**Legend for Lesson Plan:**

slido poll – blue

activity (audience engagement) - orange

handout – red

break/leakage time – green

Slido Poll Questions can be accessed in a sharable template at this link: [here](https://auth.slido.com/eu1/api/latest/the-auth/user/lifecycle-process/shareable-link/init?token=1411c175e7054b41562dcdc408a8c74d0be92151276530dd5f71ec1e5281cfb2)

**Detailed Lesson Plan**

|  |  |
| --- | --- |
|  |  |
| Intro question  8 minutes - 9:55am-10:03 am | Sli.do poll question on the board: Presenters chat with folks as they enter, *What is the biggest challenge you have when making figures?* Access link [HERE.](https://auth.slido.com/eu1/api/latest/the-auth/user/lifecycle-process/shareable-link/init?token=1411c175e7054b41562dcdc408a8c74d0be92151276530dd5f71ec1e5281cfb2) |
| Introduction  2 minutes - 10:03 am - 10:05 | Introduction of SCIFIG creators and workshop organizers   * SCIFIC acknowledgement slide * Presenters introduction slides * Introduce workshop outcomes * Introduce schedule of events (and handout) |
| Transition to Slido poll | End with Sli.do word cloud of the words people are associating with good figures most often (word cloud), Access link [HERE.](https://auth.slido.com/eu1/api/latest/the-auth/user/lifecycle-process/shareable-link/init?token=1411c175e7054b41562dcdc408a8c74d0be92151276530dd5f71ec1e5281cfb2) |
| Purpose of Workshop  5 minutes - 10:05-10:10 | Why bother with a figure:   * What is the purpose of a figure? * What audiences care about a figure? * What is the timeline of a figure?   Transition - How can we increase the impact of a Figure? By communicating the main point  Transition to Figure Activity (Slide 10) |
| Figure Activity  TOTAL: 20 minutes - 10:10 - 10:30  INTRO:  2 minutes - 10:10-10:12  FIGURE 1:  2 minutes – 10:12-10:14  SLIDO POLL:  1 minute  REFLECTION:  1 minute  **FIGURE 2:**  **2 minutes**  DISCUSSION:  2 minutes  REFLECTION  FIGURE 3:  2 minutes  REFLECTION:  FIGURE 4:  LESSON:  FIGURE SPECTRUM: | **Figure Activity: Why should you care about the quality of the figures?**  **Introduce Activity: will show some figures and highlight the main point of each.**  Show Figure 1 with no context, and give 30s for people to analyze and assess    Slido Poll questions - Who would you be comfortable sharing this with? What is the main point of this figure? Access link [HERE.](https://auth.slido.com/eu1/api/latest/the-auth/user/lifecycle-process/shareable-link/init?token=1411c175e7054b41562dcdc408a8c74d0be92151276530dd5f71ec1e5281cfb2)  Fixing the Basics: Highlight the things that are wrong with it. Use as a teaching example, referring to poll responses. What could use attention?  Introduce Figure 2 in contrast to Figure 1  Open Discussion: What changed between Figure 1 versus Figure 2? What is still missing? (Slide 14).  **Lesson: The data format has not changed, but the content has (format v. content).** Discuss how different formats can be used to highlight content and build understanding  Introduce Figure 3 versus Figure 2  Open Discussion: What changed between Figure 2 versus Figure 3? What is still missing? (Slide 16)  Reflect with the group on changes of in content from Figure 2 and Figure 3. Similar graph type but shifting the content to be more presentable.  Open Discussion: What changed between Figure 3 and Figure 4? What is still missing?  Lesson: Creating content can be specific to the audience; the needs of a figure change over time  Highlight the handout of the Figure Spectrum and how the figure changes through iterations over time, over different contexts, and through feedback from advisor/mentor/collaborator(s). |
| Leakage Time/Questions  10:30-10:33 | Leakage time/Q&A pause |
| Figure Rubric  10 minutes 10:33 - 10:43 | Becoming Figure Surgeons  Show a slide of not-so-fantastic figures to reflect on how creating fantastic figures takes time, just like surgical training. Replace with your own examples if you’d like!  (Call back to the Figure Spectrum)  Now we will go through the essential elements of a good figure following the structure outlined in the Figure Rubric |
| Figure Rubric Categories | Introduce Figure Rubric Categories with examples:  Low hanging fruit of figure creation:   * Scale & Resolution * Units & Labels   Higher level figure categories:   * Colors * Emphasis * Ink: Content Ratio   The highest, most complex goal:   * Accessibility |
| Questions Break  5 minutes 10:45 - 10:50 | Leakage time/Q&A  Transition slide that shows the GitHub SCIFIG logo: audience can scan the QR code for more information |
| Transition to the P^3: How can these figures be used? | Poster vs. Publication vs. Presentation  *Links and FAQs Sheet handout for specific tools* |
| Intro to P^3  5 minutes - 10:50 - 10:55 | One Size does not fig all: Posters versus Presentations versus Publications – showing the screenshot of the three different interpretations on the Figure spectrum.  What this workshop is NOT: Designing a poster, presentation, publication -> refer questions to the Links and FAQs sheet on the SCIFIG GitHub. |
| Posters | Discuss the important features of creating posters:   * A poster should stand on its own * Size of fonts/text matters * Consistent poster color palette * Poster interfaces with a person standing alongside * Less is more   Recap of the Poster main talking points |
| Presentation  5 minutes - 10:55 - 11:00 | Discuss important parts of presentation figures:   * Start the activity with a poor presentation (presenting all the content at once) versus a good presentation (presenting it in pieces) * Using animations and transparency, do not need to show ALL of your paper figures * Showing a subset of the data * Table versus figure for presentation formats   Recap of the Presentation's main talking points |
| Discussion | What are the primary differences you see with posters versus presentations? |
| Publications  5 minutes 11:02-11:07 | Discuss important features of publications:   * Papers are academic currency: putting your best figure forward is important * The first figure – the screenshot figure! This is the figure that many others will screenshot for their own Related Work slides. * Use a multi-panel display to create a nice figure * Use schematics alongside data for ease of understanding * Pick your paper palette and keep colors consistent throughout   Recap of Publication’s main talking points |
| RECAP | One size does not fit all: each figure can be customized into different formats and follow the Figure Rubric to create figures that are lossless and save time when adjusting for each. |
| Leakage plus break  13 minutes 11:07 - 11:20 | Questions/Transition room to sides for breakouts |
| Breakout Option 1 – e.g. Inkscape 101  30 minutes 11:20 - 11:50 | INSERT BREAKOUTS HERE IF TWO HOURS, if not skip onto Final Recap |
| Breakout Option 2 – e.g. Figure Peer Review  30 minutes 11:20 - 11:50 | INSERT BREAKOUTS HERE IF TWO HOURS, if not skip onto Final Recap |
| Final Recap  11:50 - 11:55 | Restate & Callbacks   * Slide of learning objectives * Slide of handouts |
| Ending Slide | End Slide with emails/contact information |
| Supplemental Slides: | Bibliography Slide included at the end of this sheet |

