimate to a different habitat, or relocate to a new geographic area. This presentation will discuss phenotypic plasticity, past and current examples of morphological responses to environmental change in humans, and discuss potential human phenotypic responses to rapid climate change.

BIO: Allison Nesbitt, Ph.D. is a medical educator, anatomist, and biological anthropologist. She is an Assistant Teaching Professor in the Department of Pathology and Anatomical Sciences at the University of Missouri School of Medicine. She teaches dissection-based clinical anatomy to medical and physical therapy students and facilitates case-based learning for medical students. Dr. Nesbitt has been honored as an outstanding medical educator with two awards for teaching excellence. Her research focuses on anatomy education in the health professions and evolutionary and developmental changes of the human skull. She earned a M.S. in Anthropology with a concentration in Forensic and Biological Anthropology from Mercyhurst University and a M.A. and a Ph.D. in Anthropology from Stony Brook University. Dr. Nesbitt is a founding member and Vice-President of Black in Anatomy, a non-profit organization dedicated to amplifying and supporting Black contributions to the anatomical sciences. She is committed to increasing the representation of historically excluded individuals in medicine and science.
Update Seminar VII: Ballroom A
Friday, May 26 from 1:15 – 2:15 PM

Joe Alcock
Sponsored by HAPS

University of New Mexico
Albuquerque, New Mexico

Progress in Sepsis - an Evolutionary Medicine Approach

Abstract: Sepsis is the leading cause of death in hospitals. Unfortunately, well over a hundred clinical trials and post-market evaluations of sepsis interventions have failed to improve sepsis survival. One reason is that many sepsis interventions target immune pathways that are evolutionarily conserved across phyla and kingdoms of life some of which are necessary for a successful response to infection. In fact, many therapeutics aimed at dismantling these mechanisms tend to mimic countermeasures that pathogens have evolved to subvert host immunity over millions of years, and tend to impede host defenses. We offer an evolutionary medical view of sepsis as a multiplex of evolutionarily appropriate host responses to severe infection. A shift in perspective from “host as harmful”, to “host as adapted” in sepsis has important implications for drug design, and we use it to highlight high priority areas for sepsis therapy development. These include targeting pathogen virulence, intervening less aggressively when appropriate, and supporting rather than interfering with host immunity.

BIO: Joe Alcock MD is a professor of emergency physician at the University of New Mexico, where he is a practicing emergency physician and teaches evolutionary medicine in the School of Medicine. Dr. Alcock received an MS in Neurobiology and Behavior from Cornell University and an MD from UCLA in 1997. He finished residency in Emergency Medicine at the University of New Mexico in 2000. One current area focuses on the role of host-microbiome cooperation and conflict in sepsis.
Gestational Complications Associated with Environmental Toxicants: Specific Studies of Microplastics and Inhaled Pollutants

Abstract: Environmental factors have potentially detrimental impacts on gestational health, with numerous epidemiological studies showing an association between inhaled pollutants and gestational hypertension and preeclampsia. Furthermore, as an emerging contaminant, microplastics have been found in placentas and pose a risk for negative impacts to both the mother and growing fetus. Our studies with air pollution have built on discoveries that endogenous peptides may be released from the lung into the circulation, created an antiangiogenic signal that may stymie early placental growth. Thus, early gestational exposure to the air pollutant ozone leads to late-stage impacts on the maternal heart and circulatory system. Detailed cellular transcriptomic studies highlight persistent impacts to placental endothelial cells and pericytes. In tangential studies, we have begun to quantify the degree and composition of microplastics accumulation in human placentas. While preliminary, these observations present a conundrum for a contaminant that will continue to rise in the environment for many decades.

BIO: Matthew Campen, PhD, MSPH is a Regents’ Professor in the Department of Pharmaceutical Sciences in the College of Pharmacy at UNM. Dr. Campen is a Co-Director for the UNM Clinical and Translational Sciences Center and Director of the NIH-funded Center for Metals in Biology and Medicine. He is an environmental health scientist who trained at the University of North Carolina School of Public Health and Johns Hopkins University. His research entails understanding how inhaled toxicants can indirectly promote disease beyond the lung.
**HHMI BioInteractive Workshops:**

**Tying the Body Systems Together with HHMI BioInteractive’s Biomolecules on the Menu**
Saturday, May 27, 9:45 AM, Building L, Room 201

**Integrating Models into Physiology Teaching and Assessment with HHMI BioInteractive’s Model Builder**
Saturday, May 27, 1:15 PM, Building L, Room 204

---

**WILEY**

Improve student learning outcomes with Wiley Anatomy & Physiology courseware.

https://www.wileyplus.com/course-catalog/#anatomy
Poster 101
**MYOE (Make Your Own Exam) in Human A & P: Student Response to Peer-Written Exams**
Laura Kabiri, Rice University, laura.kabiri@rice.edu

Based on a 2022 HAPS workshop, undergraduate students (n=67) in Human Anatomy and Human Physiology courses were taught to create test banks which were then exclusively used by the instructor to assemble course exams. Anonymous surveys indicated that 84.6% - 92.9% of students felt the practice should be retained. Surveys also showed that compared to instructor generated exams, peer-written exams improved student perception of learning and retention of material as well as engagement and satisfaction with the assessment process. The use of peer-written exams should be considered as an assessment technique in the human anatomy and physiology classrooms.

Poster 102
**Physiological Knowledge Retention in Second-Year Bachelor of Science and Psychiatric Nursing Students**
Raj Narnaware, MacEwan University, narnawarey@macewan.ca

Co-Authors: Brandi Pawliuk, MacEwan University pawliukb@macewan.ca, Melanie Neumeier, MacEwan University, neumeierm@macewan.ca, Sarah Cuschieri, University of Malta, sarah.cuschieri@um.edu.mt, Paul Chahal, MacEwan University, chahalp@macewan.ca

Numerous studies have demonstrated the difficulty of retaining and applying anatomical and physiological knowledge experienced by students in medical and allied health disciplines, although few studies focus on nursing students (Narnaware and Neumeier, 2020, 2021a). MacEwan University students in the Bachelor of Science in Nursing (BScN) and Psychiatric Nursing programs take the same first-year physiology course. With the understanding that discipline choice potentially impacts knowledge retention, this study aimed to determine the overall difference in physiological knowledge retention between second-year BScN and psychiatric nursing students and if there is a difference based on the organ system.

Poster 103
**Development of a Cadaver Experience Outreach Program**
Mary Schilling, Northern Kentucky University, schillingm2@nku.edu

Co-Authors: Anthony Avenido, Northern Kentucky University, avenidoa@nku.edu

The Biological Sciences department of Northern Kentucky University has developed a Cadaver Experience outreach program aimed at high school (14-18) students. This program seeks to expose students to biomedical careers. With the guidance of faculty, as many as 30 students at a time use the pathology lab to investigate organ specimens, biomechanical tools, 3D-printed knee replacements, and models that coordinate with the cadaver portion of the experience. Students also spend 20-30 minutes in the prosectorium for a hands-on exploration of the cardiovascular, central nervous, musculoskeletal, and digestive systems. Almost 1500 students have experienced this program in the first 18 months.

Poster 104
**The Impact of Content Reinforcement on Anatomical Knowledge Retention of Cardiovascular and Lymphatic Systems in Nursing Students**
Kiara Ukrainetz, MacEwan University, ukrainetzk3@mymacewan.ca

Co-Authors: Raj Narnaware, MacEwan University, narnawarey@macewan.ca, Melanie Neumeier, MacEwan University, neumeierm@macewan.ca, Sarah Cuschieri, University of Malta, sarah.cuschieri@um.edu.mt

Medical & allied health students struggle to transfer the anatomical knowledge from the first year to the future years of their disciplines, although few studies focus on nursing students. As an intervention strategy to improve long-term knowledge retention, the present study demonstrates that repeated evaluation of the cardiovascular and lymphatic systems over eight weeks can significantly increase anatomical knowledge retention of these systems compared to the evaluation of the same organ systems in the first week. Our results show that content reinforcement can be used as an effective interventional strategy to improve long-term anatomical knowledge retention in nursing students.
Poster 105
HAPS Curriculum & Instruction 2022 Laboratory Survey: the Impact of COVID-19 on Laboratory Instruction
Carol Britson, University of Mississippi, cbritson@olemiss.edu
Co-Authors: Rachel Hopp, University of Louisville, rachel.hopp@louisville.edu, James Clark, Los Medanos College, jclark@losmedanos.edu, Heather Armbruster, Southern Union State Community College, harmbruster@suscc.edu, Chris Kule, Pennsylvania College of Technology, ckule@pct.edu, Chineny Anako, Georgian Court University, ccanako@gmail.com, Julia Schmitz, Piedmont University, jschmitz@piedmont.edu, Jeff Huffman, Salt Lake Community College, Jeff.Huffman@slcc.edu, Marnie Chapman University of Alaska Southeast - Sitka Campus, mdchapman@alaska.edu, Cynthia Schmaem, Auburn University at Montgomery, cschmaem@aub.edu, Janay Dennis, Mitchell Community College, jdennis@mittcicc.edu, Kathleen Ahles, University of Texas-Arlington, kathleen.ahles@uta.edu

In early 2022, the Human Anatomy & Physiology Society (HAPS) launched its survey of instructors for introductory undergraduate-level course sequences in human anatomy and physiology for the nursing and allied health student. We present final analyses for the survey section on how laboratory instruction has evolved, and continues to evolve, due to the COVID-19 pandemic. Results are compared to those from the first and second offerings of the lab survey from 2014 and 2017.

Poster 106
HAPS Curriculum & Instruction 2022 Laboratory Survey: Curriculum, Laboratory Activities, and Learning Outcomes
Carol Britson, University of Mississippi, cbritson@olemiss.edu
Co-Authors: Rachel Hopp University of Louisville rachel.hopp@louisville.edu, James Clark Los Medanos College, jclark@losmedanos.edu, Heather Armbruster, Southern Union State Community College, harmbruster@suscc.edu, Chris Kule, Pennsylvania College of Technology, ckule@pct.edu, Chineny Anako Georgian Court University, ccanako@gmail.com Julia Schmitz, Piedmont University, jschmitz@piedmont.edu, Jeff Huffman, Salt Lake Community College, Jeff.Huffman@slcc.edu, Marnie Chapman University of Alaska Southeast - Sitka Campus, mdchapman@alaska.edu, Cynthia Schmaem, Auburn University at Montgomery, cschmaem@aub.edu, Janay Dennis, Mitchell Community College, jdennis@mittcicc.edu, Kathleen Ahles University of Texas-Arlington, kathleen.ahles@uta.edu

In early 2022 the Human Anatomy & Physiology Society (HAPS) launched its survey of instructors for introductory undergraduate-level course sequences in human anatomy and physiology for the nursing and allied health student. We present final analyses for the survey section on implementation of activities and learning outcomes in the laboratory. Results are compared to the data obtained from the first and second offerings of the lab survey from 2014 and 2017.

Poster 107
HAPS Teaching Tips - A Valuable Resource for New Ideas on Tough Topics
Rachel Hopp, University of Louisville, rachel.hopp@louisville.edu
Co-Authors: Wendy Rappazzo, Harford Community College, wrappazzo@harford.edu, Abbey Breckling, University of Illinois at Chicago, abreck2@uic.edu, Ellen Krumme, Galen College of Nursing, ekrumme@galencollege.edu, Edgar Meyer, University of Mississippi Medical Center, emeyer@umc.edu, Kayla Pavlick, University of Mississippi Medical Center, kpavlick@umc.edu

Are your students struggling with certain topics in A&P? HAPS Teaching Tips can help! A Teaching Tip is a “ready to go” activity which instructors can download and use as is or edit to fit their teaching style. Each tip includes an instructor’s guide and formative assessment. The topics of recently published Teaching Tips include the integumentary, muscular, nervous, urinary, and cardiovascular systems. Visit us to see examples of some of these tips and learn how easy it is to submit a Teaching Tip (and receive recognition for your academic portfolio).

Poster 108
Evaluating the Impact of Prior Anatomical Experience on Student Performance in a Medical Human Gross Anatomy Course
Nicole Geske, Michigan State University, geskenic@msu.edu

At Michigan State University’s College of Osteopathic Medicine, anatomy is not a prerequisite for acceptance into the medical (DO) program. In their first semester, osteopathic medical students with varying levels of anatomical knowledge take a medical human gross anatomy course. This research evaluated the impact of prior anatomy experience on how students prepared for assessments and their overall successfulness in a hybrid version of the course offered in summer of 2021. Common themes were noted between the bottom and top performers, including differences in anatomical experience, preparation, and usage of course materials. Recommendations are provided for future students.

continued on next page
Poster 109
Interactive Small Group Learning Sessions Significantly Improved Academic Performance in Physiology Course for Health Professions Students
Anastasia Mashukova, NSU MD, amashukova@nova.edu
Co-Authors: Alvin Ledesma Nguyen, Nova Southeastern University, Dr. Kiran C. Patel College of Allopathic Medicine, an1089@mynsu.nova.edu, Marye Lee, Nova Southeastern University, Dr. Kiran C. Patel College of Allopathic Medicine, ml2521@mynsu.nova.edu
During the last decade, reorganization efforts in medical school curricula highlighted the importance of active learning. Yet, the foundational sciences curricula for health professions rely primarily on didactic lectures. We evaluated the effect of including virtual active learning sessions into physiology course for health professions otherwise delivered as in person didactic lectures. We found a significant increase in three out of four average exam scores. There was also significant pretest-posttest score increase indicating overall improvement in learning outcomes. Our study provides an effective strategy of incorporating small group active learning into any foundational science course with large number of students.

Poster 110
Engaging in higher-order thinking with concept maps: a student's perspective
Jessica Cisneros Lerma, University of North Georgia, lermax328@gmail.com
Concept mapping, an active learning strategy that graphically represents interrelationships among concepts, facilitates the transfer of information from short-term to long-term memory. Instead of relying on lower-order cognitive skills such as rote memorization, concept mapping promotes meaningful learning by encouraging the development of higher-order cognitive skills. Constructing concept maps allows me to connect new information with prior knowledge and reveals gaps in my understanding. In this presentation, I will present a review of the current pedagogical research on concept mapping in pre-nursing education and then summarize how this learning tool has facilitated my deeper understanding of anatomy and physiology content.

Poster 111
Engaging Undergraduates by converting your classroom into a scientific conference
Emily Bradshaw, University of Central Florida, Emily.Bradshaw@ucf.edu
Engaging biomedical science and health science undergraduates in a large enrollment neuroscience course and encouraging scientific discussion can be a daunting task. This poster will discuss how to engage students by creating a semester long project that mimics presenting at a neuroscience scientific conference. Students investigate a primary literature article of their interest, create and present a poster in a team. During the presentation portion, students are taught how to evaluate a poster and engage their classmates. Overall, this can be a very effective way to inspire students to learn about a neuroscience topic, communicate science, and develop professionalism behaviors.

Poster 112
Third-Year Nursing Student’s Physiological Knowledge Retention
Prabal Sharma, MacEwan University, sharamp47@mymacewan.ca
Co-Authors: Raj Narnaware, MacEwan University, narnawarey@macewan.ca, Caroline Foster-Boucher, FosterBoucher@macewan.ca, Melanie Neumeier, MacEwan University, neumeierm@macewan.ca, Paul Chahal, MacEwan University, chahalp@macewan.ca
There is a growing concern that medical, allied health & nursing students struggle to retain & apply physiological knowledge in the subsequent years of their disciplines (Narnaware & Neumeier, 2020). The present study evaluates physiological knowledge retention in third-year nursing students. The results show that the mean class average in the first year was 64.9 ± 10.5 (±SD), which significantly (P<0.05) decreased to 50.95 ± 9.2 (±SD), in the third year. Although organ-specific knowledge retention was found, this study identifies the potential gaps in knowledge retention, which help develop interventions to improve knowledge retention in nursing students.

continued on next page
Poster 113
The Impact of Figure-Based vs. Practical-Style Quizzes on Students’ Practical Exam Performance in Undergraduate Anatomy and Physiology Lab
Lacy Cleveland, Colorado Christian University, lceleveland@ccu.edu
Co-Authors: Faith Brandt, Colorado Christian University, faith.e.brandt@gmail.com
Undergraduate A&P Laboratory is a challenging course required for pre-health students. Students identify vast quantities of tissues and structures. Instructors often assess students’ ability to identify structures via a small number of high-stakes practical exams (PE). However, formative assessments provide students low-stake opportunities to assess their knowledge. We sought to determine if the type of formative assessment impacted students’ PE performance and interpretation of medical images. Students in different sections, participated in weekly formative assessments, either a practical-style or figure-based quiz. Preliminary data indicates students taking practical-style quizzes initially scored lower on their quizzes but displayed higher histology-related PE scores.

Poster 114
Factors that Improve a Sense of Belonging in a Human Anatomy and Physiology Classroom
Nicole Pinaire, St. Charles Community College, npinaire@stchas.edu
Co-Authors: Suzanne Hood, Bishops University, shood@ubishops.ca, Ron Gerrits, Milwaukee School of Engineering, gerrits@msoe.edu, Murray Jensen, University of Minnesota, msjensen@umn.edu
Students’ feelings of belonging have been linked to achievement and retention. Implementing classroom strategies to enhance students’ sense of belonging could be an effective means of retaining students. In this study, guided inquiry and cooperative quizzes were used to promote a sense of belonging. Students were surveyed about their perceptions of belonging. Thematic analysis of comments suggested a shift in how students perceived their sense of belonging from beginning to end of semester. Class educational activities increased a sense of belonging. This study suggests using guided inquiry and cooperative quizzing can facilitate a student’s sense of belonging.

Poster 115
Active Learning Activities Utilizing Digital Wrist Blood Pressure Cuffs: Investigating their possible effects on Student Comprehension and Learning in the Classroom.
Cynthia Foote, Georgia State University, Perimeter College, cfoote@gsu.edu
Co-Authors: Kathryn Crowther, Laura Carruth
Cardiac physiology is one of the more challenging concepts for students in A&P2. An increasing number of studies have shown the benefit of incorporating active learning into the STEM classroom (Freeman et. al, 2014). This study examines whether use of a digital wrist blood pressure cuff in conjunction with an active in-class activity will improve student understanding of regulation of heart rate and blood pressure. We hope to show that incorporation of new technology that facilitates active participation of students versus the traditional lecture presentation of this material will improve student learning.

Poster 116
Coanda Effect in Coronary Artery
Nhan Bui, Methodist Hospital, Merrillville IN, Drtrinhanbui@gmail.com
The Coanda effect is the action in fluid mechanics whereby a flow along a solid surface tends to follow the curvature of the surface rather than separating. The Coanda effect entrains fluid from the surroundings so that a region of lower pressure develops. In right coronary artery, the coanda effect is seen in the internal boundary layer with prolonged arterial phase, causing delayed oxygen delivery to the myocardium resulted in chest pain. Images of coronary flow with thick internal boundary will be presented.

Poster 117
Meander Effect in Coronary Flow
Nguyen Nguyen, Palmetto General Hospital, Hialeah FL, Drnguyen299@gmail.com
In general, laminar flow is the standard. When the blood turns a curve, the layers at the center and outer border flow faster while the flow at the inner border flow at a slower speed. When the difference between these 2 speeds is large, there is recirculation flow and turbulence in the inner border. This is the Meandering effect. With recirculation, turbulence could injure the intima and start the atherosclerotic process. An anatomical curve can happen at any bifurcation and is predilected to develop plaque. The plaque will not grow if there is high LDL level.

continued on next page
Poster 118
**Does Endothelial Shear stress or turbulent flow rupture the plaque? and where?**
Hien Nguyen, Methodist Hospital, Merrillville IN, nguyenquanghienmd@gmail.com

In a plaque, the base of the upslope entry is of low endothelial shear stress (ESS) whereas at the most severe stenotic area in the lumen, the ESS is labeled to be high. These results are from animal studies. In our new technique of coronary imaging, the plaque at the base of the upslope entry is seen eroded by the antegrade coronary flow. In contrast, the plaques at the distal right coronary artery are injured by the systolic retrograde flow and ruptured at the base of the exit slope. Flow mechanics can explain the mechanism of disease better than ESS.

