Biochemistry and Neuroscience - Doctor of Philosophy - Full Review & SLOA

Current Compliance Year: 2023-2024
Full review

Recent Recommendations

Feedback will include recommendations from the last Expedited Review or from your most recent review by your school or college. You may not see any feedback or recommendations until you have completed your first full or mid-cycle review.

Response to Previous Recommendations (if any):

We recommended focusing on quantitative skills in Chem 688, but due to short-term shuffling to cover departing faculty this plan has not been implemented. We are on track to begin in fall 2024.

Student Learning Outcomes

The previous Student Learning Outcomes Assessment has been submitted as its own report. Going forward you will use the following prompts to discuss the success of your most recent SLOA plan and address your assessment activities since your last SLOA report (typically the past two years or since your last program review).

Learning outcomes feedback from last review: Feedback and recommendations may not appear until after your first full or mid-cycle review.

Strong

Discuss your SLOA findings, changes you are making and what you hope to see as a result:

With regard to our SLOA goal, we find:
To prepare students for careers in biochemistry and neuroscience to meet workforce demand within academia, industry, government and legal services. All of students who graduated during the performance period have found jobs in academia or industry.

With regard to our 5 learning outcomes, we find:
Strong written communication skills to communicate significance and innovation as well as technical details of biochemistry and neuroscience research. The majority of our students are on track or advanced in writing skills.

Ability to formulate hypotheses and articulate methods for testing hypotheses, and ability to perform technical tasks and quantitative analyses needed to test hypotheses and interpret results
Most of our students are on track or advanced in ability to formulate hypothesis. We attribute this to one-on-one mentoring in the laboratory group setting and to our biochemistry colloquium that focuses on formulating and communicating a model and to develop testable hypotheses from this model.

General and specific knowledge of field and peer-reviewed literature. Ability to critically analyze literature.
Most of our students are on track on their ability to read, comprehend and critically analyze peer-reviewed literature. We attribute this to the use of peer-reviewed literature in our courses, laboratory

group activities that include discussion of literature, and student productivity with their own research and participation in scientific conferences.

Strong presentation skills
Our students are on track for presentation skills. We attribute this to frequent presentations in courses, at laboratory group meetings, committee meetings and scientific conferences.

Strong professional skills
Professional skills are assessed from the conglomerate of assessment topics. Overall, our students are developing professional skills to make them competitive for advancing in their field.

Discuss the curricular changes made based on assessing your SLO. If you haven't made any curricular changes, please explain why not and address what you did notice in the review, including strengths of your curriculum through the assessment of your outcomes:

Overall our curriculum is strong. Students are publishing papers and getting jobs in fields related to bichemistry and neuroscience. Our greatest concern with the current curriculum is that we do not have sufficient faculty to maintain all of our core courses. We are in the process of revising our curriculum so that it is more flexible and adaptive to faculty workload. This is how the program functioned back to about 2008 until we reached a critical mass of faculty and developed a program based on core course requirements. We are also looking to enhance experiential learning opportunities for PhD students.

Are communication outcomes embedded in the SLOA Plan?
As of 2017 all Baccalaureate programs were required to embed the communication outcomes within their SLOA Plans, this is optional for non-Baccalaureate programs.

Not Embedded

Student Success

To access the Student Success Dashboard please sign into a UA computer with VPN connection (if not on campus). You will need your UA credentials and it is best accessed with the most updated version of Chrome, Edge, Firefox or Safari browsers; Internet Explorer is not supported. You will need to filter the data to see your programs. If you need assistance in finding the data for your programs, please contact your data liaison or Julia Manfredini in the PAIR office.

Data Liaisons
Each school or college has a team of Data Liaisons to help you analyze the data provided in the portal and may be able to help you see your data in multiple contexts. You can find a list of data liaisons on the resources page for Program Review.

The college or school level committee will also have access to this data with the goal that by providing these visualizations data availability will be increased.

Data supplied within the dashboard linked below is intended for Academic Program Review and not for any other purpose.