**Bibliography of Figures Used:**

A. K. Schulz, N. Schneider, M. Zhang, and K. Singal, “A Year at the Forefront of Hydrostat Motion,” *Biology Open*, vol. 12, no. 8, p. bio059834, Aug. 2023, doi: [10.1242/bio.059834](https://doi.org/10.1242/bio.059834).

N. Ruegg, S. Tripathi, K. Schindler, M. J. Black, and S. Zuffi, “{BITE}: Beyond Priors for Improved Three-{D} Dog Pose Estimation,” presented at the IEEE/CVF Conf.~on Computer Vision and Pattern Recognition (CVPR), 2023.

A. K. Schulz *et al.*, “Conservation tools: the next generation of engineering–biology collaborations,” *Journal of The Royal Society Interface*, vol. 20, no. 205, p. 20230232, Aug. 2023, doi: [10.1098/rsif.2023.0232](https://doi.org/10.1098/rsif.2023.0232).

A. Schulz, “Early Outcomes from an Interdiscplinary VIP Course,” presented at the Georgia Tech Teaching Conference, 2021.

B. Christensen and M. A. Daley, “Energy Regulation in Response to Substrate Energy Loss,” presented at the American Society of Biomechanics, 2023.

N. Rokhmanova, O. Pearl, K. J. Kuchenbecker, and E. Halilaj, “IMU-Based Kinematics Estimation Accuracy Affects Gait Retraining using Vibrotactile Cues,” *TNSRE (under review)*, 2023.

N. Rokhmanova, K. J. Kuchenbecker, P. B. Shull, R. Ferber, and E. Halilaj, “Predicting knee adduction moment response to gait retraining with minimal clinical data,” *PLOS Computational Biology*, vol. 18, no. 5, p. e1009500, May 2022, doi: [10.1371/journal.pcbi.1009500](https://doi.org/10.1371/journal.pcbi.1009500).

A. K. Schulz *et al.*, “Skin wrinkles and folds enable asymmetric stretch in the elephant trunk,” *Proceedings of the National Academy of Sciences*, vol. 119, no. 31, p. e2122563119, Aug. 2022, doi: [10.1073/pnas.2122563119](https://doi.org/10.1073/pnas.2122563119).