Poster 119
**Aerospace physics in coronary artery: How does the vortex form and injure artery?**
Duc Nguyen, Methodist Hospital, Merrillville IN and Tan Tao University School of Medicine, Long An Vietnam, hoangduc.fsh@gmail.com

In iliac artery, there is fast antegrade systolic flow and late systolic and diastolic retrograde flow. In case of uncontrolled systolic or diastolic hypertension, there is a collision between the antegrade and retrograde flow, creating one vortex or multiple vortices. These vortices move with the flow, fuse with each other, develop turbulence and so damage the intima of adjacent arterial segment. This is the start of the atherosclerotic process. However, these phenomena develop and disappear with each cardiac cycle. Images of the birth and death of vortices in iliac arteries will be presented.

Poster 120
**Presentation of a Persistent Metopic Suture in a Human Anatomical Donor**
Trisha Waldman, University of Saint Mary, trisha.waldman@stmary.edu

*John Martin Second Timers Award Winner*

Upon dissection, the skull of a human anatomical donor presented with a persistent metopic suture. Metopic sutures, or frontal sutures, most often fuse and obliterate within youth, approximately by the age of seven. If the suture persists, it is referred to as metopism. Metopic sutures can be associated with frontal sinus deformities and are considered a clinically significant presentation.

Poster 121
**A 3D-Printed Forearm Trainer for the Practice of Ultrasound Guided Arterial and Venous Line Placement**
David Resuehr, UAB, resuehr@uab.edu

Co-Authors: Mary Chambers, UAB SOM, chambme0@uab.edu, David Schartung, UAB SOM, david103@uab.edu, David Resuehr, UAB SOM, resuehr@uab.edu

As sonography further develops as a mainstay of everyday medicine, the use of sonographic trainers (i.e. phantoms) has become increasingly necessary. However, despite the frequency and technicality of ultrasound-guided procedures involving arterial and venous line placement, the benefit of such hands-on sonography simulation for medical professionals is often outweighed by cost. Our experiment utilizes 3D printing and ballistics gelatin to create a cost-effective, versatile, and realistic peripheral line simulator to cultivate real-time learning of arterial/venous arm anatomy, while providing practice for needle-driving ultrasound techniques at a fraction of the commercial price.

Poster 122
**A Scalpel and a Scanner: Training the Next-Generation of Anatomists in 3D Modeling Technology**
Jake Shearer, Modern Human Anatomy Program, University of Colorado Anschutz Medical Campus, jake.shearer@cuanschutz.edu

Co-Authors: Maureen Stabio, University of Colorado Anschutz Medical Campus, maureen.stabio@cuanschutz.edu, Ernesto Salcedo, University of Colorado Anschutz Medical Campus, ernesto.salcedo@cuanschutz.edu, Noah Leppek, University of Colorado Anschutz Medical Campus, noah.leppke@cuanschutz.edu, Chelsea Lohman, University of Colorado Anschutz Medical Campus, chelsea.lohmanbonfiglio@cuanschutz.edu

*Sponsored by Touch of Life Technologies*

The use of immersive real-time 3D technology in anatomy education is exploding. With advances in medical imaging, segmentation powered by machine learning, surface scanning, and 3D printing, modern anatomists must be cross-trained in both digital workflows and classical anatomy. However, most anatomy education training programs do not offer formalized training in 3D modeling. Therefore, in 2022, we piloted a technology-focused track, the Anatomical Imaging and Modeling (AIM) track, within the Modern Human Anatomy Master’s Program at the University of Colorado. We discuss our framework for training in industry-standard software, fostering independent research skills, and report on student successes and experiences.

continued on next page
Poster 123
Investigation of lecture modalities in student performance in anatomy
Sarah Beam, The Ohio State University, beam.102@osu.edu
HAPS Conference Travel Award Winner
Co-Authors: Mary Ghiotti, The Ohio State University ghiotti.1@osu.edu, Kristin Stover, The Ohio State University, stover.353@osu.edu
The pandemic has been a catalyst for change in many courses. This study investigates how lecture modalities in a hybrid anatomy course affected student exam performance. Undergraduate human anatomy students were given the option to attend synchronous Zoom lectures or watch the recording later. Student exam scores were collected over the course of four exams and compared for statistical differences. Additionally, we compared didactic verbal lectures with active note-taking lectures and encouragement of active study techniques to see the effect on student exam performance. Student exam scores were collected over the course of seven semesters and compared for statistical differences.

Poster 124
Bridging the gap between 3D digital and traditional physical A&P lab models using smart tablet technology.
Luis Rosado, Worcester State University, lrosado@worcester.edu
A disadvantage A&P classrooms using 3D digital computer anatomical models experience is the disconnect between digital and physical models traditionally used. This project used iPads and physical models for A&P lab practical exam studying and preparations. We focused on the experiential learning component seen in both constructivist and ecological pedagogical approaches. Digital models labeled by students served as “answer keys” to the physical models and “Mock Practical” exam questions were created on the physical models. Students reported digital models, “helped them make connections”, “were a good reference”, and “they preferred using the iPads in combination with the physical models”.

Poster 125
Effect of Short Active Breaks & Exercises on the Attention, Content Retention and overall success of Students registered in Anatomy and Physiology Course.
Ben Ondimu, Harford Community College, bondimu@harford.edu
Are your students bored, asleep, and tuned off in lectures especially if classes run for 75 minutes or more? Try to increase their attention and success by allowing short active breaks and encourage them to do simple Exercises that last 2-3 minutes during the breaks after every 25-30 minutes of teaching. There is scholarly evidence suggesting that the attention span of most students is only 20-30 minutes. The purpose of this study is to examine the effect of short active breaks and Exercises on the attention, material retention and overall success of students registered in Anatomy and Physiology Course.

Poster 126
The Impact of Online Laboratories and Hybrid Laboratories on Examination Scores in an Undergraduate Anatomy Program During the COVID-19 Pandemic
Hwoi Min Oh, The Ohio State University, oh.591@osu.edu
Co-Authors: Christian Prada, The Ohio State University prada.4@osu.edu, Jeremy Grachan, The Ohio State University, grachan.1@buckeyemail.osu.edu, Jennifer Burgoon, The Ohio State University, jennifer.burgoon@osumc.edu, Claudia Mosley, The Ohio State University, claudia.mosley@osumc.edu
This study compared the impact of online laboratories and hybrid laboratories on examination scores in an undergraduate anatomy program during the COVID-19 pandemic. The hybrid laboratories included online activities and options to attend in-person prosection laboratories. Within the hybrid group, students who attended 63.6% or more total in-person laboratories had higher mean practical scores. Students who attended at least one in-person laboratory performed higher on image-based questions. Final course grades were significantly higher for the hybrid group than for online group. These results may have been affected by pandemic-related issues, such as mental health and financial issues.
Session 2: Thursday, May 25 from 2:15 pm – 3:15 pm

Poster 201
Impact of Integration of Neuroanatomy and Head Anatomy on student learning outcomes in a year 1 medical course
Rylee Samander, Burrell College of Osteopathic Medicine, Rylee.samander@burrell.edu
Co-Authors: Cindy Funk, Burrell College of Osteopathic Medicine, cfunk@burrell.edu, Kris Vaudrey, Burrell College of Osteopathic Medicine, kvaudrey@burrell.edu, Miriam Donohue, Rocky Vista University - Montana College of Osteopathic Medicine, mdonohue@rvu.edu
The OMS (Osteopathic Medical Student) 1 Nervous System final included non-integrated and integrated test questions (anatomy, neuroanatomy and integrated). Anonymous, aggregate exam data was analyzed utilizing one-way ANOVA and feedback was elicited from the course evaluation as a Likert scale and open-ended question. Over 90% of students reported integrated cases/self-assessments as having supported overall understanding of both subjects. No significant difference (p-value > 0.5) with regards to question difficulty, point by serial, and discrimination between anatomy, neuroanatomy and integrated questions was found. This study showed a beneficial impact from integration, without corresponding increase in exam question difficulty/decrease in exam performance.

Poster 202
Inconsistency in Neuroanatomy Textbooks of Osteopathic Medical Schools
Kris Vaudrey, Burrell College of Osteopathic Medicine, kvaudrey@burrell.edu
Co-Authors: Alayna Schwartz, Burrell College of Osteopathic Medicine, Alayna.schwartz@burrell.edu, Ashley Stiglich, Burrell College of Osteopathic Medicine, Ashley.stiglich@burrell.edu, Miriam Donohue, Rocky Vista University - Montana College of Osteopathic Medicine, mdonohue@rvu.edu
There is inconsistency in textbooks describing the upper motor neuron (UMN) pathway of the hypoglossal nerve (CN XII) in Osteopathic medical schools. Textbook lists from 39 osteopathic schools were evaluated for discrepancies in UMN innervation to the hypoglossal nucleus. A comprehensive analysis found four major patterns of UMN innervation of the hypoglossal nucleus described among the resources reviewed. The differences in teaching innervation to the hypoglossal nucleus demonstrates a need for recognition of these differences and standardization in neuroanatomy curriculum among Osteopathic medical curricula as well as evaluation of clinical relevance of these differences.

Poster 203
Variation of Upper Motor Neuron Pathways of the Hypoglossal Nerve (CN XII)
Kris Vaudrey, Burrell College of Osteopathic Medicine, kvaudrey@burrell.edu
Co-Authors: Ashley Stiglich, Burrell College of Osteopathic Medicine, Ashley.stiglich@burrell.edu, Alayna Schwartz, Burrell College of Osteopathic Medicine, Alayna.schwartz@burrell.edu, Miriam Donohue, Rocky Vista University - Montana College of Osteopathic Medicine, mdonohue@rvu.edu
Cranial Nerve XII (CN XII) innervates muscles of the tongue and upper motor neuron (UMN) fibers descend from the motor cortex to synapse in the hypoglossal nucleus. This UMN CN XII pathway is described four main ways: (1) all fibers descend contralaterally, (2) most descend bilaterally except those innervating genioglossus, which descend contralaterally, (3) most are contralateral while a few remain ipsilateral, and (4) all descend bilaterally. Damage to UMNs of CN XII is typically taught in Osteopathic medical curricula as resulting in contralateral tongue deviation. However, the four descriptions would result in varying pathologic presentations.

Poster 204
Student experiences and preferences after COVID-19 on professional healthcare program: a longitudinal study
Mabel Yin Chun Yau, Tung Wah College, mabelyau@twc.edu.hk
Co-Authors: Paula Hodgson, paula.hodgson@protonmail.com, Chi Ming Wong, The Hong Kong Polytechnic University, samyuen@twc.edu.hk, Sam Yuen, Tung Wah College, paklaitang@gmail.com, Pak Lai Tang, Caritas Medical Centre, Hong Kong, paklaitang@gmail.com
Students experienced a shift from fully campus-based to remote learning as COVID-19 cases broke out in 2020-2022. Despite regular class resumption, students expect blended learning after exposure to virtual learning. This survey was done among healthcare students from 2021 to 2022 with autonomous and anonymous participation. 1,586 responses were collected. Students preferred online classes for Anatomy and Physiology (AnP) and skewed to on-site attendance for other science subjects. Their preferences on the respective components of each course were differential. An overwhelming choice of on-site learning on laboratory skills was noted indicating hands-on practice is crucial for mastery in authentic settings.

continued on next page
Poster 205
Biomedical Engineering Students Investigate the Cardiovascular System in the Gross Anatomy Lab
Emily Bradshaw, University of Central Florida, Emily.Bradshaw@ucf.edu
HAPS Conference Travel Award Winner
Co-Authors: Alain Kassab, University of Central Florida alain.kassab@ucf.edu, Luigi Perotti, University of Central Florida, luigi.perotti@ucf.edu
Biomedical engineering (BME) students may be asked to understand blood pressure and cardiomyocyte function in the human body, yet typically have little exposure to the biological sciences or anatomy. To address this, we developed a series of labs where BME graduate students examined normal and diseased human hearts, examined cardiac hypertrophy, measured wall thickness and vessel diameters, and calculated Reynold’s number. This project describes the labs and student opinions. Overall, students reported more satisfaction working with and examining human specimens than plastic models, particularly for those with pathologies. Future directions include providing more time for discussion and data interpretation.

Poster 206
Development of an Anatomy Self-Study Room for ANP Students
Jacqueline Carnegie, University of Ottawa, jcarnegi@uottawa.ca
Co-Authors: Abbey Dikaitis, University of Ottawa, adika046@uottawa.ca, Joanne Savory, University of Ottawa, Joanne.Savory@uottawa.ca
Students in large-enrolment A&P courses don’t have access to laboratory sessions to support anatomy learning. In collaboration with the Anatomy Division of the Faculty of Medicine, a room for self-directed anatomy learning was created in the library. Equipped with models, whiteboards, a computer plus projection screen, and bilingual charts and atlases, the 18-seat room admits students via access code during normal library hours. Room use was tracked using sign-in sheets and student feedback collected via surveys. Students reported that the room supported their anatomy learning and provided suggestions to expand its capabilities. Challenges and future directions will also be presented.

Poster 207
Skeletal System Coverage in Undergraduate Stand-alone Human Anatomy and A&P Courses: General trends
Valerie O’Loughlin, Indiana University, vdean@indiana.edu
Co-Authors: Asmita Aryal, Indiana University, aryala@iu.edu
Undergraduate anatomy and A&P courses vary in depth and breadth of the skeletal system coverage, yet little data has been collected about these differences. To address this data deficit, the authors developed a skeletal system coverage survey (presented at HAPS 2022) and received complete responses from 282 undergraduate anatomy & physiology courses from around the world. Here, we present the general data trends, including the most commonly identified bones for these courses, and the top 5 features required for selected bones (from our sample). Additional data comparisons between these two types of courses will be presented.

Poster 208
Skeletal System Coverage in Undergraduate A&P Courses, part 2: Comparisons between Stand-alone Human Anatomy and A&P Courses
Valerie O’Loughlin, Indiana University, vdean@indiana.edu
Co-Authors: Asmita Aryal, Indiana University, aryala@iu.edu
Undergraduate anatomy and A&P courses vary in depth and breadth of the skeletal system coverage, yet little data has been collected about these differences. To address this data deficit, the authors developed a skeletal system coverage survey (presented at HAPS 2022) and received complete responses from 124 anatomy and 158 A&P courses. While both types of courses were similarly likely to teach specific bones, anatomy courses were more likely to require identification of more specific bony features (e.g., costal facet on vertebra). Additional data comparisons between these two types of courses will be presented.
Poster 209
Skeletal System Coverage in Undergraduate Stand-alone Human Anatomy and A&P Courses, Part 3: Comparisons Between Lower-level and Upper-level Human Anatomy and A&P Courses
Asmita Aryal, Indiana University School of Medicine-Bloomington, aryala@iu.edu
Co-Authors: Valerie Dean O'Loughlin, Indiana University School of Medicine - Bloomington, vdean@indiana.edu
Undergraduate anatomy and A&P courses vary in depth and breadth of the skeletal system coverage, yet little data has been collected about these differences. To address this data deficit, the authors developed a skeletal system coverage survey (presented at HAPS 2022) and received 282 responses with 197 lower-level and 72 higher-level courses. While both types of courses were most likely to teach similar bones, the vertebra is the most required bone to identify in lower-level courses and the sternum in higher-level. Additional data comparisons between these two types of courses will be presented.

Poster 210
From Clinic to Classroom: Development of an Online Pathohistology Database
Soma Mukhopadhyay, Augusta University, soma.mukhopadhyay.08@gmail.com, smuk@hapsconnect.org
Co-Authors: Rachel Hopp, University of Louisvillerachel.hopp@louisville.edu, rhopp@hapsconnect.org, Deborah Merritt, University of Hawaii, dmerritt@hawaii.edu, dmerritt@hapsconnect.org, Judy Maloney, Marquette University, jmaloney1706@gmail.com, Hiranya Rowcowdhury, New Mexico State University, hroychow@hapsconnect.org, Yuli Pernia, San Jacinto College North, yuli.pernia@sjcd.edu, ypernia@hapsconnect.org, Sharada Gollapudi, San Jacinto College South, sharada.gollapudi@sjcd.edu, sgollapudi@hapsconnect.org, Kathleen Ahles, University of Texas, kathleen.ahles@uta.edu
The study of tissues, or histology, is one of the fundamental topics used in most of the undergraduate Anatomy and Physiology (A&P) curricula to prepare students who are planning to enter the field of medicine and/or an allied health profession. In the last decade, the use of digital histology has greatly increased, especially during COVID19-related lockdown time. Since 2010, HAPS Histology Challenge has provided anatomy faculty with novel tissue images to facilitate critical thinking in their A&P courses. Under the Curriculum and Instruction Committee initiative, a project is currently underway for repurposing the images to create a virtual database to be efficiently used for greater engagement and metacognition among A&P students.

Poster 211
Accommodations in the A&P Lab: It’s so much more than providing extended time
Abbey Breckling, University of Illinois at Chicago, abreck2@uic.edu
Co-Authors: Heather Ambruster, Southern Union State Community College, harmbruster@suscc.edu, James Clark, Los Medanos College, jclark@losmedanos.edu, Pat Clark, Indiana University Purdue University, patclark@iupui.edu, Jennifer Ellsworth, Moorpark College, Jenniferroseellsworth@gmail.com, Youlonda FitzGerald, Texas Woman’s University, patclark@iupui.edu, Rachel Hopp, University of Louisville, rachel.hopp@louisville.edu, Jenna Jarvis, State College of Florida, jarvisj@scf.edu, Jennifer Stokes, Southwestern University, stokesj@southwestern.edu, J. P. Swigart, Carle Illinois College of Medicine, swigart@illinois.edu, Diane Tice, SUNY Morrisville, ticedg@morrisville.edu, Margaret Weck, University of Health Sci. and Pharm. (ret.), mweck602@gmail.com
Over the past couple years, the HAPS Curriculum and Instruction Accommodations Subcommittee has been writing, reviewing, and vetting a handbook for HAPS members which entails suggestions for how to meet student accommodations in anatomy and physiology laboratory settings. This poster shares feedback from our Town Halls, past posters, workshops, and presents our progress on the handbook document. Our goal is to provide a space for reflections and discussions around accommodation successes or difficulties members may have.

Poster 212
Hawkeye Introductory Courses: A Collaborative Effort to Transform Undergraduate Introductory STEM Courses
Jennifer Rogers, University of Iowa, jen-rogers@uiowa.edu
Co-Authors: Ray Fagenbaum, The University of Iowa, ray-fagenbaum@uiowa.edu, Kelli Taeger, The University of Iowa, kelli-taeger@uiowa.edu, Stephanie Preschel, The University of Iowa, stephanie-preschel@uiowa.edu, Jamie Tanas, The University of Iowa, tanas-jamie@uiowa.edu
The aim of the Hawkeye Introductory Courses project was to support teaching and learning innovations in selected STEM gateway courses in Chemistry, Computer Science, Math, Statistics, and Health and Human Physiology. Methods: Departmental teams, in collaboration with university resources and funding, identified a variety of course-level strategies to enrich opportunities for student engagement. Results: Faculty survey results indicated that participation improved understanding of student performance and student success resources and programs, while also improving departmental coordination and benefitted their own professional development. Conclusion: Support from university-wide resources, professional development, and cross-departmental collaboration facilitated student success in critical first-year courses.
Poster 213
Hawkeye Introductory Courses Project: Evaluating Withdrawal Patterns in a Large Lecture-Based Introductory Human Anatomy Course
Ray Fagenbaum, The University of Iowa, ray-fagenbaum@uiowa.edu
Co-Authors: Kelli Taeger, The University of Iowa, kelli-taeger@uiowa.edu, Jen Rogers, The University of Iowa, jen-rogers@uiowa.edu
One aim of the Hawkeye Introductory Courses Project was to enhance student persistence in introductory STEM courses. Methods: Academic characteristics for students who withdrew from Human Anatomy were evaluated, along with survey results asking students to comment on reasons for withdrawal. Results: Approximately 10% of students withdrew with most withdraws around Week 11, coinciding with the timing of exam 3 of 5. Students that withdrew most commonly indicated poor performance or having fallen behind with content as primary reason for withdrawal. Conclusion: A better understanding of reasons for and timing of withdrawals may help instructors improve course delivery.