Student Success Data Dashboard

Previous Feedback: Feedback and recommendations may not appear until after your first full or mid-cycle review.

Student Success Data Trends:

No change in majors

If equity gaps were found in any of your disaggregated student success data, please explain how you plan to address those gaps. Please contact your data liaison or make an appointment with Julia Manfredini to learn more about analyzing your data.

We did not find equity gaps

Optional Data Explanation

Feel free to share more of your thoughts on the data provided.

High Impact Practices

According to the AAC&U, High-Impact Educational Practices "have been widely tested and have been shown to be beneficial to college students from many backgrounds." UAF is particularly interested in Undergraduate Research and/or Scholarly Activity because it is one of our mission fulfillment indicators, but all of these researched High-Impact Educational Practices should be reflected in your program's student learning outcomes and curriculum.

Previous Feedback: Feedback and recommendations may not appear until after your first full or mid-cycle review.

High-Impact Practices Used in this Program

Please use the following fields to discuss how your program is using the high-impact practices, successes and known issues and solutions, or ways you are considering incorporating them in the future. If you are not using any of the high-impact practices listed, please use the "Other or None of These," filed to share what your program is doing to help students be successful.

High Impact Practices that currently apply to your program:

Collaborative Assignments & Projects

Undergraduate Research

Diversity/Global Learning

ePortfolios

First Year-Seminars & Experiences

Writing-Intensive Courses

Service-Learning and/or Community-based Learning

Internships

Capstone Courses & Projects

Other or None of these (explain)

By supporting graduate students, especially PhD students, we enhance the mentoring pool for undergraduates. Most of our graduate students assist PIs in mentoring undergraduate students in laboratory research.

Program Profile and Financial Data

The program review elements in this section usually stay consistent for departments. Any responses you provide will be saved for your next visit. So, when it's time for the next program submission, your previous narrative profile answers will be here, ready for editing. You can then decide if any updates are necessary, based on your needs for the next program review cycle.

Financial Data Resources

The Board of Regents shapes program review, through BOR Policy 10.06, to support budget increase advocacy in the state legislature. The standardized financial data template should be analyzed with your data liaison to assess your program's capacity and resource status.

To keep integrity and remain standard across all of UAF it is very important that you do not provide any additional or alternative data.

Financial Template

Your data liaison may have uploaded your template to the Google folder for this program, or you may do so now.

Previous Feedback: Feedback and recommendations may not appear until after your first full or mid-cycle review.

Cost Effectiveness

How does your department/program approach being cost effective?

On average, we teach four stacked graduate/undergraduate courses on an every-other-year basis and one annual 1-credit graduate student skills class, about 7 credit-hours per year. Students from other programs (e.g. M.S. Chemistry, BS biology, BS chemistry) account for about 50% of enrollment for our graduate courses. Only department-level fiscal data
was provided to us, but we attempted to estimate cost for teaching the courses in each of our graduate programs by taking the department's total budget, which averaged [redacted]/yr and dividing by the average workload units of teaching, which was 145, meaning [redacted] / teaching unit (credit) times 7 credit hours = [redacted]/yr.

PAIR data: From student statistics, the majors' annual average SCH load is 13.6 SCH x 13 students = 176 SCH / year. At [redacted]/SCH (in state rate), this is [redacted]/yr income to UAF. About half of the graduate students pay international (non-resident) tuition at over twice the cost, leading to an additional income to UAF.

On this simple calculation basis, we see that the program is cost neutral; however, there are many benefits of graduate programs beyond tuition revenue. Many B&N graduate students are supported on external grants, but ICR is not included in the calculation. If faculty were teaching labs they would be less likely to compete successfully for grant funding, would have less active research and be able to support less PhD or MS level research activities needed to graduate PhD students and to provide research experiences for undergraduates.

Program's Value to Mission

Duplicative Programs

Community or Other Partnerships

Value of Service Courses (Optional)

Post-Graduate Success

Submission

Submitter & Collaborator Names

Maegan Weltzin, Larry Duffy, Kriya Dunlap

College or School Review Committee

The college or school committees set the tone for helping each program feel seen during this process. We have provided you with strength-based feedback tags to attach to this program review. Please select as many as applicable.