A. K. Schulz, M. Chellapurath, P. C. Khandelwal, S. Rezaei, S. Merker, and A. Jusufi, “Spiny Tail Enhances Traction on Diverse Barks in Pel’s Scaly Tailed Squirrel,” *In Prep*, 2023.

K. Gordon, “Using Color to Enhance Your Design,” Nielsen Norman Group. Accessed: Nov. 23, 2023. [Online]. Available: <https://www.nngroup.com/articles/color-enhance-design/>

**Bibliography by Slide Number:**

|  |  |
| --- | --- |
| Slide Number: | Citation: |
| 22 | First drafts of figures for the data later published in:  Left: Rokhmanova N, Kuchenbecker KJ, Shull PB, Ferber R, Halilaj E (2022) Predicting knee adduction moment response to gait retraining with minimal clinical data. PLOS Computational Biology 18(5): e1009500. https://doi.org/10.1371/journal.pcbi.1009500  Right: A. K. Schulz et al., “Skin wrinkles and folds enable asymmetric stretch in the elephant trunk,” Proceedings of the National Academy of Sciences, vol. 119, no. 31, p. e2122563119, Aug. 2022, doi: 10.1073/pnas.2122563119. |
| 28 | Gordon, Kelley (June 6, 2021), Using Color to Enhance your Design, Nielsen Normal group |
| 29 | Rokhmanova, N, Pearl, O, Kuchenbecker, KJ, Halilaj, E. “IMU-Based Kinematics Estimation Accuracy Affects Gait Retraining using Vibrotactile Cues” TNSRE (under review) |
| 38 | Left: Schulz, A.K. Early Outcomes from an Interdisciplinary VIP Course, Georgia Tech Teachers Appreciation Day 2021  Right: Christensen, B., Daley, M., Energy Regulation in Response to Substrate Energy Loss, American Society of Biomechanics, 2023 |
| 39 | Christensen, B., Daley, M., Energy Regulation in Response to Substrate Energy Loss, American Society of Biomechanics, 2023 |
| 44 | Andrew K. Schulz, Nikole Schneider, Margaret Zhang, Krishma Singal; A Year at the Forefront of Hydrostat Motion. *Biol Open* 15 August 2023; 12 (8): bio059834. |
| 45 | Andrew K. Schulz, Nikole Schneider, Margaret Zhang, Krishma Singal; A Year at the Forefront of Hydrostat Motion. *Biol Open* 15 August 2023; 12 (8): bio059834. |
| 46 | Schulz AK, Shriver C,Stathatos S, Seleb B, Weigel EG, Chang Y-H, Saad Bhamla M, Hu DL, Mendelson III JR. 2023 Conservation tools: the next generation of engineering–biology collaborations. J. R. Soc. Interface20: 20230232. |
| 47 | Andrew K. Schulz, Nikole Schneider, Margaret Zhang, Krishma Singal; A Year at the Forefront of Hydrostat Motion. *Biol Open* 15 August 2023; 12 (8): bio059834. |
| 49 | Schulz, A.K., Chellapurath, M., Khandelwal, P., Rezaei, S., Merker, S., Jusufi, A. (2023) Spiny Tail Enhances Traction on Diverse Barks in Pel’s Scaly Tailed Squirrel, *In Prep* |
| 52 | Rokhmanova N, Kuchenbecker KJ, Shull PB, Ferber R, Halilaj E (2022) Predicting knee adduction moment response to gait retraining with minimal clinical data. PLOS Computational Biology 18(5): e1009500. <https://doi.org/10.1371/journal.pcbi.1009500>  [1]  A. K. Schulz *et al.*, “Skin wrinkles and folds enable asymmetric stretch in the elephant trunk,” *Proceedings of the National Academy of Sciences*, vol. 119, no. 31, p. e2122563119, Aug. 2022 |
| 53 | Ruegg, N., Tripathi, S., Schindler, K., Black, M., Zuffi, S., BITE: Beyond Priors for Improved Three-D Dog Pose Estimation, IEEE/CVF Conf. on Computer Vision and Pattern Recognition (CVPR), 2023 |
| 55 | Rokhmanova N, Kuchenbecker KJ, Shull PB, Ferber R, Halilaj E (2022) Predicting knee adduction moment response to gait retraining with minimal clinical data. PLOS Computational Biology 18(5): e1009500. https://doi.org/10.1371/journal.pcbi.1009500 |
| 56 | Rokhmanova N, Kuchenbecker KJ, Shull PB, Ferber R, Halilaj E (2022) Predicting knee adduction moment response to gait retraining with minimal clinical data. PLOS Computational Biology 18(5): e1009500. https://doi.org/10.1371/journal.pcbi.1009500 |