Poster 214
Hawkeye Introductory Courses Project: Improving Student Engagement in a Large Lecture-Based Introductory Human Anatomy Course
Kelli Taeger, University of Iowa, kelli-taeger@uiowa.edu
Co-Authors: Jennifer Rogers, University of Iowa, jen-rogers@uiowa.edu, Ray Fagenbaum, University of Iowa, ray-fagenbaum@uiowa.edu, Jamie Tanas, University of Iowa, tanas-jamie@uiowa.edu, Preschel Stephanie, University of Iowa, stephanie-preschel@uiowa.edu
Introduction: Changes were made to enhance learning in an introductory large-lecture course through incorporation of active learning activities in-class and out-of-class supplemental learning activities. Methods: In-class and out-of-class activities were introduced to the course. Students completed surveys regarding the use and helpfulness of these activities. Results: Students reported exam reviews, weekly low-stakes quizzes, supplemental worksheets, and interactive reviews midway through each unit to be the most helpful in-class activities. Access to anatomical models outside of class was also beneficial as evidenced by the number of check-outs. Conclusion: Changes to the course were well-received and favorably impacted student engagement.

Poster 215
Student Perspectives of the Case Study Approach to Teaching and Engagement
James McCaughern-Carucci, St.Johns River State College, jamesmccaugherncarucci@sjrstate.edu
Co-Authors: Dana Smith, St. Johns River State College, DanaSmith@sjrstate.edu, Kim Van Vliet, St. Johns River State College, KimVanVliet@sjrstate.edu, Kerry Hull, Bishop's University, khull@hapsconnect.org, Kyla Ross, Georgia Tech, kross@hapsconnect.org, Suzanne Hood, Bishop's University, shood@ubishops.ca, Murray Jensen, University of Minnesota, msjensen@umn.edu
Case studies have been used in many fields of study; however, science and medicine rely heavily upon this teaching method precisely because of the ability of the case study to create a rich narrative of clinical evidence and foster critical thinking skills. A combination of case studies, collaborative learning and real-time polling resulted in a hybrid teaching strategy which was useful in my face-to-face and online synchronous anatomy & physiology courses. Students found the weekly case studies engaging, beneficial to their understanding of the course material and promoted community in the classroom which may translate to improved student success and resiliency.

Poster 216
Metacognitive awareness in Anatomy and Physiology for among mixed majors
Lecia Robinson, Tuskegee University, lrobinson@tuskegee.edu
Co-Authors: Suzanne Hood, Bishop University, shood@UBishops.ca
Metacognition, which is the awareness of one's own learning or thinking processes, has been shown to increase student achievement and learning. In this study we introduced exam wrappers into undergraduate A&P classes to increase student metacognition and to determine whether exam wrappers affected student anxiety, and exam performance. In the sample studied, there was not any significant difference in overall exam scores between the groups. However, student anxiety dropped significantly among those who used exam wrappers.
Progression of the Community College Anatomy and Physiology Education Research (CAPER) Project: An Update on Teaching Practices for Anatomy and Physiology

Chasity O’Malley, Wright State University Boonshoft School of Medicine, chasity.omalley@wright.edu
Co-Authors: Kathy Bell, Salt Lake Community College, kathryn.bell@slcc.edu, Charlene Cornwell, University of Minnesota, cornw055@umn.edu, Melaney Farr, Salt Lake Community College, melaney.farr@slcc.edu, Ron Gerrits, Milwaukee School of Engineering, gerrits@msoe.edu, Suzanne Hood, Bishops University, shood@ubishops.ca, Kerry Hull, Bishops University, khull@ubishops.ca, Murray Jensen, University of Minnesota, msjensen@umn.edu, Vicky Rands, Salt Lake Community College, Vicky.Rands@slcc.edu, Dana Smith, St. Johns River State College, DanaSmith@sjrstate.edu

The Community College Anatomy and Physiology Education Research (CAPER) project aims to support community college faculty to supplement their courses with additional best practices and conduct an educational research study. Cohort 1 participants have completed classroom research projects, while cohort 2 participants have completed 2 professional development courses and are preparing to conduct a classroom-based research project. Data from participating students on learning and anxiety associated with the effects of various teaching interventions are also being recorded. Instructors have also been studied through a series of interviews aimed at assessing their approaches to education. This poster will highlight the overall CAPER project.

Case Study: Cervical radiculopathy with pedagogical application

David Bowden II, Wright State University, davidbowdenii@gmail.com
Co-Authors: Chasity O’Malley, Wright State University Boonshoft School of Medicine, chasity.omalley@wright.edu

Cervical radiculopathy is a common cause of neck pain, often occurring due to nerve root impingement. In order to fully understand the condition, it is important to have an understanding of the anatomical landmarks and the pathophysiology. This poster will examine a teaching case of a patient with cervical radiculopathy subsequent to a space occupying lesion. This case could be applied in an anatomy laboratory classroom, most appropriate for graduate level studies.

Analysis of coronary flow calculated by Artificial Intelligence and Machine Learning

Van Nguyen, Methodist Hospital, Merrillville IN, nvtuong0903@gmail.com

The current requirement for offline analyses of plaque anatomic/hemodynamic/biomechanical characteristics that are time consuming and require substantial technical and computational resources. Nevertheless, intense efforts are needed to enhance imaging and postprocessing systems and the application of artificial intelligence (AI) and machine learning (ML) permit more rapid and detailed assessment of these high-risk characteristics. Images of the coronary flow calculated by AI and ML will be presented.

Micro-Cavitation in Coronary Arteries

Kieu Thai, Methodist Hospital, Merrillville IN, thaikieungoc@gmail.com

Micro-cavitation happens due to vortex formation from Kelvin-Helmholtz instability. Once a vortex is formed, the angular velocity of the flow around the vortex increases exponentially, thus causing a negative pressure zone. This low pressure ruptures any bubble wandering in its territory (cavitation) and so injures the intima. Additionally, in the negative pressure zone, due to the pressure gradient, the blood will be pulled in more than the flow in the distal region. This results in reversed flow or delay anterograde flow. This is called dynamic obstruction resulting in chest pain while no lesion is detected on the angiogram.

Cardiac Cycle Puzzle

Juanita Jellyman, California State Polytechnic University Pomona, jkjellyman@cpp.edu

This poster will describe a learning activity that helps students relate the atrial state, ventricular state, states of atrioventricular valves, and pulmonary and aortic valves to the different phases of the cardiac cycle.
Poster 222
**Usually you check blood pressure by the number, can you see the images of controlled and uncontrolled hypertension?**

Imran Mihas, Indiana University Bloomington, Mihasimran@gmail.com

This session will present the images of antegrade flow in systole and the reversed flow in late systole and diastole in the iliac artery. The reversed flow represents the extent of peripheral vascular resistance. In patient with uncontrolled systolic hypertension (HTN), the reversed flow is seen being stopped abruptly. With diastolic HTN, the reversed flow in the iliac artery is prominent and prolonged. If the diastolic BP is below 70mmHg, there is no reversed flow. Images of antegrade flow as result of systolic contraction of the left ventricle and retrograde flow representing the strength of the distal vascular resistance.

Poster 223
**Kevin-Helmholtz Instability in Coronary Artery**

Thinh Nguyen, Methodist Hospital, Merrillville IN, nguyen.thi.thinh.ped@gmail.com

The Kelvin–Helmholtz instability is a fluid instability that occurs when there is velocity shear in a single continuous fluid or a velocity difference across the interface between two fluids. The reason is because between two layers, there is always a surface tension. The amplitude has to be large enough to overcome the surface tension for the turbulence to occur, otherwise the surface tension will suppress the instability. In coronary artery, this phenomenon is seen frequently and is the nidus of the first plaque formation. Images of flow at the exit slope of the left circumflex artery will be presented.

Poster 224
**An open-source model for demonstrating changes in transpulmonary pressure during ventilation**

John Pattillo, Middle Georgia State University, john.pattillo@mga.edu

Students may find it difficult to comprehend the changes in pleural and alveolar pressures during ventilation. This project details the construction of a device to demonstrate these changes, and to measure and display them in real time. A standard “balloon in a bell jar” model is modified to incorporate pressure sensors. As the instructor moves the diaphragm, pressure data is sent to wirelessly to a small computer attached to the classroom audiovisual system. The instructor may also demonstrate pneumothorax. The model is designed to be inexpensive, easily constructed, and is compatible with a variety of audiovisual systems.

Poster 225
**Utilization of Social Media for Increased Engagement and Understanding in Anatomy and Physiology**

Shannon Kispert, Webster University, shannonkispert@webster.edu

Co-Authors: Sarah Schryver, Webster University, schryversj13@gmail.com

Increased engagement has shown to improve student success. One strategy to increase student engagement is utilizing social media in courses which focus on visual identification. This study investigated the use of academic social media to increase engagement. Results revealed that most students felt social media would be an effective supplement and increase engagement. Comparing user groups, students in social media utilization courses felt more strongly that it improved student engagement when compared to students in courses which did not. These students reported increased understanding of course material. Users described benefits such as easier access to information, increased enjoyment and comfort when studying.

Poster 226
**Analysis of assessment data to examine a correlation between Cumulative Block Practice Exam (BPE) usage and HAPS exam scores in ANAT-A215**

J.T. Cornelius, Indiana University School of Medicine - Bloomington, Jtcornel@iu.edu

HAPS Conference Travel Award Winner

Co-Authors: Valerie O’Loughlin, Indiana University School of Medicine - Bloomington, Vdean@iu.edu

The HAPS Anatomy Exam is offered as an optional cumulative final to our undergraduates each semester. To prepare for this exam, students used past formative assessments known as Block Practice Exams (BPEs). These BPEs were used throughout the semester for students to check their knowledge. BPEs could be completed an unlimited number of times and integrated with both lecture and lab content. Thus, we investigated the correlation between the BPE scores and performance on the HAPS exam. We hypothesized that frequent BPE usage would correspond with increased HAPS exam scores compared to students who did not utilize BPEs throughout the course.
Session 3: Friday, May 26 from 9:45 am – 10:45 am

Poster 301
Health Sciences Student Perceptions and Attitudes Regarding Proctorio E-Proctoring Versus Testing Center
Justin Burr, Weber State University, justinburr1@weber.edu
During the COVID-19 pandemic, faculty were forced to pivot toward online education. With the switch to online learning, e-proctoring became a popular choice to continue proctored exam assessments. With the resumption of in-person learning, faculty are faced with the question of continuing with e-proctoring alone, switching back to campus testing centers, or utilizing a combination of both modes. This study aims to understand student perceptions and attitudes regarding e-proctoring versus testing center use. 244 students responded to an 18-question survey. The results indicate that students felt less stress and anxiety and perceived improved performance using e-proctoring compared to testing centers.

Poster 302
Use of a Vocation Assignment in a Human Anatomy and Physiology Course
Sarah Lovern, Concordia University Wisconsin, sarah.lovern@cuw.edu
Concordia University explores vocation in many classes, so a vocation project was added to A&P II in the fall of 2019. This assignment allows students to evaluate how the course contributes to their future vocations and religious beliefs. This formative assignment has students write a fictional story, make a video, write a poem or song, draw a comic strip, or evaluate Bible verses. Giving the students autonomy in choosing their project method is intentional as it allows students to select some variation that they hopefully enjoy. Methodology, rubrics, student feedback, and examples will be shown on this poster.

Poster 303
Benefits of a hands-on summer research program in increasing high school students’ interest in science with a focus on Anatomy and Physiology
Donika Rakacolli, Edgewood College, drakacolli@edgewood.edu
Co-Authors: Rachael Lancer, Madison Country Day School, rlancer@madisoncountryday.org
We will present the structure and teaching materials of a summer research camp held in summer 2022, as a collaboration between the Madison Country Day School and Edgewood College biology faculty. In this program, students participated in hands-on research projects. The students learned the stress response in humans and zebrafish followed by experiments exploring the effect of acute stress on zebrafish behavior and white blood cells. The students also learned the steps of scientific inquiry, including primary literature search, data collections and analysis and scientific poster design. The impact of this summer camp on the participating students will be discussed.

Poster 304
Content Reinforcement of Cell and Membrane Transport between Physical Education and Arts and Science Students
Paul Chahal, MacEwan University, chahalp@macewan.ca
Co-Authors: Raj Narnaware, MacEwan University narnawarey@macewan.ca
The present study evaluates content reinforcement of cell membrane transport over eight weeks for Physical Education and Arts and Science physiology students. The highest retention for physical education students was in weeks 1 and 3, whereas for the Arts and Science students, it was the highest in weeks 2 and 3. Knowledge was comparatively higher for Physical Education students than for the Arts and Science students. Therefore, relatively more robust interventional strategies need to be implemented for Arts and Science students to improve knowledge retention.

Poster 305
Making Anatomy & Physiology Make Cents
Haneen Salhieh, Chamberlain College of Nursing, hsalhieh@chamberlain.edu
When it comes to learning anatomy and physiology, it is easy to be overwhelmed with all of the different structures and functions. What is something that can help? Money! Use of a reward system to earn “Instructor Bucks” has been seen to motivate students in course participation, exam performance, and overall comprehension. Through group-based activities, exam scores, or individual activities, students have the opportunity to earn fake “money” that can be redeemed for incentives like snacks, drinks, organ plushie toys, extra credit, etc. Let’s take a look at how different reward systems improve student retention and performance!

continued on next page
Poster 306
Institutional attitudes around the addition of cadaver anatomy to the curriculum of a new medical school.
Madeline Hansen, Burrell College of Osteopathic Medicine, madeline.hansen@burrell.edu
Co-Authors: Jon Jackson, Burrell College of Osteopathic Medicine, jjackson@burrell.edu
After one and a half years of virtual anatomic instruction, Burrell added the use of cadavers to the instructional resources. At our start-up school, many of the staff and faculty weren't aware that cadavers would be stored and used in our relatively small location. How this adoption was perceived by the Burrell community was assessed through a survey of every employee and current student (at the time of the adoption). Our poster details aspects of the response and identifies patterns of the responses.

Poster 307
Open Educational Resources (OER) to Catalyze Student Investment in the Life Science Laboratory
Gillian Backus, Northern Virginia Community College, gbackus@nvcc.edu
Co-Authors: Paula Rodgers, Northern Virginia Community College, prodgers@nvcc.edu, Heidi Wangerin, Northern Virginia Community College, hwangerin@nvv.edu
Anatomy and Physiology lab manuals are expensive and often lack engaging stories. We followed HAPS guidelines to create an Open Educational Resources (OER) lab manual. Each lab includes a relevant Case Study. We will recount our journey, guide you through the lab format, and allow you to peruse the labs. We will share resources and lessons learned. This lab manual has strengthened our curriculum, encouraged critical thinking and independent work in our students, and significantly reduced the course cost. It is freely accessible on the web and through CANVAS and offers a pedagogically rigorous curriculum design that follows HAPS guidelines.

Poster 308
Evaluating the Quality of Medical School Canvas Pages, Pre-Pandemic Through Today
Trey Shupp, Indiana University - Bloomington, tshupp@iu.edu
HAPS Conference Travel Award Winner
Co-Authors: Polly Husmann, Indiana University - Bloomington, phusmann@indiana.edu, Christine Eckel, Indiana University - Northwest Gary, ceckel@iu.edu, Joshua Mangum, Indana University - Northwest Gary, jemangum@iu.edu, Saira Butt, Indiana University - Indianapolis, sairbutt@iu.edu, Sally Mitchell, Indiana University - Indianapolis, mitchsaa@iu.edu
Within higher education there is a reliance on learning management systems such as canvas. During the COVID-19 pandemic, many of these systems were leaned on more heavily and the organization of pages were changed to increase usability and functionality. Our research sought to evaluate canvas pages in undergraduate medical school courses pre-pandemic through today. We hypothesized that canvas pages increased in functionality as time progressed as a result of changes from the COVID-19 pandemic. Using a pre-made rubric, canvas pages within the course Human Structure in the Indiana University Medical School was evaluated from 2019 to 2022.

Poster 309
AnatomicalTerms.info (ATI): a free, wiki-like, reference-website dedicated to anatomical terminology
Anthony Weinhaus, University of Minnesota, weinh001@umn.edu
Sponsored by The American Association of Clinical Anatomists
A reliable source of information for teachers and learners with proper anatomical terminology with short definitions, clinical terms, synonyms, and eponyms. For accuracy, the terminology is derived from the Terminologia Anatomica, and is organized by the Clinical Anatomical Terminology Committee of the American Association of Clinical Anatomists. It is a work in progress and welcomes all interested anatomists to contribute through a systematic data-entry program, which are reviewed by other contributors and editors. The poster describes the components of the ATI with the hopes that attendees will find the site useful in their teaching, but also contribute to its growth.

Poster 310
Review Days in Anatomy and Physiology
Timothy Bradshaw, Polk State College, tbradshaw@polk.edu
Engaging students in review sessions prior to exams may help them develop a deeper understanding of material and may increase academic performance. However, it is unclear if different types of review session are more effective or preferred by students. This study examined the effect of two different types of review sessions (open lab and game show competition) on student performance and preference in an introductory A&P course. Preliminary results indicate a marked preference for game show competition style review days.

continued on next page
Poster 311

Muddiest Point Assignments to Normalize Help-Seeking
Hilary Engebretson, Whatcom Community College, hengebre@whatcom.edu

Many learners experience anxiety and resist asking for help due to a variety of factors. This study sought to reduce student anxiety around help-seeking through repeated muddiest point reflections in which students ask for help on their most confusing course topics. No significant difference in the anxiety-caused ratings occurred from beginning to end of term. Nor did a significant difference exist between academic self-efficacy ratings from beginning to end of term. Affecting students’ perceptions of help-seeking is difficult and may require greater interventions over a longer time period.

Poster 312

Use of cooperative quizzes on students’ sense of belonging
Amy Bauguess, Forsyth Technical Community College, abauguess@forsythtech.edu
Co-Authors: Chastity O’Malley, Wright State University, chasity.omalley@wright.edu, Suzanne Hood, Bishop’s University, shood@UBishops.ca, Charlene Cromwell University of Minnesota, cornw055@umn.edu

Cooperative quizzes are a type of evidence-based instructional practice, where students take an individual quiz followed by a group quiz. This technique is used to improve students’ learning through peer work. Academic Belongingness is a students’ sense of being valued and respected as a community. This project examined the use of cooperative quizzes and/or the type of class (modality) on students’ sense of belonging. Students were given a survey at the start and end of the course to measure their sense of belonging. The results indicated that students believed that cooperative quizzes contributed to their sense of belonging.

Poster 313

The Impact of Course Length and Delivery Method on Student and Faculty Perceptions of Combined Muddiest Point and Peer Instruction Activities in Community College Anatomy and Physiology Classes
Anthony Edwards, Tarleton State University, aedwards@tarleton.edu
Co-Authors: Murray Jensen, University of Minnesota, mjensen@umn.edu, Ronald Gerrits, Milwaukee School of Engineering, gerrits@msoe.edu, Melaney Farr, Salt Lake Community College, melaney.farr@slcc.edu, Suzanne Hood, Bishop’s University, shood@UBishops.ca, Chastity O’Malley, Wright State University, chasityomalley@gmail.com

Muddiest point and peer instruction are evidence-based instructional practices (EBIPs) that can be used to address student learning gaps. This study sought to determine the impact of course length (8-weeks or 16-weeks) and modality (face to face or online) on faculty and student perceptions of effectiveness of combined muddiest point and peer instruction activities in community college anatomy and physiology courses. This study focuses on survey responses at the end of the semester. This research is part of the Community College Anatomy and Physiology Research Project (CAPER) funded by National Science Foundation (Award #2111119).

Poster 314

Using Cooperative Quizzes to Increase Student Performance, Academic Self-Efficacy, and Sense of Belonging in an In-Person and a Hybrid A&P I Class.
Wendy Rappazzo, Harford Community College, wrappazzo@harford.edu
Co-Authors: Suzanne Hood, Bishops University, shood@ubishops.ca, Chasity O’Malley, Wright State University, Boonshoft School of Medicine, chasity.omalley@wright.edu, Murray Jensen University of Minnesota, mjensen@umn.edu, Kerry Hull, Bishops University, khull@ubishops.ca, Ron Gerrits, Milwaukee School of Engineering, gerrits@msoe.edu

Cooperative quizzes have been shown to improve students’ content knowledge and foster collaboration, while also lowering anxiety. This project examined whether cooperative quizzes increased student performance on unit exams and their effect on student academic self-efficacy, sense of belonging, and persistence in the course. Cooperative quizzes were implemented for one semester and student academic performance on topics related to the quizzes and exam scores were analyzed. Additionally, students were given a survey to measure academic self-efficacy and sense of belonging in the course before and after implementation of cooperative quizzes. This poster presents the results of the study indicating the effectiveness of cooperative quizzes.

continued on next page
Poster 315
Community College Student Attitudes of Evidence-Based Instructional Practices
Brian Shmaefsky, Lone Star College - Kingwood, brian.r.shmaefsky@lonestar.edu

The research presented in this poster session is part of the NSF Funded (IUSE 2111119) HAPS Community College Anatomy and Physiology Educational Research Program (CAPER). In this study, community college students were surveyed about their apprehension levels and satisfaction levels with evidence-based instructional practices (EBIP). The study focused on cell biology, molecular biology, and toxicology content covered in health professions and human sciences classes. The results underline that certain EBIPs cause student anxiety and disconnect in certain populations of students. In these student populations, the EBIPs are counterproductive to learning. Suggestions are made to help faculty select optimal instructional strategies.