Overall Recommendations

Consider curricular revisions,Improve time to degree

Explanation of Recommendations

Curricular revisions are already being considered; the committee recommends continuing to pursue curricular revisions.
As there are not enough faculty to teach core courses, the committee recommends increasing the number of faculty FTEs. This will also help improve the time to degree.

Student Learning Outcomes Assessment Feedback (tags)

Strong alignment with SLOA plan,"Clear, concise presentation of findings"

Student Learning Outcomes Assessment Feedback (narrative)

Profile Feedback

Program is mission-centric to UAF or college/school,Program is unique in the state,Collaborative with other UA programs

Financial Feedback

High Tuition Revenues,Operates at Low Cost

Student Success & Equity Feedback

High-Impact Practices Feedback

No information was provided about high-impact practices.

Dean's Review Feedback

The Ph.D. in Biochemistry and Neuroscience provides advanced training in general topics as well as Alaska-specific topics (e.g., strong and prov hibernation biology).

Vice Provost Feedback

SLOAs – Your report shows strong alignment between the plan, the results, and the analysis done by the program. Provided 5 SLOs; the program should consider revising the SLOs to be more fleshed out and to include more "action" words (https://tips.uark.edu/blooms-taxonomy-verb-chart/). Need to address closing the loop and continuous improvement.

HIPs - Provided overviews of these practices; could have used more details for each practice with specific examples. Not clear if these are required for all students or if students can choose from a group of options. Frequency of these opportunities? Where in the program/what classes? Required or optional? What proportion of students involved?

UNIVERSITY OF ALASKA FAIRBANKS

Student Learning Outcomes Assessment Plan

PhD Biochemistry and Neuroscience

CNSM

May 12, 2021

Expanded Statement of Institutional Purpose	Intended Objectives/Outcomes	Assessment Criteria and Procedures	Implementation (what, when, who)
MISSION STATEMENT: Mission: The PhD graduate program in Biochemistry and Neuroscience supports training and research excellence in core areas including cellular and molecular neuroscience, drug discovery and bioanalytical chemistry. The program contributes to the Biomedical and One Health Science community at the University of Alaska and seeks to better understand and develop technologies related to the Arctic. **GOAL STATEMENT**: To prepare students for careers in biochemistry and neuroscience to meet workforce demand within academia, industry, government and legal services.	Strong written communication skills to communicate significance and innovation as well as technical details of biochemistry and neuroscience research	Writing assigned in the B&N graduate colloquium (Chem 688) is evaluated according to a standard rubric. The written comprehensive exam (proposal) and thesis are evaluated according to professional proposal and manuscript review criteria and written documents are revised until expected standards are met.	The graduate advisory committee will recommend revisions to written comprehensive exam and the thesis and evaluate drafts until the student demonstrates mastery of written communication.
	Ability to formulate hypotheses and articulate methods for testing hypotheses, and ability to perform technical tasks and quantitative analyses needed to test hypotheses and interpret results	Skills demonstrated during regular laboratory meetings, annual graduate committee meetings, and during thesis defense are evaluated according to professional standards. Laboratory records are evaluated according to professional standards. Number of first authored student or alumni peer-reviewed publications in professional journals. Number of successful student authored fellowship applications such as Alaska INBRE and other competitive funding mechanisms supporting graduate student research assistantships.	The thesis advisor reviews laboratory work and notebooks at regular lab meetings and during one on one meetings with students. The student shares a current laboratory notebook for comments at committee meetings and presents a summary of research progress. The graduate committee completes a presentation rubric and provides additional feedback to develop skills at annual meetings and the thesis defense and when reviewing drafts of manuscripts and the thesis. To improve quantitative skills we will dedicate one semester of our B&N colloquium to biostatistics, data visualization and quantitative aspects of rigor.
	General and specific knowledge of field and peer-reviewed	Knowledge demonstrated during regular laboratory meetings, annual graduate committee meetings, oral	List of first-authored, peer-reviewed publications (including impact factors), abstracts, talks and poster