Poster 316
A Continued Look at A&P I Content Retention Trends Through the Pandemic Covid Slide
Youlonda FitzGerald, Texas Woman’s University, yfitzgerald@twu.edu,
Co-Authors: Karen V. Goodwin, Texas Woman’s University, kgoodwin2@twu.edu

This longitudinal perspective assesses whether university matriculation or method of instruction lead to differences in retention of core A&P I content observed during the pandemic, and whether these patterns are changing as society moves toward pre-pandemic patterns of social and classroom engagement. Previous data indicated a significant difference in retention between university of instruction (N=179, TWU, n=151, 6.12 correct; Other University, n=28, 5.29 correct, p=.021) while mode of instruction showed a non-significant difference (p=.913). Introduction of new data from the most recent cohort sheds light on retention trends observed over time.

Poster 317
Prevalence of nutritional supplement use and early indicators of renal disfunction among collegiate athletes.
Colton Koch, Southern Utah University, cbkoch2002@gmail.com
Co-Authors: Corbin Hampton, Southern Utah University, cheeto67@gmail.com, Dillon Petty, Southern Utah University, dillonpetty@gmail.com, Alexa Lord, Southern Utah University, alexanlord@gmail.com, Paul Pillitteri, Southern Utah University, pillitteri@suu.edu, Mary Tufte, Southern Utah University, tuftem@suu.edu

Collegiate athletes use a variety of nutritional supplements to benefit training and performance. Vigorous exercise combined with supplements may increase stress on kidneys, which can be measured with an albumin-to-creatinine ratio (ACR). Albumin, a natural protein in the blood, maintains osmotic pressure, and creatinine, a byproduct of muscle metabolism, are normally found in the urine at a ratio of 30 mg/g could suggest renal dysfunction. Participants take a survey about supplement use, lifestyle, while their urine will be tested for ACR. Data will then be analyzed to find possible correlations and improve athletes’ health.

Poster 318
Distinct population and single-neuron selectivity for executive and mnemonic processing in human dorsal posterior cingulate
Lyndsey Aponik Gremillion, Weber State University, lyndseygremillion@weber.edu

Posterior cingulate cortex (PCC) is an enigmatic region with poorly understood contributions to cognition. Human studies link PCC to episodic memory, while non-human primate findings emphasize executive processes. We hypothesized this difference reflects a functional division between dorsal and ventral PCC. To test this, we utilized human intracranial recordings of population and single-unit activity targeting dorsal PCC during an executive/episodic task. Dorsal PCC population responses were significantly enhanced for executive conditions. Single-unit recordings, however, revealed four functional types with unique executive or episodic response profiles. Our findings provide critical electrophysiological data from human PCC, furthering our understanding of PCC function.

Poster 319
Revisiting the origin of gluteus minimus
Bonny Ford, Department of Anatomy & Cell Biology, Burrell College of Osteopathic Medicine, bonny.ford@burrell.edu
Co-Authors: Ashley Stiglich, OMS-II, Burrell College of Osteopathic Medicine, ashley.stiglich@burrell.edu, Oscar Hernandez, OMS-II, Burrell College of Osteopathic Medicine, oscar.hernandez@burrell.edu, Nancy Minugh, Department of Anatomy & Cell Biology, Burrell College of Osteopathic Medicine, nminugh@burrell.edu

Gluteus minimus is consistently described in the literature as originating from the external aspect of the ilium between the anterior and inferior gluteal lines. However, careful dissection reveals an origin typically reaching the margins of the greater sciatic notch with muscle tissue and/or its investing fascia entering the pelvis. This little-known attribute of gluteus minimus is depicted in various editions of Pernkopf’s atlas, and reiterated by Beck, et al. (2000), but remains generally unrecognized. Current texts should document this endopelvic origin, which merits further investigation to clarify its potential functional and clinical significance.

continued on next page
Poster 320
Impact of Content Reinforcement of Muscular and Skeletal Systems on Knowledge Retention in Nursing Students
Amber Zyla, MacEwan University, amber.zyla33@gmail.com
Co-Authors: Raj Narnaware, MacEwan University, narnawarey@macewan.ca, Melanie Neumeier, MacEwan University, neumeierm@macewan.ca, Sarah Cuschieri, University of Malta, sarah.cuschieri@um.edu.mt
Numerous studies have expressed concern over nursing students’ ability to retain the anatomical knowledge they gain in the first year to the subsequent years of nursing (Narnaware, Y. 2021). The present study assesses the impact of content reinforcement on the musculoskeletal systems over eight weeks. Results show that compared to week 1, repeating knowledge of the musculoskeletal systems resulted in organ- and week-specific retention over eight weeks of these systems. This study demonstrates that content reinforcement should be used as one of the interventional strategies to improve knowledge retention in nursing students.

Poster 321
How Does Gamification using Classroom Response System (CSR) Affect Test-Taking Anxiety in Human Anatomy Students in a Flipped Classroom?
Dalia Salloum, Salt Lake Community College, dalia.salloum@slcc.edu
Marieb, Hoehn, and Haynes Award for Diversity, Equity, and Inclusion Winner
Co-Authors: Suzanne Hood, Bishops University, shood@ubishops.ca
The existing research on the effectiveness of the flipped classroom suggests that it is effective in increasing student performance in anatomy and physiology courses, as well as across various disciplines in higher education. It has been shown that the successes in the flipped classroom are attributed to active learning strategies that allow students to be engaged with their peers and instructors, reflect on their own thinking process, and deconstruct difficult concepts in the classroom. One active learning strategy that this research focuses on is the use of a live classroom response system (CSR), which allows students to use their smartphones, laptops, or tablets as the response device.

Poster 322
Tissue specimen revitalization and resuscitation with monophenol ethers.
Christina Baquera, Burrell College of Osteopathic Medicine, cbaquera@burrell.edu
Co-Authors: Jon Jackson, Burrell College of Osteopathic Medicine, jjackson@burrell.edu
Discovered in 1944 as a treatment for infections in war wounds, 2-phenoxyethanol (2-PE) has seen a number of utilizations across the continuum of the anatomic sciences in the eight decades following its first description. A number of HAPS members already utilize this compound as a component of their cadaver lab wetting solutions. If you aren’t using 2-PE both ON—and IN—your lab, you may be missing the chance to maintain valuable teaching specimens in great condition for longer periods of time. This poster will show you just how big a difference 2-PE can make with your teaching specimens.

Poster 323
Identify a Challenge and Create a Solution: Development of an Anatomy Color by Numbers App
Claire Farrell, Clemson University, cafarre@g.clemson.edu
Co-Authors: John Cummings, Clemson University, cumminj@clemson.edu
As a current undergraduate student who has both taken Anatomy and Physiology and also teaches a lab section of the course, I am very familiar with the struggles of finding a study method that is both engaging and effective. When I could not find exactly what I was looking for, I decided to create it: an anatomy color by numbers app. Anatomy coloring books have been a favorite study method for years, but they have their limitations. Over the last two years, I have worked to create a virtual solution to address these limitations.

Poster 324
Antibiotic Induced Microbiome Depletion (A IMD) in Mice and its Effect on Thyroid Hormone Levels, Corticosterone Levels, and Mandibular Alveolar Bone Height
Cinnamon VanPutte, Southern Illinois University School of Dental Medicine, cvanput@siue.edu
Co-Authors: Lucia Thompson, Southern Illinois University, luthom@siue.edu, Cinnamon VanPutte, Southern Illinois University School of Dental Medicine, cvanput@siue.edu
The microbiome’s importance in homeostasis is not understood; however, evidence shows its involvement in metabolism, including thyroid function. Thyroid hormones, critical for growth, and metabolism, are linked to microbiome disruption. Mice received antibiotics in water for six weeks for microbiome depletion (AIMD). Blood and mandibles were collected for analysis. Thyroxine was lower in AIMD animals (n=4) than control animals. Alveolar bone height was reduced in experimental animals (n=6) compared to controls. An impediment to this approach is collectable blood volume. We developed and validated an ELISA to measure thyroid hormones and corticosterone. Here we describe our validation of this assay.
**Poster 325**

**Coverslip Restoration of Oxidized Histology Slides**  
Bob Duerst, UW-Eau Claire, duerstr@uwec.edu  
Co-Authors: Amy Madlon, UW-Eau Claire, madlonae6725@uwec.edu  
The purpose of this project was to compare methods of microscope coverslip restoration in oxidized histology slides. The coverslip removal methods investigated were: submersion in xylene, chilling in -80°C freezer, and liquid nitrogen administration via a liquid nitrogen gun. Gross and microscopic photos were taken before experimentation, after coverslip removal, and after a new coverslip was applied. The liquid nitrogen gun produced immediate, high-quality results. The -80°C freezer required more work and time, but the results were consistent. Xylene had the most variable results. An area of future research could analyze if restaining previously oxidized slides improves the quality.

---

**Session 4: Friday, May 26 from 2:15 pm – 3:15 pm**

**Poster 401**

**A Metacognitive Approach to Remediation**  
Asha Eapen, University of Illinois at Chicago, ashasara@uic.edu  
Co-Authors: Robert Druzinsky, University of Illinois at Chicago, druzinsk@uic.edu, Steven Miller, University of Illinois at Chicago, sfmiller@uic.edu, Alison F Doubleday, University of Illinois at Chicago, adouble@uic.edu  
Remediation is a highly complex process involving learners, faculty, and societal factors. Challenges in remediation include faculty availability and interest, and the individualized nature of students’ challenges. This poster outlines the reflection-based remediation format that was implemented to provide the opportunity to engage in reflection and to develop metacognitive skills. The overall goal of the activity was to help students understand their own mistakes, as well as develop a strategy for learning and studying for future exams. A secondary goal was to normalize the remediation process so that it was not viewed as punitive, but as an opportunity for learning.

**Poster 402**

**Effective Learning Communities in Online Anatomy and Physiology**  
Rebecca Burt, Southeast Community College, rburt@southeast.edu  
This poster presentation includes strategies for effective structuring of Anatomy & Physiology discussions, suggestions for constructing efficacious prompts, and approaches for building collaboration among students in the online course environment. The author will provide experience-based insight regarding discussions as effective, community-building learning tools for students in online Anatomy & Physiology. For further exploration of topics, a QR code and handout are included to provide attendees access to author-created accompanying digital resources.

**Poster 403**

**Musculoskeletal disorders among Gardeners- A cross sectional study**  
Subhadip Nandy, Windsor University School of Medicine, subha38@hotmail.com  
Gardeners are at increased risk of occupational hazards. Musculoskeletal disorders are common as they are exposed to risk factors like unhealthy posture and lifting of heavy weight and need to be assessed to know the health status of the gardeners. This was a cross sectional study done on 80 gardeners. General information of the worker and work related history was enquired using Modified Nordic questionnaire. Anthropometric parameters were recorded. Examination of the gardeners was done. Analysis of Working Posture was done using OWAS method. Low back pain was the commonest musculoskeletal disorder in gardeners. It was followed by thigh, ankle and neck pain. Thus gardeners are at increased risk of development of MSD. It may be linked to uncomfortable gardening posture during their work.

**Poster 404**

**Content Retention of Cell and Membrane Transport for Physical Education Students**  
Paul Chahal, MacEwan University, chahalp@macewan.ca  
Co-Authors: Raj Narnaware, MacEwan University, narnawarey@macewan.ca  
Human physiology is considered a foundational course in the Physical Education program. The objective of the present study was to evaluate content retention of cell and plasma membrane transport for first-year Physical Education University Transfer physiology students over eight weeks. Results show that the knowledge retention was observed to be week-specific, highest in weeks one and three and lower for other weeks. Therefore, content reinforcement can be used as an interventional strategy to improve long-term knowledge retention in Physical Education University Transfer students.
Poster 406

The Efficacy of Cadaver Dissection in Undergraduate Anatomy Education
Kebret Kebede, Nevada State College, kebret.kebede@nsc.edu
Co-Authors: Victor Trandalfir, Nevada State College, victor.trandalfir@students.nsc.edu
Cadaver training offers many benefits to both undergraduate and graduate students. Relying on cadavers as instructional instruments rather than using diagrams, models, photo images or slides, allows students to experience the uniqueness that exists from person to person. During the dissection process, we challenge the students to find the cause of death and the coexisting morbidities. Biology majors and Human Health sciences students (N=89) were surveyed in this study. Those who thought the cadaver experience was very important were 78, whereas those who think that it is not important were 4-Std Deviation 0.85.

Poster 407

The Implementation of Structured Office Hours as a Central Component of Student Success in A&P courses
Catherine Kirn-Safran, Widener University, cbsafran@widener.edu
Co-Authors: Taylor R. Wise, Widener University, trwise@widener.edu
John Martin Second Timers Award Winner
The A&P two-semester sequence is perceived as hard to master, and higher-than-average D, F, and withdrawal grades often prevent pre-health majors from maintaining the GPA required to progress in the program of their choice. In this poster, a student who attended most regular office hours will share her experiences working with the instructor and peers to utilize office hours efficiently and improve performance on higher-order assessments. In addition, strategies on how students who attend office hours can become study group leaders who influence social factors such as student-instructor trust and classroom community sense of belonging will be presented.

Poster 408

Creating Multimedia Learning Presentations Using Backwards Design for Gross Anatomy
Laurel Moore, University of Illinois of Chicago, lmoore37@uic.edu
Co-Authors: Laurel Moore, University of Illinois at Chicago, lmoore37@uic.edu, Abbey Breckling, University of Illinois at Chicago, abreck2@uic.edu
This student led project created an interactive multimedia classroom exercise to increase student engagement and assessment scores. Using backwards design principles to accommodate different learning preferences, complex brachial plexus (BP) anatomy was transformed into a simple follow along lecture presentation. Students were encouraged to fill a printed template alongside the presentation. A survey was given before and after the exercise to analyze BP knowledge and student perceptions of the exercise. Despite a small sample size (n=21), this interactive lecture was positively received, resulted in significantly increased post survey scores, and will likely be used in future lectures.

Poster 409

Student performance and perceptions of anatomy and physiology across face-to-face, hybrid, and online teaching lab styles
Nicholas Pollock, University of Texas at Arlington, nicholas.pollock@uta.edu
There is a lack of research investigating advantages/disadvantages of hybrid, online, and face-to-face labs styles, something particularly glaring within biological sciences, including A&P. Attendance and grades were compared between face-to-face, hybrid, and online A&P labs and a survey was administered to compare student perceptions and experiences. Hybrid labs had many of the same advantages as online and face-to-face labs, yet few of the disadvantages. Hybrid students reported better experiences, greater satisfaction, and outperformed online students. However, face-to-face students outperformed hybrid students. These findings can inform how to implement, organize, and improve hybrid labs to maximize student learning, achievement, and enjoyment.

Poster 410

How much detail is taught in A&P labs
Ed Griff, University of Cincinnati, edwin.griff@uc.edu
A survey to estimate the amount of detail taught in the labs of introductory year-long A&P courses was administered to A&P lab instructors at 7 local colleges or universities. The survey asked specific questions on: tissues, cardiovascular, urinary, reproductive, and nervous systems. For example, the survey asked which of 7 blood vessels in the kidney were students assessed and how students were assessed on this content. The total number of structures students needed to know for lab exams varied from 80 to 143 and the possible questions (number of structures X assessment approaches) from 104 to 387.
Poster 411
Student Participation and Experience in Peer Supplemental Instruction for Anatomy and Physiology at a Minority Serving Institution
Caroline Hanson, Georgia Gwinnett College, chanson@ggc.edu
HAPS Conference Travel Award Winner
Co-Authors: Karen Perrell-Gerson, Georgia Gwinnett College, kperellg@ggc.edu, Joshua Webb, Georgia Gwinnett College, jwebb4@ggc.edu, Jerome Lee, Georgia Gwinnett College, jlee102@ggc.edu
Peer Supplemental Instruction (PSI) supports student academic success and provides service learning opportunities for junior/senior level students. A PSI program was developed for Anatomy/Physiology I (API) to offer practical activities on difficult topics. API students were surveyed to determine reasons for non-attendance and perceptions of assistance for those who attended. 94 students responded. 81% of responses cited time conflicts for non-attendance. Of the 29% of students who attended, as a result of PSI sessions, they were able to study more effectively (54%), had increased interest and skill level in course material (56%), and were becoming more independent learners (50%).

Poster 412
Evidence-Based Instructional Practice (EBIP), Just-in-Time Teaching (JiTT) model
Amanda Rosenzweig, Delgado Community College, arosen@dcc.edu
An Evidence-Based Instructional Practice (EBIP), Just-in-Time Teaching (JiTT) model, provides a strategy for a personalized education through active learning. JiTT pedagogy uses pre-instruction assignments designed to inform student’s knowledge about content prior to class. The instructor uses pre-work results to guide the lesson plan. This allows the teacher to focus on areas the learners find difficult, and not topics students are comfortable with. Students took surveys to identify the perceived impact on content knowledge as a result of implementing prework and JiTT. The preliminary results support the published literature for JiTT as an effective EBIP. Supported through NSF DUE 2111119.

Poster 413
Active Learning in a Pharmacology Course Promotes Concept Mastery
Kimberly Jeckel, Colorado State University, kimberly.jeckel@colostate.edu
Pharmacology is an important component of pathophysiology and understanding disease treatments aids students in mastering the related physiological concepts. To provide students with additional methods for understanding course material, the addition of active learning in an undergraduate pharmacology course was implemented. The impact of class activities on student learning and attitudes was analyzed via survey. Students were asked to assess their learning, in relation to active learning, based on their retention and performance in summative assessments. Student perception of improved learning and mastery of pharmacological concepts, through participation in class activities, was supported by their course assessment and survey results.

Poster 414
HyFlex Supporting Students Where They Are
Amanda Rosenzweig, Delgado Community College, arosen@dcc.edu
HyFlex - what is it? why use it? Your child is sick. Your car breaks down. You are a veteran having a tough day. These are daily occurrences in the lives of our students. Missing class and falling behind adds stress. Importantly, these events create a domino effect that prevents achieving academic goals. Imagine you can accommodate students at these times? What if you could give them options for meeting class requirements through a hybrid flexible course design and delivery? Would you? Learn how Hyflex delivery mode gives students a choice of where and when to participate.

Poster 415
Reflection after teaching a problem-based learning (PBL) interdisciplinary course using team-based practices
Nalini Broadbelt, MCPHS University, nalini.broadbelt@mcphs.edu
Co-Authors: Michelle A. Young, MCPHS University, michelle.young@mcphs.edu, Nevila Jana, MCPHS University, nevila.jana@mcphs.edu, Kristen Petersen, MCPHS University, kristen.petersen@mcphs.edu, Katrina Van Dellen, MCPHS University, katrina.vandellen@mcphs.edu, Martha Gardner, MCPHS University, martha.gardner@mcphs.edu
A problem-based interdisciplinary premed capstone course focused on Malaria was developed and taught to enhance authentic/real world learning. A total of six instructors participated on this project with specialization in biology, chemistry, and social science. We modeled and observed teamwork skills such as communication, collaborative decision making, problem solving, conflict resolution, respect, tolerance, reliability, planning and organization, engagement, information literacy, and presentation skills. The outcomes from both the instructor and students’ perspective on the successes and the improvements needed will be presented.
Poster 416
Fistula Discovery in Undergraduate Cadaver Dissection Course
Melissa Thompson, Louisiana State University, melissathompson@lsu.edu
HAPS Conference Travel Award Winner
Co-Authors: Meghan Jackson, University of Health Sciences and Pharmacy, Meghan.Jackson@uhsp.edu
Timeline of a student led discovery of a brachiocephalic arteriovenous fistula in undergraduate human cadaver dissection course. Continued student-led inquiry related to cardiovascular and renal systems and clinical procedures and outcomes for pathologies associated with these systems. Background information relative to brachiocephalic arteriovenous fistulas and vascular access for hemodialysis in patients and cadavers.