Submitted by:

	literature. Ability to critically analyze literature	comprehensive exam and during thesis defense are evaluated according to state-of-the art in the field.	presentations included on annual report.
	Strong presentation skills	Ability to communicate significance, innovation, application, theory, hypothesis, experimental design, and interpretation of results demonstrated during laboratory meetings, annual graduate committee meetings, oral comprehensive exam and during thesis defense are evaluated according to professional standards.	Graduate committee evaluates oral presentation according to an established rubric at each annual committee meeting, oral comprehensive exam and thesis defense.
	Strong professional skills	Establish a continuous training addressing accurate note taking, short succinct communication pitches, mentoring of undergraduate students to enhance team work, foster leadership qualities, enhancing skills regarding logistic and management of projects, and networking activities. Modify the program performance rubric to include Professional Skills and complete the rubric again when the student exists the program.	Lab meetings and day to day operations in the research laboratory of individual PIs resting on a previously agreed upon approach. Professional development activities offered through INBRE and ITHS. Chem 688 Biochemistry Colloquium

Submitted by:

Fiscal Report for __CHEM_____ Department/Program	FY2021	FY2022	FY2023
Total Student Credit Hours (SCH)	3740	3399	3619
Service SCH	2283	1947	2257
Department FTEs	10.2	10.2	10.2
Total SCH per Department FTE	366.67	333.24	354.80
Service SCH per Department FTE	223.82	190.88	221.27
Majors in Programs			
Department FTEs	8.4	8.4	8.4
Majors per Department FTE	10.12	9.17	9.40
Total Unrestricted Expenditures	[redacted]	[redacted]	[redacted]
Total Restricted Expenditures	[redacted]		
Total Unit/Central Support Allocated to Program(s)			

Tuition Revenue	[redacted]	[redacted]	[redacted]
State Appropriation Revenue	[redacted]	[redacted]	[redacted]
Restricted/Sponsored Project Revenue	[redacted]		
Fees	[redacted]	[redacted]	[redacted]
Other UA Receipts/Revenue	[redacted]	[redacted]	[redacted]

Workload allocation: Teaching Units	140	162	132
Workload allocation: Service Units	45	50	40
Workload allocation: Research Units	115	118	98

Full-time Equivalent Worksheet**	FY2021	FY2022	FY2023
Faculty FTEs	5.4	5.4	5.4
Adjunct FTEs	0.95	0.9	0.5
Staff FTEs	2.83	2.83	2.83
Graduate TA/RA FTEs	12	11.25	12.75
Total Departmental FTEs	21.18	20.38	21.48

****Note: FTE definitions and calculations for the purpose of Academic Program R**

Definitions for the compiling staff

Provided in SCH tab in the student success data provided by PAIR.

Sum rows labeled as "In unit, outside department, Service" and "Outside unit, Service" in the SCH tab of the data provided by PAIR.

for each employee type, and then use the total from row 31 here.

Sum for all programs from the Majors Total tab in the data provided by PAIR.

From row 31 below or row 5 above

Total Expenditures made from budgets with an F1 or F7 fund type designation, from provided cycle report data filtered by Data Liasion

Total Expenditures made from budgets with revenue of the F2 or S2 fund type designation, from provided cycle report data filtered by Data Liasion

Expenses incurred for direct support of instruction within orgs identified as central or academic support, if applicable

Receipts to college from tuition generated by the department/program (F1). NOTE: under the current 80/20 percent tuition distribution model generating units receive 80%. PLEASE USE PAIR REPORTED SCH TO REPLACE ZEROES IN CELL CALCULATIONS.

Appropriations for current funds operation of the university from the general fund of the State of Alaska through the annual budget cycle. This category also includes TVEP and State Mental Health Trust funds, if allocated to the department. (F1)

Revenue from external sponsors; includes grants, contracts, sponsored projects & restricted (grant) accounts funded by UA Foundation funds (F2/S2)

Course Fees (9159)

e.g. Performance and Sales Receipts, Space Rental Revenue, Indirect Cost Recovery (F1/F7); NOTE: COURSE FEES (9159) REPORTED ABOVE

Department facultys' workload units assigned to teaching

Department facultys' workload units assigned to service

Department facultys' workload units assigned to research

Split appointments are multiplied by the % of effort assigned to this

adjuncts in a year divided by 40 = the FTE of adjuncts in that year.

Split appointments are multiplied by the % of effort assigned to this

0.75 FTE.

Sum of all employee FTEs

eview are different than for other institutional reporting processes (e.g. (

0.375

Definitions for the programs and reviewing committees

Receipts to college from tuition generated by the department/program, based on the campus's active tuition distribution model, which determines how much the unit receives of their generated tuition, and how much the campus keeps (in addition to the out-of-state surcharges) to support central offices/functions. The current distribution model is 80/20, where the unit/college receives 80% of their generated in-state tuition.

Appropriations for current funds operation of the university from the general fund of the State of Alaska through the annual budget cycle.

Revenue from external sponsors; includes grants, contracts, sponsored projects & restricted (grant) accounts funded by UA Foundation funds

OMB or IPEDS reporting)

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Revenue from external sponsors; includes grants, contracts, sponsored projects & restricted (grant) accounts funded by UA Foundation funds

OMB or IPEDS reporting)

1. Assessment information collected in accordance with your SLOA plan

Biochemistry and Neuroscience Ph.D. students are assessed at all committee events, oral defense of comprehensive exam and oral defense of dissertation. Students are assessed on a nine-point rubric to determine if they are performing at the level for expected for that event (on track), or above or below expectations. Table 1 shows a statistical summary of the results.

Table 1: SLOA assessment data for the Biochemistry and Neuroscience Ph.D. program, based upon 18 assessment forms from 2019 – 2023. The number of responses are shown for the assessed level and the average of all responses is calculated using numerical values.

Assessment	Average	Deficient (-1)	On Track (0)	Advanced (+1)
Specific knowledge of literature	0.11	2	12	4
Critical analysis of literature	0.11	3	10	5
Technical abilities	0.28	2	9	7
Quantitative abilities	0.00	5	8	5
General knowledge of field	0.22	1	12	5
Presentation skills	0.17	3	9	6
Writing skills	0.17	1	13	4
Hypothesis Development	0.06	3	11	4
Independence	0.06	3	11	4

Table 2: UAF PAIR data on Environmental Chemistry Ph.D. student statistics from FY2019-FY2023.

Fiscal year	Students in program	Degrees conferred	SCH load per student
2019	11	1	15.8
2020	13	2	15.78
2021	12	1	11.1
2022	10	2	12.56
2023	11	0	15.8

According to PAIR data (Table 2), student enrollment from FY2019-FY2023 averaged 11.4 students. This enrollment is flat over the period. There are approximately four core faculty members in the program (Professors K Drew, M Weltzin, K Dunlap and L Duffy) (T. Kuhn retired in 2019 and R Oliver left in 2020). Assuming four faculty, there are 2.8 students per core advisor. Ten (10) students graduated during this period. Of those graduates, all obtained employment in the field. The appendix below shows student products (publications, datasets or code, student grants, presentations). The 9 graduate students have published 18 student-first-authored peer-reviewed publications stemming from chapters in their dissertations and there are several other manuscripts in preparation. This averages two dissertation-chapter manuscripts published per graduating student, and will increase as later chapters are published. There are a total of 26 publications involving graduate students in this period, or 5 publications per year from the program, or about one peer-reviewed publication every two years per student.

2. Conclusions about student learning outcomes drawn from the information summarized above

Overall, the program assessed students to be on track or better in all areas. Highest marks were given for technical abilities (0.28) and general knowledge of the field (0.22). The lowest area is in quantitative abilities. To address this deficiency, our first colloquium (Chem 688) focused on biostatistics and data visualization will be offered in fall of 2024.