Poster 417
Effect of fidget spinners in the enhancement of cognitive skills in normal healthy individuals: an Interventional study
Yogesh Kumar, AIIMS Patna, dryogeshk@aiimspatna.org
Co-Authors: Ratandeep Biswas, AIIMS Patna, ratnadeepbis2404@gmail.com, Ruchi Rani, AIIMS Patna, ruchirani11@gmail.com
Those people who fidget may have deficits in fine motor control and cognition. Using Fidget spinners may improve both. Methods: This study was performed on 30 MBBS students 17-25 years of age. After a baseline assessment of cognitive functions, a 3-week intervention with fidget spinners was done and a repeat assessment of functions was done. Results: Significant improvement in digit symbol matching, picture pairs, multiple object tracking, fast choice, and fast reaction tests is seen. Conclusion: Using fidget spinners may improve all cognitive domains.

Poster 418
Active Learning in Understanding Cell Membrane Transport
Jamie Dalton, Arkansas Tech University, rdalton1@atu.edu
In order to enhance student knowledge of diffusion, osmosis and active-transport across cell membranes, students participate in an activity where they take on the roles of a phospholipid bilayer, a membrane channel, a membrane transporter, water, a small nonpolar solute and a polar solute to simulate the movement of each substance across the membrane given a variety of electrochemical gradient scenarios, and other environmental changes. Students then break into groups to prepare posters or power point presentations to teach the rest of the class either diffusion, osmosis, primary-active transport or secondary-active transport.

Poster 419
Creation of Personal Case Study for an Anatomy & Physiology Course
Jinoh Jang, MCPHS Boston, m0419640@stu.mcphs.edu
Co-Authors: Michelle Young, MCPHS University, michelle.young@mcphs.edu, Nalini Broadbelt, MCPHS University, nalini.broadbelt@mcphs.edu
An educational case study of acne will be presented. Prevalence of acne is the first reason for this case study. Acne concerns most American adolescents. Secondly, severe acne can have a devastating effect on one's physical appearance, especially for teenagers who are developing self-awareness and caring more about their physical appearance. Thirdly, the case study is uniquely based on the author's personal experience with severe acne and its course of treatment. This case study will provide insight of acne development and its role of the integumentary system.

Poster 420
Creation of a Urinary Case Study for an Anatomy & Physiology Course
Ipsita Kadam, MCPHS University, m0448878@stu.mcphs.edu
Co-Authors: Adam Chan, MCPHS University, m0449007@stu.mcphs.edu, Michelle Young, MCPHS University, michelle.young@mcphs.edu, Nalini Broadbelt, MCPHS University, nalini.broadbelt@mcphs.edu
This case study was created for undergraduate Anatomy and Physiology class, which focuses on the kidneys and nephrolithiasis. This case follows a middle-aged female patient who is dealing with calcium oxalate stones due to an unhealthy lifestyle. It guides the audience through the case— from the initial symptoms all the way to the lifestyle changes made by the patient recommended by the healthcare provider. The study discusses the possible causes of kidney stones, the potential signs and symptoms which affect the normal functioning of the urinary system, the usage and interpretation of lab results, and various treatment options of kidney stones.

continued on next page
Poster 422

To dissect or virtual reality, that is the question
Carmen Carrion, Agnes Scott College, ccarrion@agnesscott.edu
Co-Authors: Nathan Hutcheson, Agnes Scott College, nhutcheson@agnesscott.edu

In the last decade the STEM fields have migrated towards more active and interactive learning environments. Interestingly, with the advancement of digital technology more curriculum has moved towards Virtual Reality (VR). This pilot study explored whether students learn more effectively about anatomy and physiology (A&P) when mastering a module through a VR experience than more traditional experiences such as dissections. A total of 33 undergraduates, from a traditional women's college participated in this pilot study. Modules that were implemented through VR were associated with significantly higher assessment scores. Our findings demonstrated that VR can facilitate learning in A&P.

Poster 424

Utilizing Diagram-Driven Digital Study Tools to Reinforce Anatomical Structure Comprehension
Jenna Arkelian, Clovis Unified School District, jennaarkelian@gmail.com

Memorization of anatomical structures requires extensive repetition of viewing and analyzing high-quality anatomical diagrams and visuals. In the age of technology, students are accustomed to utilizing phone applications and online platforms to consume and acquire information. Teachers can take advantage of this by utilizing online platforms to reinforce anatomical concepts that require graphics and visuals. Online platforms provide students with immediate feedback, allowing students to view their score, fix their mistakes, and learn the material instantaneously. These platforms allow educators to instantaneously view a variety of statistics such as student achievement scores, most missed questions, class averages, and student completion rates.

Poster 425

Hypo-Hyperbaric Chamber Facility at Colorado State University
Ryan Maresh, Colorado State University, ryan.maresh@colostate.edu

The Colorado State University Hypo-Hyperbaric Chamber Facility (HHCF) allows for long-duration animal, human and equipment protocols. Dual-use capability allows continuous profiles from depths below sea level up to 35,000 feet. Its mission is to provide faculty and students, as well as external entities, the facilities to study the effects of altered pressure environments on a variety of physiological systems and equipment. The chamber is configurable to meet the needs of individual protocols. The proximity to the CSU Veterinary Teaching Hospital, numerous research centers, and other research CSU capabilities makes it a valuable resource for collaborative work.

Poster 426

Ur-ine a “blooming” classroom!
Cathy Whiting, University of North Georgia, cathy.whiting@ung.edu
Co-Authors: Juliza Agrego, University of North Georgia, jabre8149@ung.edu, Ben Carr, University of North Georgia, jbcarr1293@ung.edu, Ethan Cook, University of North Georgia, ecook9301@ung.edu, Emily Harris, University of North Georgia, elharr3935@ung.edu

Join us in this interactive workshop as we engage in a hands-on activity using inexpensive props such as beads, pipe cleaners, and bubble wrap to build a model of a renal corpuscle to explore the structure and function of the filtration membrane. As we build and discuss our model, we will demonstrate several simple techniques that you can use to transform a traditional lecture into a collaborative learning environment. Finally, we will outline a strategy for leveraging Bloom's taxonomy to facilitate the development of higher-order cognitive skills as students dive deeper into renal physiology.
Don’t forget to attend the HAPS Committee Meetings!
Become more involved with HAPS by joining a committee.

Saturday, May 27:
Central New Mexico Community College, 12:30 – 1:00 PM

- Awards & Scholarship – SB 105
- Anatomical Donor Stewardship – SB 107
- Communications – SB 108
- Conference – SB 109
- Curriculum & Instruction – SB 207
- Diversity, Equity, and Inclusion – SB 209
- Fundraising – SB 211
- Membership – SB 103

Visit Us At Booth 701!

High Fidelity, Zero Biohazard, Anatomical Training.
Human Models & Organs.

10% OFF
Mention "HAPS23" to receive 10% off thru Oct. 2023
Workshop Shuttle Schedule

SATURDAY, MAY 27:

7:00 – 9:00 am  3 shuttles running from the Clyde Hotel and Central New Mexico Community College
9:00 am – 4:30 pm  1 shuttle running between the Clyde Hotel and Central New Mexico Community College
4:30 – 5:50 pm  3 shuttles running from Central New Mexico Community College and the Clyde Hotel

SUNDAY, MAY 28:

7:00 – 9:00 am  3 shuttles running from the Clyde Hotel and Central New Mexico Community College
9:00 am – 3:00 pm  1 shuttle running between the Clyde Hotel and Central New Mexico Community College
3:00 – 5:00 pm  3 shuttles running from Central New Mexico Community College and the Clyde Hotel

Lt Sensors for Human Physiology

Engage students in active learning in the lab or remotely

Visit adinstruments.com/lt/sensors
<table>
<thead>
<tr>
<th>Session 1</th>
<th>Session 2</th>
<th>Session 3</th>
<th>Session 4</th>
<th>Session 5</th>
<th>Session 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30 AM – 9:30 AM</td>
<td>9:45 AM – 10:45 AM</td>
<td>11:00 AM – 12:00 PM</td>
<td>1:15 PM – 2:15 PM</td>
<td>2:30 PM – 3:30 PM</td>
<td>3:45 PM – 4:45 PM</td>
</tr>
<tr>
<td>A105 (SB 111) Sponsored by Visible Body Learning on the Go ... 3Dify your A&amp;P</td>
<td>A205 (SB 111) Virtual Reality In Anatomy and Physiology</td>
<td>A305 (SB 111) Transbiology as part of A&amp;P Curriculum</td>
<td>A405 (SB 111) From Complexity to Simplicity: Creating Interactive, Animated Presentations to Enhance Student Learning</td>
<td>A505 (SB 111)</td>
<td>A605 (SB 111) Sponsored by Touch of Life Technologies An exploration of the latest 3D interactive tools for the Modern Anatomist</td>
</tr>
</tbody>
</table>

*continued on next page*
<table>
<thead>
<tr>
<th>Session 1</th>
<th>Session 2</th>
<th>Session 3</th>
<th>Session 4</th>
<th>Session 5</th>
<th>Session 6</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30 AM – 9:30 AM</td>
<td>9:45 AM – 10:45 AM</td>
<td>11:00 AM – 12:00 PM</td>
<td>1:15 PM – 2:15 PM</td>
<td>2:30 PM – 3:30 PM</td>
<td>3:45 PM – 4:45 PM</td>
</tr>
<tr>
<td><strong>A106 (SB 207)</strong> Anatomy of a Multiple Choice Question</td>
<td><strong>A206 (SB 207)</strong> HAPS Conference Travel Award Winner</td>
<td><strong>A306 (SB 207)</strong> The CAPER Project: Past Participants as Peer Mentors Supporting Research in Community College (and Related) A&amp;P Classrooms</td>
<td><strong>A406 (SB 207)</strong> HAPS Conference Travel Award Winner</td>
<td><strong>A506 (SB 207)</strong> A Short Look at the Long History of Medicine in Wales</td>
<td><strong>A606 (SB 207)</strong> How intentional interdisciplinary conversations can influence course design in A &amp; P</td>
</tr>
<tr>
<td><strong>A107 (SB 209)</strong> Developing an Anatomy Outreach Program</td>
<td><strong>A207 (L 106)</strong> Sponsored by Carolina Distance Learning</td>
<td><strong>A307 (SB 209)</strong> HAPS Leadership Academy: Revised and Refined</td>
<td><strong>A407 (SB 209)</strong> Physiology of a Multiple Choice Question</td>
<td><strong>A507 (SB 209)</strong> Engaging anatomy &amp; physiology college students through science and STEM outreach</td>
<td><strong>A607 (SB 209)</strong> From Bingo Chips to Tonicity: An Simple Interactive Activity to Differentiate Tonicity from Osmolarity</td>
</tr>
<tr>
<td><strong>A108 (L 110)</strong> Bringing The Fun To A Flipped Lab</td>
<td><strong>A208 (L 110)</strong> Dissecting the “Heart” of the ADS Coaching Program</td>
<td><strong>A308 (L 110)</strong> Sponsored by Science Interactive Moving A&amp;P Labs Online: Lessons Learned and Best Practices</td>
<td><strong>A408 (L 110)</strong> The first day of class: They’ll want to come back for more!</td>
<td><strong>A508 (L 110)</strong> Sponsored by Science Interactive The Future of A&amp;P Labs: Balancing Hands-On and Virtual Learning Techniques</td>
<td><strong>A608 (L 110)</strong> Surface Anatomy of the Human Brain: How to Get it Right When Most of us are Getting it Wrong.</td>
</tr>
<tr>
<td><strong>A109 (L 201)</strong> Our OER Odyssey: Creating a Case-Study Based OER Lab Manual for Undergraduate Anatomy and Physiology</td>
<td><strong>A209 (L 201)</strong> Sponsored by HHMI Interactive Tying the Body Systems Together with HHMI BioInteractive’s Biomolecules on the Menu</td>
<td><strong>A309 (L 201)</strong> Anatomy Arcade</td>
<td><strong>A409 (L 201)</strong> Sponsored by HAPS HAPS Exam Program 2023 Update: How to use the HAPS Physiology Learning Outcomes plus the latest information about the HAPS comprehensive A&amp;P and stand-alone anatomy exams</td>
<td><strong>A509 (L 201)</strong> Enjoy Studying Coronary Physiology and Pathophysiology with Dynamic Images in Health and Disease</td>
<td><strong>A609 (L 201)</strong> Food for Thought! Teaching Tips for the Digestive System</td>
</tr>
<tr>
<td><strong>A110 (L 204)</strong> Using gamification to improve student engagement and enhance learning</td>
<td><strong>A210 (L 204)</strong> Pathways to belonging in science: Including diverse scientists and health disparities in the A&amp;P classroom.</td>
<td><strong>A310 (L 204)</strong> Sponsored by Codon Learning Developing effective study habits for A&amp;P students</td>
<td><strong>A410 (L 204)</strong> Sponsored by HHMI BioInteractive Integrating models into physiology teaching and assessment with HHMI BioInteractive’s Model Builder</td>
<td><strong>A510 (L 204)</strong> LGBTQIA+ Inclusive Teaching of Anatomy and Physiology</td>
<td><strong>A610 (L 204)</strong> Sponsored by ADInstruments The Importance of Preparedness - How to Help Your Students Arrive Ready to Learn</td>
</tr>
</tbody>
</table>

*continued on next page*
### WORKSHOPS-AT-A-GLANCE SUNDAY (B) – MAY 28, 2023

<table>
<thead>
<tr>
<th>Session 1</th>
<th>Session 2</th>
<th>Session 3</th>
<th>Session 4</th>
<th>Session 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30 AM – 9:30 AM</td>
<td>9:45 AM – 10:45 AM</td>
<td>11:00 AM – 12:00 PM</td>
<td>1:15 PM – 2:15 PM</td>
<td>2:30 PM – 3:30 PM</td>
</tr>
<tr>
<td><strong>B101 (SB 103-104)</strong> Beating Quizlet and Chegg Through Inquiry Based Learning</td>
<td><strong>B201 (SB 103-104)</strong> Histology: Disjointed Facts or Unifying Principles?</td>
<td><strong>B301 (SB 103-104)</strong> Do your students have the right mindset to be successful in A&amp;P?</td>
<td><strong>B401 (SB 103-104)</strong> Jigsaw activities and group exams: resurrecting old ideas for the modern classroom</td>
<td><strong>B501 (SB 103-104)</strong> Maintaining Academic Integrity in Hybrid and Online Courses</td>
</tr>
<tr>
<td><strong>B102 (SB 105)</strong> Starting Strong</td>
<td><strong>B202 (SB 105)</strong> Head Cases: How to Write a Thought-Provoking and Clinically Accurate Case Study</td>
<td><strong>B302 (SB 105)</strong> The Good, the Bad and the Ugly of Generative AI in Human Anatomy and Physiology Education</td>
<td><strong>B402 (SB 105)</strong> Core Values in Donor Memorialization Practices</td>
<td><strong>B502 (SB 105)</strong> Sponsored by AACA AnatomicalTerms.info (ATI): a free, wiki-like, reference-site dedicated to anatomical terminology.</td>
</tr>
<tr>
<td><strong>B103 (SB 108)</strong> Making Anatomy &amp; Physiology Make Cents</td>
<td><strong>B203 (SB 108)</strong> Modeling of Mastery Matters: Rethinking How to Grade and Teach for Equity in our Undergraduate A&amp;P Courses</td>
<td><strong>B303 (SB 108)</strong> Marieb, Hoehn, and Haynes Award Winner for Diversity, Equity, and Inclusion Reaching A&amp;P Students from Diverse Communities through Collaborative Peer-Led Instruction</td>
<td><strong>B403 (SB 108)</strong> So Much To Do and Yet So Little Time: Leveraging Prosection Lab Activities to Reinforce Anatomy &amp; Physiology Content</td>
<td><strong>B503 (SB 108)</strong> Students as prosumers of anatomy and physiology content</td>
</tr>
<tr>
<td><strong>B104 (SB 207)</strong> Writing Assignments in A&amp;P: Thinking Beyond the Lab Report</td>
<td><strong>B304 (SB 111)</strong> Lights! Camera! Action! Using Tutor Videos to Engage Today’s Learners</td>
<td><strong>B404 (SB 111)</strong> Gail Jenkins Teaching and Mentoring Award Winner Demystifying the hypothalamo-hypophyseal axis using active learning strategies and “study hacks”</td>
<td><strong>B504 (SB 207)</strong> Toward a New “Normal”: Examples of non-Pathological Human Variation</td>
<td></td>
</tr>
<tr>
<td><strong>B105 (SB 209)</strong> Accepting Mark Nielsen’s challenge: Viewing bones through the lens of cellular and organismal function.</td>
<td><strong>B205 (SB 207)</strong> An Anatomy Color by Numbers App Used as a Mechanism to Reduce Student Anxiety and Increase Competency</td>
<td><strong>B305 (SB 207)</strong> Editing A&amp;P textbooks through a DEI lens: Authors’ perspectives</td>
<td><strong>B405 (SB 207)</strong> Real-time measurements of muscle energy loading during osteopathic evaluation maneuvers.</td>
<td></td>
</tr>
</tbody>
</table>

*continued on next page*
<table>
<thead>
<tr>
<th>Session 1</th>
<th>Session 2</th>
<th>Session 3</th>
<th>Session 4</th>
<th>Session 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30 AM – 9:30 AM</td>
<td>9:45 AM – 10:45 AM</td>
<td>11:00 AM – 12:00 PM</td>
<td>1:15 PM – 2:15 PM</td>
<td>2:30 PM – 3:30 PM</td>
</tr>
<tr>
<td>B206 (SB 209) John Martin Second Timers Award Winner Getting Students On Board With Active Learning</td>
<td>B306 (SB 209) Teaching hip replacement with 3D Printing</td>
<td>B406 (SB 209) Build Your Teaching Portfolio by being a Reviewer for the HAPS Educator</td>
<td>B506 (SB 211) Building a Science Department DEIA Committee: A second year reflection</td>
<td></td>
</tr>
<tr>
<td>B107 (L 110) Picturing skeletal muscle contraction</td>
<td>B207 (SB 211) Utilizing a Continuous Quality Improvement (CQI) Process in Student Assessments</td>
<td>B307 (L 110) Service Dogs in the Classroom and Laboratory</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B208 (L 110) Sponsored by Vernier Science Education Let's Get Physical: Human Physiology Experiments</td>
<td>B308 (L 201) Unleashing student potential: A flexible final assessment approach in undergraduate anatomy and physiology</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B109 (L 204) Boost Success without Sacrificing Content</td>
<td>B209 (L 201) Wait! Wait! Don't Dissect Me — A HAPS News Quiz</td>
<td>B309 (L 204) Evidence-based Strategies to Promote Student Success, Retention, and Outcomes in Anatomy and Physiology Courses and Health Science Programs</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Workshop Abstracts

Session 1: Saturday, May 27 @ 8:30 AM

A101 - Top 10 Tools Needed In Your Anatomy Lab Resource and Outreach Toolbelt
Abbey Breckling, University of Illinois at Chicago, abreck2@uic.edu, Jeremy Grachan, Rutgers New Jersey Medical School, jg1916@njms.rutgers.edu Bobbie Leeper, Seton Hill University, bleeper@setonhill.edu, Rhiannon Robinson, Boston University Chobanian & Avedisian School of Medicine, Kelsey Stevens Briar Cliff University

The Anatomical Donor Stewardship, Lab Resource subcommittee, would like to invite HAPS members to a workshop designed to showcase best practices to employ in your own human donor anatomy labs! These tips and tools will highlight simple adaptations that make teaching the main priority, while maintaining student safety and instructor time. Panel members will describe creative methods/tools for specific dissections, highlight tips for donor preservation techniques, and revisit how to safely and effectively prepare for classroom sessions and outreach opportunities to surrounding communities.

A102 - Lifting All Ships: Practical Measures to Increase Equity in Anatomy & Physiology I Lab
Kathleen Ahles, Tarrant County College, kathleen.ahles@uta.edu, James Harman, Tarrant County College, james.harman@tccd.edu, Lara Kingeter, Tarrant County College, lara.kingeter@tccd.edu

Anatomy instructors strive to create a learning environment in which all students can succeed, but racial and socioeconomic disparities in achievement often persist. Over the last 5 years, we incrementally redesigned the anatomy lab experience at our minority-serving community college in north Texas. By increasing the transparency of our curriculum and adding regular low stakes assessments, overall student success dramatically increased. Perhaps most notably, however, was the virtual elimination of racial and socioeconomic achievement gaps. By the end of this workshop, you will have several data-supported ideas of how you could meaningfully increase student success in your own anatomy lab.

A103 - Enjoy Studying Coronary Physiology by Discovering the Hydraulics and Physics Phenomena in Arteries
Thach Nguyen, Methodist Hospital, Merrillville IN and Tan Tao University School of Medicine, Long An Vietnam, thachnguyen2000@yahoo.com, Nguyen Nguyen, Palmett General Hospital, dnguyen299@gmail.com, Duc Nguyen, Methodist Hospital, hoangducfsh@gmail.com, Nhan Bui, Methodist Hospital, drtrinhbui@gmail.com, Thinh Nguyen, Methodist Hospital, nguyen.thi.thinh.ped@gmail.com

When turning a curve, fast antegrade layers flow at the center while layers at the border flow at slower speed. If recirculation happens at the inferior layers, it is the Meandering effect. During collision of the antegrade against retrograde flow in iliac artery, vortices form. If the laminar flow in a distal coronary artery is stopped by the left ventricle (LV), this is the Water Hammer Shock. When the laminar flow in the distal coronary artery flow forward creating an empty bubble, upon contraction of the LV a reverse flow slams into the bubble, ruptures it. This is the Cavitation

A104 - Incorporating Interactive Digital Technology for Interdisciplinary and Equitable Learning
Ranya Taqieddin, Saint Charles Community College, rtaqieddin@stchas.edu

This workshop will feature a collection of online interactive digital tools that have been developed to actively engage learners in meaningful learning experiences and to ensure all students have equitable access to learning resources that support their success. I will discuss best practices in selection and implementation of technology for educational use in online labs and courses that are designed in an interdisciplinary approach.
A105 - Learning on the Go ... 3Dify your A&P
Mary Beth Davidson, Georgia State University, Perimeter College, mdavison@gsu.edu, Mary Ness, Visible Body, mary.ness@visiblebody.com
Sponsored by Visible Body
Come, explore and experience the benefits of Visible Body Courseware for your lecture and lab courses. The cost is low, engagement high and learning increases. There are pre-made exercises or you can tweak and develop your own. It’s an “on the go” app fitting into their lifestyle and its theirs to keep. I started in Fall 2022 with API and currently evaluating in APII. It has didactic lessons and videos, plus exercises, quizzes and a gradebook. This is a hands-on workshop. Participants will leave with access and online support.

A106 - Anatomy of a Multiple Choice Question
Brian Hill, Via College of Osteopathic Medicine, bhill@vcom.edu,
As instructors, we test our students regularly, often utilizing multiple choice exams. Many of us merely imitate our former instructors in terms of constructing multiple choice questions as we have had no formal training in this area. This session will focus on writing better exam questions by presenting the best practices for construction of multiple choice questions, and how to write items that test on higher cognitive levels. Particular emphasis will be placed on the item writing guidelines used by standardized exams such as the Medical College Admissions Test (MCAT) or Graduate Record Exam (GRE).

A107 - Developing an Anatomy Outreach Program
Pilard Hanna, The Ohio State University, College of Medicine, pilardhanna@gmail.com, Melissa Quinn, The Ohio State University, College of Medicine-Division of Anatomy
Developing an anatomy educational program that provides an unforgettable, hands-on learning experience to the community is a challenging process that can be less burdensome by learning from others. Through this discussion-based workshop, the Anatomy Outreach Program at The Ohio State University will share our experiences in building and expanding the program. We will discuss the different aspects that needs to be considered in building an educational program from scheduling, recruiting facilitators and outreach sessions design. We are eager to learn from our peers and expand our program nationally and internationally with our future projects.

A108 - Bringing The Fun To A Flipped Lab
Beth Kersten, State College of Florida, kersteb@scf.edu, Jenna Jarvis, State College of Florida, jarvisj@scf.edu
In traditional labs, students frequently came unprepared to class with prelab assignments. Three hours of lab were usually spent scrambling just to see content for the first time. There was little to no time left for engagement in interactive review. Our flipped A&P I and II labs allow more time for engaging and fun learning-centered activities that review and reinforce learning. The new environment has also led to a significant increase is assessment outcomes. In this workshop, we will show you samples of how we brought the fun to our classrooms and provided an enriching experience for our students.

A109 - Our OER Odyssey: Creating a Case-Study Based OER Lab Manual for Undergraduate Anatomy and Physiology
Gillian Backus, Northern Virginia Community College, gbackus@nvcc.edu, Paula Rodgers, Northern Virginia Community College, prodgers@nvcc.edu, Heidi Wangerin, Northern Virginia Community College, hwangerin@nvcc.edu
Anatomy and Physiology lab manuals are expensive and often lack engaging stories. We followed HAPS guidelines to create an Open Educational Resources (OER) lab manual. Each lab includes a relevant Case Study. We will recount our journey, guide you through the lab format, and allow you to peruse the labs. We will share resources and lessons learned. This lab manual has strengthened our curriculum, encouraged critical thinking and independent work in our students, and significantly reduced the course cost. It is freely accessible on the web and through CANVAS and offers a pedagogically rigorous curriculum design that follows HAPS guidelines.
A110 - Using gamification to improve student engagement and enhance learning
Melanie Neumeier, MacEwan University, neumeierm@macewan.ca,
Capturing and maintaining the attention of students over the course of an entire semester is a challenge for any professor, but even more so today with the added pressure of short attention spans and need for immediate gratification. In this workshop we will discuss the potential benefits of gamification, some strategies to employ in the classroom, and then delve into a battle for the House Cup as we immerse ourselves in the process. Come ready to explore techniques to connect with our undergraduate students, promote independent and collaborative learning, and of course, have fun!

Session 2 : Saturday, May 27 @ 9:45 AM

A201 - Improving Success Rates in Anatomy & Physiology: Implementation of a Strategy to Address DFW Rates at San Juan College.
Crystal Blake, San Juan College, blakec@sanjuancollege.edu, Lori Schiess, San Juan College, scheissl@sanjuancollege.edu Ryan Webster, San Juan College, websterr@sanjuancollege.edu

Anatomy and Physiology (A&P) has one of the lowest student success rates at San Juan College (SJC). Lack of good learning and study skills contributes to decreased student success in this course. The A&P courses at SJC implemented a weekly, concurrent, mandatory study skills support course for all A&P I students called Test Prep. This course allows students to work with a supplemental instructor and develop learning techniques, study skills and form study groups. In this workshop we will review the student success rates, review the approval process at our institution, discuss implementation, and the challenges of adding this course.

A202 - Restoring Balance
Shawn Macauley, Muskegon Community College, shawn.macauley@muskegoncc.edu,
Balance is the integration of multiple sensory inputs that significantly influence everyday activities. Balance disorders not only lead to increased falls, but damage to the vestibular apparatus also directly affects gait, posture, vision, reflexes, memory, cognition, and spatial awareness. In this presentation, Dr. Macauley will describe and demonstrate how he compensated and navigated life for over two decades following ablation of his vestibular function. He will also provide a personal update on life following the implantation of an experimental, unilateral vestibular prosthesis.

A203 - Building Upper Limb Musculature of the Five Branches of the Brachial Plexus and Vasculature
Cary Cortese, Anatomy in Clay, carycortese@gmail.com, Jon Zahourek, Anatomy in Clay, jonz@anatomyinclay

Sponsored by Anatomy in Clay
Common practice is to first present muscles and bones, saving innervations and vasculature until later. This workshop suggests an alternative approach, presenting muscles initially in the context of their innervations and vasculature. Participants will be provided the Anatomy in Clay® Learning Systems MANIKEN® upper limb to use as an example during the presentation. Starting with blood supply, we demonstrate how to overlay certain contextual muscles, and trace their innervations back to the brachial plexus. We end with a full brachial plexus, and sample muscles from each of the five branches of the plexus. The plan is available to take home and is adaptable to variable classroom requirements.
A204 - Creating Affordable Educational Resources for Anatomy and Physiology
Travis Price, Weber State University, tprice@weber.edu, Justin Burr, Weber State University, justinburr1@weber.edu, Lyndsey Aponik Gremillion, Weber State University, lyndseygremillion@weber.edu, Jordan West, Weber State University, jordanwest@weber.edu

The costs of college tuition, housing, and textbooks can be a barrier to student access. Affordable open educational resources (AOER) are an alternative to expensive course materials. The Health Sciences Department at Weber State University created a comprehensive, two-semester anatomy and physiology course using only openly available, copyright-free educational resources and an inexpensive, interactive laboratory program. This workshop outlines the steps taken to transition from a traditional textbook-centered anatomy and physiology curriculum to one that offers students a wide range of learning resources for a fraction of the cost.

A206 - Who do we represent? Student choice and diversity content analysis of A&P textbook images
Kathy Burleson, Hamline University, kburleson01@hamline.edu

HAPS Conference Travel Award Winner

We performed a content analysis on diversity of body representations in anatomy and physiology textbooks. Next, students indicated their preferences from a series of textbook images. Finally, we interviewed authors to explore textbook production. We found disparities in representation of race, sex, body size, age, and ability across books and organ systems, and student biases toward marginalized groups significantly associated with perceptions of textbook images. As publishers commit to diversity in their texts, incorporating a broader range of body types in images and supplementing with discussions in the classroom may help address gaps in representation and students’ sense of belonging.

A207 - Keep your EYE on at-home Labs with Carolina Distance Learning
Tonya Jackson, Mohave Community College, tjackson@mohave.edu, Matt Pinnix, Carolina Distance Learning, matt.pinnix@carolina.com

Sponsored by Carolina Distance Learning fee already paid

Get your EYE(s) (and hands) on an at-home eye dissection lab kit designed to provide your online students the same learning experience and rigor as on-campus students. Join Mohave Community College Associate Dean Tonya Jackson and Carolina Distance Learning Business Development Manager Matt Pinnix as they guide you through the eye dissection! Dr. Jackson will share Mohave’s experience using lab kits with students including tips and tricks for what works (or doesn’t). Mr. Pinnix will provide a preview of Carolina Distance Learning’s newest addition Gateway – an interactive lab manual experience with new digital resources that offer an enhanced user experience.

A208 - Dissecting the “Heart” of the ADS Coaching Program
Jeremy Grachan, Rutgers New Jersey Medical School, jeremy.grachan@rutgers.edu, Abbey Breckling, University of Illinois at Chicago, abreck2@uic.edu, Bobbie Leeper, Seton Hill University, bleeper@setonhill.edu, Kelsey Steven, Briar Cliff University, Jonathan Wisco, Boston University, jjwisco@bu.edu, Rhiannon Robinson, Boston University, rerbnsn@bu.edu

Over the last few years the HAPS Anatomical Donor Stewardship Committee has worked to create a mentorship program designed to match experienced dissectors and managers with HAPS members who want to grow in the areas of dissection and gross anatomy lab management. This particular workshop will present an overview of the program and will provide an opportunity to work with coaches on a small group dissection. The goal of this workshop is to present how this program fosters coaching relationships within the HAPS memberships.
A209 - Tying the Body Systems Together with HHMI BioInteractive’s Biomolecules on the Menu
Holly Basta, Rocky Mountain College, holly.basta@rocky.edu, 
Sponsored by HHMI BioInteractive
Anatomy and Physiology can leave students dizzy as it jumps back and forth between gross and molecular levels. The Biomolecules on the Menu Interactive from HHMI allows students to follow molecules in food and air from the digestive, respiratory, and circulatory system-level down to specific metabolic processes. This approach to learning about biomolecules highlights the interplay between systems on both the macroscopic and microscopic levels. Presenters will model applying this interactive to college-level Anatomy and Physiology.

A210 - Pathways to belonging in science: Including diverse scientists and health disparities in the A&P classroom.
Luis Rosado, Worcester State University, lrosado@worcester.edu, Marisol Lopez, Boston University, mlopez@bu.edu
Cultural and ethnic health disparity topics can foster an inclusive learning environment in A&P courses. Including diverse scientists’ contributions in these areas is a culturally relevant pedagogy that has been shown to have a positive effect on students’ science identity and learning. Our workshop will provide a framework for building culturally relevant pedagogy in A&P courses that incorporate Hispanic contributions to science and medicine. Group active learning activities will ask our participants to build a “kit” of diverse scientists and explore topics related to health disparities in specific areas of A&P.

Session 3: Saturday, May 27 @ 11:00 AM

A301 - Is Student Success in Human Anatomy & Physiology Impossible, or Is It the Result of Old-School, Hard Work?
Carol Britson, University of Mississippi, cbritson@olemiss.edu,
Are your students convinced that passing A&P is ‘impossible’ or that ‘no one ever gets an A’? Join Dr. Carol Britson as she presents the impacts of course design best-practices, student preparation, and the COVID-19 pandemic on student performance for over 3000 students across ten years of Human A&P instruction. Comparisons of individual instructor DFW rates to rates for home institutions and other published reports for A&P will also be examined through the use of this large data set.

A302 - Use of non-anatomical joint models to improve student engagement and understanding of synovial joints.
Meghan Andrikanich, Lorain County Community College, mandrika@lorainccc.edu, 
Greg Little, Lorain County Community College, glittle@lorainccc.edu
One topic students struggle with in our A&P 1 course is understanding the movement of the various synovial joints. Applying the typical 2-d representation in most texts to anatomical models or articulated skeletons doesn’t always work well. We have developed non-anatomical 3-d printed articulation models that students can manipulate to gain a better understanding of the relationship between articulation structure and function. Having something easy to manipulate helps keep students engaged. Students have also expressed less frustration and better understanding of movement occurring at the various synovial joints.
A303 - Create a Treasure Hunt Within Your Course Management System.
Lola Smith, The Pennsylvania State University DuBois Campus, lmd13@psu.edu,
HAPS Conference Travel Award Winner
Course Management System (CMS) treasure hunts can be adapted to any course modality, subject, or academic level. This is an innovative use of QR codes, CMS, and cell phones. There are three objectives for this presentation: 1) learn to create a course treasure hunt within a CMS or in person, 2) engage in a mini treasure hunt, and 3) gain knowledge about eight technologies that will shape future classrooms. The presentation will convey directions for creating a CMS treasure hunt. During intervals between slides participants will use their cell phones to read embedded QR codes, navigate to websites, and record the future technology.

A304 - Connect with our new HAPS Executive Director
Jacqueline Van Hoomissen, University of Portland, vanhoomi@up.edu,
We welcome all to join in on this casual conversation with our new HAPS Executive Director, Dr. Jacqueline Van Hoomissen. She is not new to HAPS, but may be new to you! You may remember Jacque as the 2019 Annual Conference Host, or as a co-host of the HAPS Book Club, or our former Board of Directors Secretary. Jacqueline loves meeting new people and sharing ideas. We hope you can join and share your hopes for HAPS with her during this gathering.

A305 - Transbiology as part of A&P Curriculum
Juanita Jellyman, California State Polytechnic University Pomona, jkjellyman@cpp.edu, Anja Goldina, Elizabethtown College, goldinaa@etown.edu, Lawrence Young, Florida Southern College, lyoung@hapsconnect.org, Burleson Kathy, Hamline University, kburleson@hapsconnect.org, Greene Sarah, Morehouse School of Medicine, Ostwold Molly, Arapahoe Community College, colomolly@gmail.com, Farnsworth Juno, Ivy Tech Community College, junofarnsworth26@gmail.com, Billings Heather, West Virginia University, hbillings@hsc.wvu.edu, Zimmer Jay, Gardener-Webb University, jzimmer@gardner-webb.edu, Christine Eckel, Indiana University, ceckel@iu.edu
This workshop will provide teaching resources and ways to incorporate aspects of transgender medicine into an A&P classroom. Emphasis will be made on physiologically relevant mechanisms of transgender medicine and strategies to teach this topic in an inclusive, scientifically accurate manner.

A306 - The CAPER Project: Past Participants as Peer Mentors Supporting Research in Community College (and Related) A&P Classrooms
Dana Smith, St. Johns River State College, DanaSmith@sjrstate.edu, Vicky Rands, Salt Lake Community College, vicky.rands@slcc.edu, Melaney Farr, Salt Lake Community College, Melaney.Farr@slcc.edu, Kathy Bell, Salt Lake Community College, kathrynbell@slcc.edu, Chasity O’Malley, Wright State University Boonshoft School of Medicine, chasity.omalley@wright.edu
Most anatomy and physiology students are enrolled in two-year community colleges, yet the bulk of science education research occurs at four-year research universities. To address this divide, the NSF-funded Community College Anatomy and Physiology Education Research (CAPER) project pairs research personnel and mentors with community college A&P faculty interested in conducting classroom-based education research. Peer mentors (graduates of the CAPER program) facilitate cohort members as they engage in a 2-year program that includes two professional development courses and completion of an educational research project from conception to publication. This workshop, led by CAPER mentors, will feature a project overview and information for prospective future participants.
A307 - HAPS Leadership Academy: Revised and Refined
Kyla Ross, Georgia Institute of Technology, kyla.ross@gatech.edu, Elizabeth Pennefather-O’Brien, Medicine Hat College, eobrien@mhc.ab.ca, Jacquie Van Hoomissen, HAPS, jvan@hapsconnect.org
This spring, HAPS hosted its second cohort of the HAPS Leadership Academy, a professional development program designed to support HAPS members as they transform their respective classrooms and institutions through modeling and practicing inclusive excellence. The program aimed to equip participants with the skills of self-awareness, unconscious bias mitigation, team science, and emotional intelligence. Participants engaged in reflective practices of dialogue, journaling, and storytelling. Join us for a workshop session as we review how the program shifted based on lessons learned from the first cohort, listen to the stories of participants, discover the impact that the program has had on participants, and discuss the future of HAPS professional development programming.

A308 - Moving A&P Labs Online: Lessons Learned and Best Practices
Duane Cagle, Science Interactive, dcagle@scienceinteractive.com
Sponsored by Science Interactive
Despite enrollment declines, student demand for online courses have never been higher, including science laboratory courses. In this session, we’ll share how one A&P professor brought their laboratory course online using Science Interactive’s hands-on laboratory kits. We’ll discuss what drove them to teach online, the challenges of bringing a lab online and how they overcame them, and how students have engaged and succeeded in their online A&P lab.

A309 - Anatomy Arcade
Marian Leal, Sacred Heart University, lealm@sacredheart.edu
Undergraduate students that study anatomy and physiology sometimes have difficulty with large amounts of content that frequently come with the course. In an attempt to decrease anxiety and to stop students from trying to memorize everything my colleagues and I have developed a collection of games where students work in small groups to sharing ideas, collaborate and have fun while learning anatomy and physiology. These teaching strategies can be utilized in labs and I have found them to be effective in summer classes where lecturing is typically 3-hrs a day.

A310 - Developing effective study habits for A&P students
Justin Shaffer, Colorado School of Mines, jshaffer@mines.edu
Sponsored by Codon Learning
Anatomy and physiology students may struggle with studying due to the amount of material, learning the new language of anatomy, and applying concepts to medical-based physiological situations. Many evidence-based strategies have been demonstrated to improve students’ study habits and thus learning, including metacognition, retrieval practice, spacing, and self-regulated learning. After attending this workshop, attendees will be able to describe what these approaches are, explain the benefits of using these methods, and develop ways to incorporate these methods into their own courses so as to improve student outcomes.
Session 4: Saturday, May 27 @ 1:15 PM

A401 - Adventures with Alternative Grading
Wendy Riggs, College of the Redwoods, wendyk-riggs@redwoods.edu
As a RE-CAPER participant in 2021-22, I spent a year with colleagues exploring evidence-based instructional practices, learning about alternative grading, and conducting educational research in one of my classes. In this workshop, I’ll share my experiences in my alternatively graded, fully online, asynchronous, summer Human Physiology course. We’ll talk about the motivation that drove the experimentation, some observations I made during the course, and conclusions I’ve since drawn about grading and its impact on learning, equity, and student success.

A402 - Tell it to me Straight: How Anatomy for Babies offers a creative approach to assessment in A & P
Kathleen Ahles, University of Texas at Arlington, kathleen.ahles@uta.edu
A cornerstone of Anatomy & Physiology courses is major exams, but with students increasingly reporting test anxiety, these tests may not capture all the knowledge these students possess. In this workshop, we will explore an alternative assessment – the Anatomy for Babies project. This project tasks students with creating illustrated dictionaries of key anatomical terms, explaining both what they mean & why they matter. But here's the key: they must do this in "easy words"! Student submissions & grading rubrics will be shared in this workshop, giving you the resources you need to implement this project in your own anatomy courses.