With regard to our SLOA goal we find:

> **To prepare students for careers in biochemistry and neuroscience to meet workforce demand within academia, industry, government and legal services.** All of students who graduated during the performance period have found jobs in academia or industry.

With regard to our 5 learning outcomes we find:

> **Strong written communication skills to communicate significance and innovation as well as technical details of biochemistry and neuroscience research.** The majority of our students are on track or advanced in writing skills.
>
> **Ability to formulate hypotheses and articulate methods for testing hypotheses, and ability to perform technical tasks and quantitative analyses needed to test hypotheses and interpret results**
> The majority of our students are on track or advanced in ability to formulate hypothesis. We attribute this to one on one mentoring in the laboratory group setting and to our biochemistry colloquium that focuses on to formulate and communicate a model and to develop testable hypotheses from this model.
>
> **General and specific knowledge of field and peer-reviewed literature. Ability to critically analyze literature.**
> The majority of our students are on track on their ability to read, comprehend and critically analyze peer-reviewed literature. We attribute this to use of peer-reviewed literature in our courses, laboratory group activities that include discussion of literature, and student productivity with their own research and participation in scientific conferences.
>
> **Strong presentation skills**
> Our students are on track for presentation skills. We attribute this to frequent presentations in courses, at laboratory group meetings, committee meetings and scientific conferences.
>
> **Strong professional skills**
> Professional skills are assessed from the conglomerate of assessment topics. Overall, our students are developing professional skills to make them competitive for advancing in their field.

3. What curricular changes or program discussions are happening as a result of the conclusions drawn above?

We continue to focus on quantitative skills. While we proposed previously to incorporate biostatistics into our biochemistry colloquium (chem 688) due to a loss of 33% of our faculty we have not had the workforce to implement the proposed change. We expect to focus on biostatistics and data visualization beginning fall 2024.

4. How do your proposed curricular changes or program discussions result from an inclusive, collaborative process?

Core faculty initially discussed this by contributing to assessment data and analysis via online collaboration (shared documents). A draft report was developed, and then program faculty (Johnston, Mao, Simpson, Trainor) reviewed and approved the report.

Appendix: Biochemistry and Neuroscience Ph.D. Program student products 2019-2023

Graduate students listed in bold. ***Undergraduate students*** in bold italics.

Student-authored Peer-reviewed publications (includes accepted) (graduate bold; undergraduate, visiting intern (J1):

1. **Carlson Z**, Drew K. Characterization and seasonal modulation of adenosine a(1) receptors in the arctic ground squirrel brain. Int J Mol Sci. 2023;24,PMC9867220.
2. Drew KL, **Bhowmick S, Laughlin BW**, Goropashnaya AV, Tøien Ø, Sugiura MH, et al. Opportunities and barriers to translating the hibernation phenotype for neurocritical care. *Front Neurol*. 2023;14:1009718,PMC9911456.
3. **Zanetti F**, Chen CY, ***Baker HA***, Sugiura MH, Drew KL, Barati Z. Cardiac rhythms and variation in hibernating arctic ground squirrels. *Physiol Biochem Zool*. 2023;96:167-176.
4. **Laughlin B**, Drew KL. Synergistic formulations of adenosine receptor modulating agents and anticholinergics *United States Patent Application Publication. No. 17/692,383*. 2022
5. ***Mikes M***, **Rice SA**, Bibus D, Kitaysky A, Drew KL. Translating pufa omega 6:3 ratios from wild to captive hibernators (urocitellus parryii) enhances sex-dependent mass-gain without increasing physiological stress indicators. *J Comp Physiol B*. 2022;192:529-540,PMC9197884.
6. **Frare C**, Drew KL. Seasonal changes in adenosine kinase in tanycytes of the arctic ground squirrel (urocitellus parryii). *J Chem Neuroanat*. 2021;113:101920,PMC8091519.
7. **Rice SA**, ***Mikes M***, Bibus D, Berdyshev E, Reisz JA, Gehrke S, et al. Omega 3 fatty acids stimulate thermogenesis during torpor in the arctic ground squirrel. *Sci Rep*. 2021;11:1340,PMC7809411.
8. **Rice SA**, Ten Have GAM, Reisz JA, Gehrke S, Stefanoni D, **Frare C**, et al. Nitrogen recycling buffers against ammonia toxicity from skeletal muscle breakdown in hibernating arctic ground squirrels. *Nat Metab*. 2020;2:1459-1471,PMC7744440.
9. **Frare C**, Jenkins ME, McClure KM, Drew KL. Seasonal decrease in thermogenesis and increase in vasoconstriction explain seasonal response to n(6) -cyclohexyladenosine-induced hibernation in the arctic ground squirrel (urocitellus parryii). *J Neurochem*. 2019;151:316-335,PMC6819227.
10. Gehrke S, **Rice S**, Stefanoni D, Wilkerson RB, Nemkov T, Reisz JA, et al. Red blood cell metabolic responses to torpor and arousal in the hibernator arctic ground squirrel. *J Proteome Res*. 2019;18:1827-1841.