A403 - Making the Case for Case Studies
Diana Baniak, Cengage, diana.baniak@cengage.com
Sponsored by Cengage
We often think of case studies as additions or bonuses to our curriculum. We may use case studies to add relevance or interest to our curriculum, but I will argue that they are some of the most important aspects of our pedagogy. In this workshop we will discuss the importance of case study teaching, compare and contrast different methods of case study teaching and adapt a case study for your own classroom. We will have case study options for Anatomy only, Physiology only and A&P classrooms. You will leave the workshop with one (or more) customized case study ready to implement in your course!

A404 - Maximizing student engagement with modern clicker questions and peer instruction
Justin Shaffer, Colorado School of Mines, jshaffer@mines.edu
Clickers, or student personal response systems, are a fantastic and evidence-based way to get students engaged in the learning process during class, from asking multiple choice questions to using more interactive question types such as multiple select, ranking, matching, numeric, and click-on-target. In addition, the educational literature strongly supports using clickers to facilitate peer instruction which improve student outcomes. This workshop will provide participants with an engaging opportunity to apply modern clicker questions and peer instruction techniques to their own anatomy and physiology courses.

A406 - Unwrapping Exam Wrappers
Larry Young, Florida Southern College, lryoung6218@gmail.com
HAPS Conference Travel Award Winner
Why are we wrapping our exams? After all, students really do not consider them gifts! But Exam Wrappers can be the greatest gift a student receives from you through A&P. During this session we will understand what an exam wrapper is and varying examples of exam wrappers. How exam wrappers can be used to increase student success on exam performance through metacognitive reflection will be considered through the lens of student feedback and data gleaned from using exam wrappers within my courses.
A407 - Physiology of a Multiple Choice Question
Brian Hill, Via College of Osteopathic Medicine, bhill@vcom.edu
Professors who utilize multiple choice exams are typically supplied with a plethora of statistics that relate to each test item, but few faculty know how to utilize these statistics beyond possibly the p value, which simply gives the percentage of students who got each item correct. Within psychometrics, item analysis uses these statistics to quantify the learning effectiveness related to each test item. When utilized, item analysis allows faculty to improve item writing, to construct more effective multiple choice exams that more accurately ascertain student learning, and to identify and improve teaching in areas of instructor-student disconnect.

A408 - The first day of class: They’ll want to come back for more!
Tom Lehman, Coconino Community College, tom.lehman@coconino.edu
First impressions set the tone for the entire course. Make the most of that first day. Come learn some simple techniques for the integration of group collaboration, terminology usage, and microscopy and model experience. Stations include “Clay anatomy”, “How to slice a banana”, “Circle the osteocyte”, “Which way is lateral”, and “Which jar is pseudostratified.” Your students will leave that day with applicable knowledge, an idea of what to expect in the course, and the desire to come back for more.

A409 - HAPS Exam Program 2023 Update: How to use the HAPS Physiology Learning Outcomes plus the latest information about the HAPS comprehensive A&P and stand-alone anatomy exams
Dee Silverthorn, Univ Texas at Austin, silverthorn@utexas.edu, Janet Casagrand, University of Colorado, Boulder, janet.casagrand@colorado.edu, Valerie O’Loughlin, Indiana University, vdean@indiana.edu, Nanette Tomicek, Thomas Jefferson University, NanetteJTomicek@gmail.com
Sponsored by HAPS
The HAPS Physiology Learning Outcomes (PLO) are complete and published. In this session, we will do an overview of the PLOs and provide some suggestions for how to use them in your courses. We will also update you about the validated HAPS Comprehensive A&P and stand-alone anatomy exams that can help you compare your class performance with others across North America. We will discuss the secure online testing platform, proctoring options, and how to order exams, along with examples of ways to utilize and fund them at your institution.

A410 - Integrating models into physiology teaching and assessment with HHMI BioInteractive’s Model Builder
David Julian, University of Florida, djulian@ufl.edu, Holly Basta, Rocky Mountain College, holly.basta@rocky.edu
Sponsored by HHMI BioInteractive
Physiological processes and systems are frequently represented with models such as flowcharts and cause-and-effect diagrams. While working with models often promotes student comprehension, retention, and critical thinking, it can be challenging for instructors to integrate models into their teaching. In this workshop, participants will use hands-on activities to learn how to use Model Builder, a free web tool from HHMI BioInteractive. With Model Builder, students can create model diagrams and receive automated feedback based on reference models (created by their instructor or available from BioInteractive) and instructors can automatically score student submissions to quickly assess student progress and identify misconceptions.
Session 5: Saturday, May 27 @ 2:30 PM

A501 - **Structural Patterns of the Neuromuscular Anatomy of the Head and Neck**  
Mark Nielsen, University of Utah, marknielsen@bioscience.utah.edu  
With an understanding of comparative and developmental anatomy, the complex neuromuscular anatomy of the head can be organized into clear structural patterns that simplify and clarify the detail of the nerves and muscles of the head and neck, along with their topography and relationships. Armed with this knowledge, you will be able to answer many “why” questions that otherwise are impossible to answer, as you gain a deeper understanding of head and neck anatomy.

A502 - **Extracellular Vesicles in A&P: How to Update Content and Engage Students in a Changing Nature of Science**  
Brenda Del Moral, Edgewood College, bdelmoral@edgewood.edu  
New information continues to emerge about extracellular vesicles, most recently about their importance in warding off pathogens in our nasal mucosal barrier in cold weather. Even though EVs are released by most cells and organisms, scientific understanding of the role and application of EVs has shifted due to new evidence on cell-cell communication and host-pathogen interactions. This workshop is in part a mini-update on EVs and their roles in nervous, digestive, respiratory, immune, and reproductive systems. A discussion of classroom methods to incorporate new findings into A&P courses to improve understanding of the changing nature of science and science literacy.

A503 - **AI and ChatGPT in Action: How to leverage these tools to improve A&P learning and increase academic integrity**  
Shawn Macauley, Muskegon Community College, shawn.macauley@muskegoncc.edu  
Artificial intelligence engines like ChatGPT can be a powerful tool to enhance our teaching of anatomy and physiology content. This session will be an interactive and timely session to examine practical examples of how students and faculty can embrace this new technology to increase both student learning and student integrity.

A504 - **20 Years of Engaging Digital Tools for your A&P Course**  
Michael Koot, McGraw Hill Education, michael.koot@mheducation.com  
**Sponsored by McGraw Hill Education**  
Anatomy & Physiology Revealed (APR) has helped students in A&P and human anatomy courses for more than 20 years with virtual dissection, 3D rotatable and anatomical models, animations, histology, and imaging. Instructors can now create their own, customized assignments using all the content from APR. Paired with the new Virtual Labs, your entire course is covered. This session will show you how to build your own customized assignments; highlight the robust reporting features and discuss the flexibility of using these tools for in-person, hybrid, or online courses. Students can now access lab resources anytime, anywhere for success in your course!

A505 - **From Complexity to Simplicity: Creating Interactive, Animated Presentations to Enhance Student Learning**  
Mark Abbott, The Ohio State University, abbott.351@osu.edu  
Anatomy education heavily relies on visualizations, but those from textbooks and the web may include unnecessary details that hinder learning. This workshop will teach you how to remove unwanted elements from anatomical images and simplify lecture content through the use of effective animations, morphs, and zoom transitions. To showcase the versatility of these techniques, examples from anatomy, neuroanatomy, histology, and embryology will be presented. By the end of the workshop, you will be able to create interactive modules complete with toggleable buttons, click-and-reveal animations, navigational controls, and more. Bring your own presentation to work on and improve your skills!
A506 - A Short Look at the Long History of Medicine in Wales
Dana Evans, University of Rio Grande, danae@rio.edu
As part of my research as the Madog Center Welsh fellowship, this presentation is a look at the growth of medicine in Wales. Starting with the earliest of times and the use of water as medicine, it follows the healers through to the medieval era and the storied Physicians of Myddfai. Once there herbal remedies then and today are examined. Moving forward from the Middled Ages, we look at the more modern era and Welsh doctor’s contributions especially to orthopedics. Much of it is accompanied by photographs from my time researching this in Wales.

A507 - Engaging anatomy & physiology college students through science and STEM outreach
Debbie Sharp, Edgewood College, DeborahSharp@edgewood.edu
I have found science outreach to be a useful tool to get my students more invested in and excited about learning. In this workshop, I will discuss how my students have engaged in STEM outreach to underrepresented populations and the benefits that it has provided them. I’ll present the basic format and materials used and how they can be easily adapted by others. Also addressed will be how these outreach activities have become a useful recruitment tool for our College. There will be time for group discussion afterwards.

Duane Cagle, Science Interactive, dcagle@scienceinteractive.com
Sponsored by Science Interactive
With the increasing prevalence of online science laboratory courses, new technologies have expanded the ways that laboratory techniques and concepts can be taught. But to what extent should virtual labs be used when compared to hands-on labs? In this workshop, we will discuss the best practices in supplementing and supporting your hands-on Anatomy & Physiology laboratories online with virtual activities.

A509 - Enjoy Studying Coronary Physiology and Pathophysiology with Dynamic Images in Health and Disease
Thach Nguyen, Methodist Hospital, Merrillville IN and Tan Tao University School of Medicine, Van Nguyen, Methodist Hospital, nvtuong0903@gmail.com, Imran Mihas, Indiana University, mihasimran@gmail.com, Hien Nguyen, Methodist Hospital, nguyenquanghienmd@gmail.com, Kieu Thai, Methodist Hospital,thaikieungoc@gmail.com, Thang Nguyen, Methodist Hospital, anh3tue@gmail.com
In clinical practice, blood pressure (BP) is measured as numbers by the sphygmomanometer. We will present the images of the reversed flow in iliac artery which represents the extent of peripheral vascular resistance. In patient with uncontrolled systolic hypertension (HTN), the reversed flow is seen being stopped abruptly. How about the images of uncontrolled diastolic HTN? What is the ideal BP so no reversed flow is seen? In patients with ruptured plaques, where is the erosion? at the entry and exit slopes of the plaques? These images of coronary flow turbulence are more accurate than the endothelial shear stress.

A510 - LGBTQIA+ Inclusive Teaching of Anatomy and Physiology
Juanita Jellyman, California State Polytechnic University Pomona, jjkellyman@cpp.edu, Anja Goldina, Elizabethtown College, goldinaw@etown.edu, Lawrence Young, Florida Southern College, lyoung@hapsconnect.org
This session shares strategies in teaching accurate and inclusive topics in reproductive anatomy and physiology. A focus on endocrine and other mechanisms in purported anatomical and physiological sex differences will be explored. We incorporate strategies to introduce culturally relevant and current examples of these topics in an inclusive, safe manner.
Session 6: Saturday, May 27 @ 3:45 PM

A601 - Teaching with Style: The A to Z of Enhancing A&P Lectures
Hisham Elbatarny, St. Lawrence College & Queen’s University, helbatarny@sl.on.ca
Lectures have been a vital part of education dating back to ancient civilizations and evolving over time to incorporate new technologies. With widespread use of audio-visual aids, such as PowerPoint or similar programs, lectures have become more interactive and engaging. However, when not constructed effectively, audience engagement suffers. This workshop will demonstrate how to maximize the use of PowerPoint’s features to enhance its effectiveness as a tool for delivering science lectures. Participants will be introduced to a range of tools and best practices for constructing visually appealing slides to create effective and engaging lectures which promote knowledge acquisition and retention.

A602 - HAPS Book Club: Inclusive classroom material development
Patrick Cafferty, Emory University, pcaffer@emory.edu, Lawrence Young, Florida Southern University, lyoung@hapsconnect.org
One objective of the HAPS Book Club is to help members develop and integrate resources that promote diversity, equity, and inclusion into their classrooms. Throughout our spring 2023 reading, we will collect content, stories, and anecdotes on the history and science of transgender and intersex athletes that HAPSters plan to incorporate into their teaching. During this workshop, we will review our collected ideas and then breakout into small groups to collaborate on developing polling questions, slide deck presentations, or case studies. At the end of this workshop, participants will have drafts of classroom materials that promote inclusive teaching.

A603 - Build Your Teaching Portfolio by Publishing in the HAPS Educator
Jacqueline Carnegie, University of Ottawa, jcarnege@uottawa.ca, Carol Britson, University of Mississippi, cbritson@olemiss.edu, Tracy Ediger, Georgia State University, tediger@gsu.edu, Elizabeth Granier, St. Louis Community College, egranier@stlcc.edu, Joanne Savory, University of Ottawa, Joanne.Savory@uottawa.ca, Brenda del Moral, Edgewood College
Would you like to explore how your successes and challenges as an A&P instructor can be published in the HAPS Educator as a research project, a teaching innovation, or a short review of a current A&P topic? Join us for this workshop where we explore the different categories of manuscripts, brainstorm ideas for publishable teaching articles, and investigate the submission and review process from an author’s perspective. The HAPS Educator is published 3 times annually, has a short turn-around time, provides helpful guidance for manuscript revision, links articles with DOIs, and is indexed with the Education Resource Information Centre (ERIC).

A604 - Leveraging Motivation To Improve Learner Outcomes
Sean Kardar, NMSU - Dona Ana Community College, skardar@nmsu.edu
Motivation is quintessential to benefit the imperfect process of instruction and learning. Above all, the learner’s spirit allows them to overcome barriers. In addition to perfecting instructional techniques, let’s think about ways to capture the learner’s spirit to motivate academic effort beyond the classroom. Stimulating a learner’s affective mind strengthens the interdependency of instruction and learning. Join me in reviewing motivating ideas to improve learner outcomes.
A605 - An exploration of the latest 3D interactive tools for the Modern Anatomist
Jake Shearer, Touch of Life Technologies, jake.shearer@toltech.net, Maureen Stabio, University of Colorado Anschutz Medical Campus, maureen.stabio@cuanschutz.edu, Ernesto Salcedo, University of Colorado Anschutz Medical Campus, Ernesto.salcedo@cuanschutz.edu, Noah Leppek, University of Colorado Anschutz Medical Campus, noah.leppek@cuanschutz.edu, Chelsea Lohman, University of Colorado Anschutz Medical Campus, chelsea.lohmanbonfiglio@cuanschutz.edu

Sponsored by Touch of Life Technologies
Technology is the love language of the modern student, and the use of 3D modeling technology in anatomy education is exploding. This workshop will explore various ways to inspire your students and help them learn complex spatial relationships through immersive extended reality (XR) technology, 3D printing, 3D surface scanning, and plastination. Workshop presenters will discuss how these tools can be integrated and scaled for large or small classrooms, large or small budgets, with or without cadaver laboratories. We will discuss case study examples from the University of Colorado Modern Human Anatomy Program, built in collaboration with Toltech using the VH Dissector software.

A606 - How intentional interdisciplinary conversations can influence course design in A & P
Sarah Hewitt, Mount Royal University, sahewitt@mtroyal.ca

I am conducting a research project that brings people together from across disciplines for intentional conversations about teaching to break through assumptions and discover crossover points that are often overlooked when we remain siloed. This experience has taught me new ways of content delivery, assessment, and developing leadership skills and creativity within an A & P context, and led to an overhaul of a senior level capstone course that I teach. I will demonstrate how I have integrated these interdisciplinary skills into my teaching, and give participants a chance to experience the guided conversation that inspired these changes.

A607 - From Bingo Chips to Tonicity: An Simple Interactive Activity to Differentiate Tonicity from Osmolarity
Debora Christensen, Drake University, debora.christensen@drake.edu

Students often can recite the definition of osmolarity, but few can actually use that information in a meaningful way. When tonicity is involved, even the best students stumble. In this workshop, we’ll demonstrate how students can engage in this material in a way that is both meaningful and memorable.

A608 - Surface Anatomy of the Human Brain: How to Get it Right When Most of us are Getting it Wrong.
Christine Eckel, Indiana University School of Medicine - Northwest, ceckel@iu.edu

Accurately locating the central sulcus, pre- and post-central gyri, Broca and Wernicke areas, and major lobes of the brain is important for most A&P courses and textbooks. However, navigating the complicated sulci and gyri of a real brain can be daunting. A critical look at textbook and online images portraying the surface anatomy of the brain revealed more errors than accuracy. In this workshop we will take a hands-on approach to learning how to accurately identify surface features of the human brain using real brains and select images. Specific activities for use in the classroom will be provided for participants.
A609 - Food for Thought! Teaching Tips for the Digestive System
Carol Veil, Professor Emeritus, Biology, Anne Arundel Community College, Anne Arundel Community College, cbveil@aacc.edu, Ewa Gorski, Professor of Biology, Community College of Baltimore County; Karen McMahon, Instructor, Retired, Biological Science, The University of Tulsa

Our team will present a variety of effective and engaging teaching activities for the digestive system that enhance student understanding and retention of A&P content. These activities can be used for in-class or online teaching, for group or individual learning. The common goal is to get students actively involved in the learning process. All exercises are linked to the HAPS Learning Outcomes posted on the HAPS website. Join us to gain some super teaching tips!

A610 - The Importance of Preparedness - How to Help Your Students Arrive Ready to Learn
Arianna Boulet, ADInstruments, a.boulet@adinstruments.com, Kathryn Tercher, k.tercher@adinstruments.com

Sponsored by ADInstruments

At ADInstruments, we have the opportunity to speak with many educators across the globe. One common theme we’re hearing over and over again? Lack of preparedness! In this workshop we will review some key components to impacting student readiness, review survey results from our current users on what’s working (and what’s not!) and ultimately address how we can improve students’ engagement before they step foot into their classroom. Equip yourself with the knowledge and tools to set your students up for success in an active learning environment.

Session 1: Sunday, May 28 @ 8:30 AM

B101 - Beating Quizlet and Chegg Through Inquiry Based Learning
William Hoover, Bunker Hill Community College, wwhoover@bhcc.edu, Gordon MacPherson, Bunker Hill Community College, gordon@atlanticvideoproductions.com

Grades and program acceptance motivate and drive students. Institutions treat students more like customers. Educators on the other hand, insist on learning and critical thinking. Companies like Quizlet and Chegg threaten to erode academic integrity. Solution: Inquiry Based Learning (IBL), coupled with “Concept Associations,” help students generate and apply knowledge through visual “imprinting.” Unlike Quizlet and Chegg, IBL empowers students by moving learned information from short to long-term memory rather than promoting memorization and regurgitation. IBL provides students the best of both worlds. They are introduced to high stakes exam questions and receive the benefit of learning and retaining knowledge.

B102 - Starting Strong
Jen West, Paloma Valley High School, jennifer.west@puhsd.org

If you’ve been looking for engaging ways to kick off the study of a new body system, look no further. Come hear how wonder walls and podcasts are being used in one high school Honors Anatomy class to get students excited about what’s next.

B103 - Making Anatomy & Physiology Make Cents
Haneen Salhieh, Chamberlain University College of Nursing, hsalhieh@chamberlain.edu

When it comes to learning anatomy and physiology, it is easy to be overwhelmed with all of the different structures and functions. What is something that can help? Money! Use of a reward system to earn “Instructor Bucks” has been seen to motivate students in course participation, exam performance, and overall comprehension. Through group-based activities, exam scores, or individual activities, students have the opportunity to earn fake “money” that can be redeemed for incentives like snacks, drinks, organ plushie toys, extra credit, etc. Let’s take a look at how different reward systems improve student retention and performance!
B104 - Writing Assignments in A&P: Thinking Beyond the Lab Report
Amie Yenser, Penn State Hazleton, alv10@psu.edu
Who has time to integrate writing assignments (and grade them!) into their A&P lectures? You may be thinking, “Most definitely not me!” This workshop will explain the benefits of writing across the curriculum as well as strategies to minimize grading time. When students write about real life problems they think critically on a deeper level. Assignment structure will be explained, and examples of writing assignments will be provided.

B105 - Accepting Mark Nielsen’s challenge: Viewing bones through the lens of cellular and organismal function.
David Temme, University of Utah, temme@biology.utah.edu
Hydroxyapatite, the mineral component of bone, consists of calcium and phosphate that tend to mineralize under certain concentrations and pH. Controlling those is the bone-forming, bone-resorption story. Yet, individual cells pump in phosphate and pump out calcium. Why? Your kidney actively reabsorbs both from filtrate, and the amount of reabsorption is constantly regulated. How? Why? Gut absorption of both occurs both paracellurally and transcellularly, with the latter more regulated in the gut, and the former more regulated by dietary choice. Curious? Plus, sunshine gets involved in several places. Puzzling? Plus, bones release signal-molecules. Really? And there is more . . .