11. **O'Brien BCV**, **Weber L**, Hueffer K, Weltzin MM. 2023. SARS-CoV-2 spike ectodomain targets α7 nicotinic acetylcholine receptors. J Biol Chem. Apr 13, online a head of print. doi: 10.1016/j.jbc.2023.104707.

12. **Witkcop JJ**, Vertigan T, Reynolds A, Duffy L, Barati B, Jerome J, Dunlap K. (2021) Sled dogs as a model for PM2.5 exposure from wildfires in Alaska. Environ Int. doi:10.1016/j.envint.2021.106767

13. ***Kromrey L***, Jerome S, Olnes S, Duffy L, Reynolds A, Dunlap K. (2020) Sled dogs as a model for brown fat research. Adv Clin Toxicol. DOI: 10.23880/act-16000195

14. **Collin A**, Jimmie S, Reynolds A, Schnurr T, Duffy L, Dunlap K. (2019) Weight gain, conditioning and metabolic syndrome: a sled dog model. Am J Biochem Biotechnol. DOI: 10.3844/ajbbsp.2019 Becker, Tynan A. *Presentation of Immunodominant Peptides Is Strongly Dependent on Cathepsin Resistance and Preliminary Cleavage of Antigens*. University of Alaska Fairbanks, 2021.

15. **Becker, T. A**., ***Osan, J.***, Rivera, K., Polanco, J., Ferrante, A., & Kuhn, T. (2019). Lipid composition impacts the assembly of MHC class II molecules in nanodiscs. *The Journal of Immunology*, *202*(1_Supplement), 131-39.

16. Matson, S., Rivera, K., **Becker, T.**, & Kuhn, T. (2020). Exploring the Kinetics and Cleavage Sites of Cysteine Cathepsins for Vaccine Design. *The FASEB Journal*, *34*(S1), 1-1.

17. **Smith, L. K.**, Babcock, I. W., Minamide, L. S., Shaw, A. E., Bamburg, J. R., & Kuhn, T. B. (2021). Direct interaction of HIV gp120 with neuronal CXCR4 and CCR5 receptors induces cofilin-actin rod pathology via a cellular prion protein-and NOX-dependent mechanism. *PLoS One*, *16*(3), e0248309.

18. **Smith, L. K.**, ***McKee, H.*** K., & Kuhn, T. B. (2019). The Role of Chemokine Co-receptor CXCR4 in HIV-1 gp120 Induced Synaptic Dysfunction. *The FASEB Journal*, *33*(S1), 791-17.

19. **Krishnan, J. K.**, **Rice, S.*, Mikes***, M., Sugiura, M. H., Drew, K., Barati, Z., & Oliver, S. R. (2022). In Arctic ground squirrels, diet and torpor alter skeletal muscle relaxation kinetics but not force development. *The FASEB Journal*, *36*.