B107 - Picturing skeletal muscle contraction
Patrice Capers, The Citadel, pcapers@citadel.edu
Students often struggle with picturing how various physiological processes like muscle contractions happen in our body. This workshop will explore approaches used to review the microanatomy of skeletal muscle and skeletal muscle contractions using inexpensive materials before, during, and after class. In this hands-on workshop, the audience will receive material to construct models to demonstrate a skeletal muscle contraction while discussing the microanatomy of skeletal muscle. We will then share and reflect on 1) this hands-on experience and 2) our experience teaching about skeletal muscle in the classroom.

B109 - Boost Success without Sacrificing Content
Nahel Awadallah, Nash Community College, nwawadallah755@nashcc.edu
This presentation will discuss establishing a productive learning environment that allows students to engage with and learn the content. Implementation of a thesis project, among many other strategies, encourages students to take control of their own learning—they learn most of the anatomy and physiology topics by applying the content to their thesis project. Strategies that will be discussed are applicable to other science courses. Join this session if you are interested in improving your student success rate and enhancing student engagement.
Session 2: Sunday, May 28 @ 9:45 AM

B201 - Histology: Disjointed Facts or Unifying Principles?
Nina Zanetti, Siena College, zanetti@siena.edu

Students often find Histology daunting because of the multitude of seemingly unrelated facts and the hurdle of interpreting microscopic images. One approach to helping students with these challenges can be to present unifying histological principles or “models”. We will explore how such “models” can help students learn to recognize recurring patterns in histological “facts”, use microscopic images for reinforcing structure-function correlations, and build conceptual frameworks that organize content and make predictions about new information. Workshop participants will use a discovery approach to identify the models, apply them to course content, and explore approaches for presenting them to students.

B202 - Head Cases: How to Write a Thought-Provoking and Clinically Accurate Case Study
John Neisser, Penn State, jxn418@psu.edu

Case studies can be an engaging and effective way to promote critical thinking. Teachers who do not have a clinical background may sometimes find writing original case studies to be an intimidating and time-consuming effort. In this workshop, we will discuss how to construct, format, and present a clinical case study that can be used in an introductory or upper division anatomy and physiology course.

B203 - Modeling of Mastery Matters: Rethinking How to Grade and Teach for Equity in our Undergraduate A&P Courses
Katrina Porter, Penn State Fayette, klp5517@psu.edu

Educators from elementary to college are beginning to rethink their grading strategies, with a common goal of making grading more equitable for all students, regardless of their learning readiness. Using traditional grading systems, while mathematically convenient, is teaching our students to strive for certain numerical scores rather than for mastery of content. To assess effectiveness of mastery grading, a GPA-based (0-4 point) grading system was implemented in undergraduate A&P courses. Observations indicate that mastery-based grading alone may not be enough for student success. This workshop will focus on how use of instructional modeling can help students achieve content mastery.

B205 - An Anatomy Color by Numbers App Used as a Mechanism to Reduce Student Anxiety and Increase Competency
Claire Farrell, Clemson University, cafarre@g.clemson.edu, John Cummings, Clemson University, cumminj@clemson.edu

Studies have shown that coloring a pre-drawn image not only reduces anxiety, but also enhances learning outcomes. This information laid the foundation for an anatomy color by numbers app, a project created in the hopes that undergraduate students will use the app as an enjoyable study tool that will enhance their knowledge of the human anatomy while reducing their overall stress level and increase their confidence in the material covered in the lecture and lab portions of the course. We tested the app with current Anatomy & Physiology undergraduate students and asked them for their feedback.

B206 - Getting Students On Board With Active Learning
Janice Fritz, St. Clair County Community College, jfritz@sc4.edu

Active learning improves student retention and understanding, but it can be hard to overcome student resistance to these techniques. Learn more active learning strategies and improve student buy-in with better explanation, facilitation, and reflection on activities.
B207 - Utilizing a Continuous Quality Improvement (CQI) Process in Student Assessments  
Brian Hill, Ph. D., Via College of Osteopathic Medicine, bhill@vcom.edu  
CQI is a philosophy that encourages team members to ask “What can we do to improve?” It is adept at providing a functional interpretation of qualitative data, and using these findings to drive meaningful and productive change. While it is widely used the healthcare administration and higher education committees and administration, it has been sparsely applied to course assessments. The incorporation of the CQI into the assessment process trains students to address their concerns by brainstorming to find practical and workable solutions, and then to professionally present their concerns and solutions to course instructors.

B208 - Let’s Get Physical: Human Physiology Experiments  
Sara Tallarovic, Vernier Science Education, sarat@vernier.com  
Sponsored by Vernier Science Education  
Get active and participate in hands-on experiments with Vernier Science Education. Explore limb position and grip strength, heart rate, and EKGS/EMGs. Experiments are designed to encourage students to think about the physiology of various human organ systems. Human physiology has never been easier. Vernier Go Direct sensors connect directly to computers, Chromebooks, and mobile devices—no interface necessary—making setup simple and cost-effective. Bring your own device or borrow one of ours. Download the free version of Graphical Analysis and get moving.

B209 - Wait! Wait! Don’t Dissect Me — A HAPS News Quiz  
Jon Jackson, Burrell College of Osteopathic Medicine, jjackson@burrell.edu,  
Elizabeth Granier, St. Louis Community College, egranier@stlcc.edu, William Perrotti,  
Mohawk Valley Community College, wperrotti@mvcc.edu, Antony Weinhaus,  
University of Minnesota, weinh001@umn.edu  
Modeled after NPR’s popular Wait, Wait, Don’t Tell Me! news quiz, this light-hearted workshop will feature audience and panel back-and-forth in friendly competition over topics culled from the science headlines or significant foundational knowledge germane to the teaching of Physiology and Anatomy. Be prepared to Laugh and Learn!

B301 - Do your students have the right mindset to be successful in A&P?  
Eric Sun, Middle Georgia State University, eric.sun@mga.edu  
What makes A&P courses so challenging? Students may say it’s the large amount of material or their instructor. Instructors may say the student’s background and motivation. However, a major factor in determining a successful experience in the classroom is the mindset of the instructor and the student. This workshop focuses on the importance of a growth mindset in promoting success. Learn the difference between a fixed and a growth mindset. Come and find out how you can cultivate a growth mindset in your classroom.

B302 - The Good, the Bad and the Ugly of Generative AI in Human Anatomy and Physiology Education  
Phil J. Medeiros, Wilfrid Laurier University, pmedeiros@wlu.ca, S. Richelle Monaghan,  
Wilfrid Laurier University, rmonaghan@wlu.ca  
Higher education is at a juncture with the launch of freely available generative AI (gAI). How do we thoughtfully leverage gAI technology to maximize teaching and learning in anatomy and physiology education? The expanding use of gAI in higher education is explored and how instructors can design ethical engagement using this technology, such as using gAI to mimic clinical conversations to learn A&P terminology. These technologies can also inspire less traditional evaluative methods in courses, including process-oriented assessments, mastery approaches, and ungrading. This workshop will explore benefits, drawbacks and solutions of gAI in the context of teaching and learning A&P.
B303 - Reaching A&P Students from Diverse Communities through Collaborative Peer-Led Instruction
Juliza Abrego, University of North Georgia, jabre8149@ung.edu
Marieb, Hoehn, and Haynes Award Winner for Diversity, Equity, and Inclusion
We invite you to listen in as we share about our learning journeys as A&P Boot Camp Coaches for a collaborative, peer-led program that engages students in an active learning environment. Additionally, coaching provides us with a sense of belonging as students from underrepresented communities. We have learned the importance of having a growth mindset and developing critical-thinking skills, both of which have transformed our academic experiences. Thus, we strive to have a similar impact on our current A&P students, and we hope that A&P instructors will recognize the benefits of implementing similar teaching strategies.

B304 - Lights! Camera! Action! Using Tutor Videos to Engage Today’s Learners
Steve Sullivan, Bucks County Community College, stephen.sullivan@bucks.edu
89% of Gen Zers are YouTube users, preferring visual content to textual content. They scour the wild west of Instagram, Snapchat, and Youtube. Unvetted content has gotten in the way of learning A&P. So, I have been making my own tutor videos for years to meet them where they are in a pedagogically sound way. I will show you what I have learned and the tools I use to supplement the classroom or replace the traditional lecture for online students.

B305 - Editing A&P textbooks through a DEI lens: Authors’ perspectives
Elizabeth Pennefather-O’Brien, Medicine Hat College, eobrien@mhc.ab.ca, Judi Nath, Lourdes University, jnath@lourdes.edu, Valerie O’Loughlin, Indiana University, vdean@indiana.edu, Keven Patton, Northeast College of Health Sciences, kpaton@northeastcollege.edu, Mark Nielsen, University of Utah
Variation is a core concept of anatomy, yet earlier texts were lacking in representing the diversity of the human population. Textbooks strive to ensure that all learners feel represented. As authors, our strong commitment to Diversity, Equity and Inclusion (DEI) can be quite challenging since there is no universally accepted inclusive terminology and descriptions for many topics. We must balance descriptions for our entire readership, and not every reader may agree with specific terminology or descriptions. Join a lively dialog with several textbook authors, sharing their DEI journeys.

B307 - Service Dogs in the Classroom and Laboratory
Pat Clark, Indiana Univ, Purdue Univ. Indianapolis, patclark@iupui.edu
The movement of diversity, equity, and inclusion into the forefront of educational can bring unexpected challenges to the classroom and laboratory. Many of us have campus adaptive education services that identify student accommodations. A service animal may be an approved accommodation. The presence of service animals is increasing in university classrooms, but faculty and staff training has often not been addressed. In this workshop, I will discuss the Americans with Disabilities Act and definition of a full access service animal (dog). I will also discuss and demonstrate the guidelines and requirements established by the IUPUI Environmental Health & Safety Office.

B308 - Unleashing student potential: A flexible final assessment approach in undergraduate anatomy and physiology
Jill Kirby, Lipscomb University, jmkirby1@lipscomb.edu
How can professors construct meaningful opportunities for students in Anatomy and Physiology courses to take control of their own learning and effectively demonstrate what they have learned? This workshop will share how one professor has given students choice in how they take their final assessment. Do they want to take a final exam? Sure, no problem. Do they want to complete a final project? Sure, no problem. Come see how it’s done and how students have responded. Participants will assess and discuss how this approach might fit into their own context and leave with steps that could be implemented immediately.
**B309 - Evidence-based Strategies to Promote Student Success, Retention, and Outcomes in Anatomy and Physiology Courses and Health Science Programs**  
Ruby Kaur, Aurora University, rkaur@aurora.edu  
The school of health science has undergone major transformations in the last couple of years by implementing faculty-led and administration-supported strategies to promote student success, retention, and learning outcomes. This presentation will include specifics on the series of strategies applied and analyzed through data collection from students’ performance in the health science courses. The presenters will connect the audience to the evidence-based team-approach for the program growth and most importantly students’ success in establishing stronger foundation at the undergraduate level and entry into the graduate programs. The focus of data collection included anatomy and physiology courses leading to pipeline programs for achieving career goals.

**Session 4: Sunday, May 28 @ 1:15 PM**

**B401 - Jigsaw activities and group exams: resurrecting old ideas for the modern classroom**  
Chad Wayne, Univeristy of Houston, cwayne@uh.edu  
Jigsaw activities are a cooperative, active learning strategy that can be used to develop student engagement, teach critical thinking, build communication skills, and encourage student accountability. Group exams reinforce and assess the effectiveness of the jigsaw approach to learning. A student who can think and communicate clearly is well prepared to enter the scientific or health-associated professions community where they will need to use these skills regularly. This talk will focus on how to design and implement jigsaw activities assignments and group exams for use in the A&P or Physiology classroom or laboratory.

**B402 - Core Values in Donor Memorialization Practices**  
Bobbie Leeper, Seton Hill University, bleeper80@hotmail.com, Rhiannon Robinson, Boston University Chobanian & Avedisian School of Medicine, rebnnsn@bu.edu, Jeremy Grachan, Rutgers New Jersey Medical School, jg1916@njms.rutgers.edu, Kelsey Stevens, Briar Cliff University, kelsey.stevens@briarcliff.edu  
Human body donors are memorialized in different ways across the country, the world, and across cultures. This workshop will highlight a variety of different donor memorialization practices. Different institutions will share various tools and methods for a range of inclusive memorialization strategies, including both religious and non-religious services. Participants in this workshop will be welcomed to offer their own best practices and ideas at their respective institutions or programs. This workshop will culminate in the identification of shared core values that the HAPS Anatomical Donor Stewardship Committee will recommend for all donor memorialization practices.

**B403 - So Much To Do and Yet So Little Time: Leveraging Prosection Lab Activities to Reinforce Anatomy & Physiology Content**  
Edgar Meyer, University of Mississippi Medical Center, emeyer@umc.edu  
Reducing course hours in anatomy curricula is a growing trend globally, especially within health professional degree programs. These time constraints compel anatomy educators to devise and implement novel, reimagined techniques to deliver content. This workshop will describe prosection lab activities in the postbaccalaureate anatomy course at the University of Mississippi Medical Center and discuss how they reinforce and enhance students’ anatomy and physiology knowledge. This workshop will discuss how these activities effectively engage students in small-group interaction and increase their critical thinking capacity. Attendees will discuss how these or similar activities applied at their own institutions can spark student learning.
B404 - Demystifying the hypothalamo-hypophyseal axis using active learning strategies and “study hacks”
Cathy Whiting, University of North Georgia, cathy.whiting@ung.edu, Josie Ayers, University of North Georgia, jgayer4588@ung.edu, Jessica Lerma, University of North Georgia, jcin0417@ung.edu, Brian Lee, University of North Georgia, ble3315@ung.edu
Gail Jenkins Teaching and Mentoring Award Winner
Join us in this interactive workshop as we present several active learning strategies designed to help students master the hypothalamo-hypophyseal axis. We will create an engaging learning environment as workshop participants review key principles of endocrinology and explore the structure and function of the axis. We will also share an effective set of “study hacks” that can be used by students to build their metacognitive skills as they monitor and evaluate their levels of understanding and performance. In summary, we will demonstrate a tactical approach for developing a growth mindset-oriented classroom that facilitates collaboration and leads to deep, meaningful learning.

B405 - Real-time measurements of muscle energy loading during osteopathic evaluation maneuvers.
Alayna Schwartz, Burrell College of Osteopathic Medicine, Alayna.schwartz@burrell.edu, Taylor Sheppard, Burrell College of Osteopathic Medicine, taylor.sheppard@burrell.edu, Jon Jackson, Burrell College of Osteopathic Medicine, jjackson@burrell.edu
Osteopathic manipulation is a non-invasive form of patient evaluation and treatment generally considered to be safe and efficient. It is used as a first-line technique in patients presenting symptoms involving the musculoskeletal system, and who seek to avoid invasive therapies or pharmacological interventions. The use of these treatments has grown exponentially the past two decades, yet a thorough mechanistic understanding of how the treatment works is lacking. This workshop will use common bio–amplification recorders used in A&P labs to demonstrate one theory of how a muscle energy technique works when employed by a competent practitioner.

B406 - Build Your Teaching Portfolio by being a Reviewer for the HAPS Educator
Brenda Del Moral, Edgewood College, bdelmoral@edgewood.edu, Tracy Ediger, Georgia State University, tediger@gsu.edu, Elizabeth Granier, St. Louis Community College, egranier@stlcc.edu, Carol Britson, University of Mississippi, cbritson@olemiss.edu, Joanne Savory, University of Ottawa, Joanne.Savory@uottawa.ca, Jacqueline Carnegie, University of Ottawa, jcarne@uottawa.ca
Reviewers for the HAPS Educator expand their scholarly experience when evaluating submissions to the journal by authors, both new and experienced. Join us for this workshop where we explore how to review manuscripts submitted as Perspectives in Teaching, Educational Research, or Literature Reviews of a topic relevant to A&P teaching. It is rewarding to help new authors and experience gained by reviewers can also help them with publishing their own work. The HAPS Educator is published 3 times annually, meaning that you are asked to review no more than 2-3 articles per year and your participation is acknowledged in each journal edition.
Session 5: Sunday, May 28 @ 2:30 PM

B501 - Maintaining Academic Integrity in Hybrid and Online Courses
Carrie Long, Anne Arundel Community College, clong9@aacc.edu
The pandemic increased the number of modalities used to deliver Anatomy and Physiology content. As online courses continue at many institutions, it is important to minimize academic dishonesty while not overloading the instructor. This presentation will discuss ways to introduce, communicate, and reinforce your academic integrity policy to your students throughout the semester. Next, I will show you how to maintain academic integrity in your course by requiring students to use an external webcam with your institution’s chosen online proctoring system, including tips that ensure quick adoption and reduce both review time and academic dishonesty.

Anthony Weinhaus, University of Minnesota, weinh001@umn.edu
AnatomicalTerms.info (ATI)
Sponsored by the American Association of Clinical Anatomists
A reliable source of information for teachers and learners with proper anatomical terminology with short definitions, clinical terms, synonyms, and eponyms. For accuracy, the terminology is derived from the Terminologia Anatomica, and is organized by the Clinical Anatomical Terminology Committee of the American Association of Clinical Anatomists. It is a work in progress and welcomes all interested anatomists to contribute through a systematic data-entry program, which are reviewed by other contributors and editors. The workshop will explore the ATI with the hopes that attendees will find the site useful in their teaching, but also contribute to its growth.

B503 - Students as prosumers of anatomy and physiology content
Melanie Schroer, Stockton University, melanie.schroer@stockton.edu
The well-accepted benefits of active learning are further enhanced when students not only actively consume educational content such as physiology videos, but produce such resources for themselves. As “prosumers,” students both teach and learn from their peers through unique representations of scientific content. This student-centered approach promotes attention to detail, advanced cognitive processing, rehearsal and refinement of comprehension, and commitment to lifelong learning. In this workshop, see how students are empowered to create their own digital media, including videos, disease diagrams, and audio summaries. In turn, students consume these novel peer-generated learning resources to bolster their understanding of complex concepts.
B504 - Toward a New “Normal”: Examples of non-Pathological Human Variation
Tracy Ediger, Georgia State University, tediger@gsu.edu
To broaden my own knowledge of the range of human variation, I asked students to research and report an example of a structure or function that shows diversity within the healthy human population. The assignment asked for one example not mentioned in our course’s textbook. The structure or function should not be disease-causing or require medical intervention. For example, people can have 3, 4, or 5 coccygeal vertebrae. In this workshop, I will discuss some interesting tidbits I learned from my students’ explorations. Do you know what the fabella is? I didn’t, but now I do!

B506 - Building a Science Department DEIA Committee: A second year reflection
Krista White, Anne Arundel Community College, kywhite1@aacc.edu
The presenter(s) will share experiences and accomplishments two years after establishing an Inclusion, Diversity, Equity and Anti-racism (IDEA) committee, which is a faculty-driven initiative started at Anne Arundel Community College (Arnold, MD). This workshop will guide participants through the initial steps of assessing their departmental climate and establishing a committee of peers. Participants will be provided with steps to navigate the process of creating an IDEA committee and will learn about accomplishments and challenges encountered. This committee work is geared towards the Science disciplines; however, the foundational aspects of the committee structure can be used by any discipline.

Ethically-Sourced, Plastinated Specimens from von Hagens Plastination.
- Silicone Plastinates
- Sheet Plastinates
- Anatomy Glass
- Skeletons & Skulls
- Blood Vessel Configuration
- Bespoke Specimen Dissection

Visit us at Booth #202

www.anatomicexcellence.com
Thanks to:

CNM HAPS
Conference Committee:
  Greg Broussard
  J. Mark Danley (Chair)
  Janet Fildes
  Melissa Franklin
  Anna Gilletly
  Nancy McNally

CNM Biology Faculty and Technical staff, especially:
  Heather Fitzgerald (Interim Department Chair)
  Richard Calabro
  M. Victoria Elenes
  Terri Koontz
  James Niforatos
  Audrey Nihart
  Caroline Rempe
  Susan Tappen
  Patricia Wilber

CNM President Tracey Hartzler
Vice President of Academic Affairs, Sydney Gunthorpe (retired)
Deans of Math Science & Engineering, John Cornish (retired) and Philip Lister
  Aline Gonzales and Nefertiti Moses
  Lillian Cordova and Laura Aguirre
  Chris Nielsen

And the many volunteers from the CNM community
who are donating their time to assist during the conference.