20. **Krishnan, J. K., Rice, S., *Mikes, M.***, **Hunstiger, M.**, Drew, K., & Oliver, S. R. (2020). Effects of diet and torpor on skeletal muscle relaxation in hibernating animals. *The FASEB Journal*, *34*(S1), 1-1.

21. **Krishnan, J. K., Hunstiger, M.**, ***Rogers, J.***, & Oliver, S. R. (2019). Effects of Hypothermia on Skeletal Muscle Contractile Function: Comparison between Hibernators and Non-hibernators. *The FASEB Journal*, *33*(S1), 868-34.

22. Oliver, S. R., **Hunstiger, M. M.**, Anderson, K. J., Boswell, B., **Krishnan, J. K.**, Rogers, J. D., & Andrews, M. T. (2019). Turning Down the Heat: Role of Sarcolpin in Thermoregulation of Hibernating Arctic Ground Squirrels. *The FASEB Journal*, *33*(S1), 701-13.

23. **Witkop, J. J.**, Vertigan, T., Reynolds, A., Duffy, L., Barati, B., **Jerome, S.**, & Dunlap, K. (2021). Sled dogs as a model for PM2. 5 exposure from wildfires in Alaska. *Environment international*, *156*, 106767.

24. Kullberg, M., Francian, A., Arabi, A., Olsson, T., Mann, K., & Martinson, H. A. (2019). Liposome delivery of natural STAT3 inhibitors for the treatment of cancer. *Pharmaceutical frontiers*, *1*.

25. **Francian, A**., Widmer, A., Olsson, T., Ramirez, M., Heald, D., Rasic, K., ... & Kullberg, M. (2021). Delivery of toll-like receptor agonists by complement C3-targeted liposomes activates immune cells and reduces tumour growth. *Journal of drug targeting*, *29*(7), 754-760.

26. Kullberg, M., **Francian, A., Arabi, A.**, Olsson, T., Mann, K., & Martinson, H. A. (2019). Liposome delivery of natural STAT3 inhibitors for the treatment of cancer. *Pharmaceutical frontiers*, *1*.
27. **Osan, J. K.**, & Kuhn, T. (2018). Comparative analysis of DR1 binding with H1N1 Hemagglutinin derived peptides. *The Journal of Immunology*, *200*(1_Supplement), 99-14.

Student grants received: Note that this is a partial list.

PhD

1. FY2021-23. Sarah Suarez (INBRE GRA) Epilepsy Associated Mutation and VILIP-1 in α4β2 nAChRs Shapes Dendritic Arborization
2. FY2022-23. Brittany O'Brien (INBRE GRA) Development of rabies viral glycoprotein derived peptides for nicotinic acetylcholine receptor subtype targeting
3. FY2020-21. Sarah Suarez INBRE GRA NFLE Mutation Disrupts VILIP-1 Modulation, Shifting α4β2 nAChR isoform Expression
4. FY2019-2020 Sarah Rice (INBRE GRA) Cross talk between metabolism and nervous system initiates arousal during hibernation
5. FY2019-2020 Tynan Becker (INBRE GRA) Role of cathepsins in determining immunodominance
6. FY2019-2020 Alexander Francian (INBRE GRA) Enhancing tumor antigen presentation with complement liposomes
7. 2021-2022 Amenah Arabi (INBRE GRA) Development of MUC1 cancer immunotherapy using complement targeted liposome

Student-authored conference presentations: Note that this is a partial list.

Weber, Lahra, Brittany CV O'Brien, and Maegan M. Weltzin. "Cytotoxicity and internalization properties of novel alpha7 nicotinic receptor selective peptides." *Biophysical Journal* 122.3 (2023): 395a.

O'Brien, Brittany CV, Lahra Weber, and Maegan M. Weltzin. "Design and optimization of nicotinic acetylcholine receptor subtype selective peptides." *Biophysical Journal* 122.3 (2023): 395a.

Krishnan, Jishnu K., et al. "In Arctic ground squirrels, diet and torpor alter skeletal muscle relaxation kinetics but not force development." *The FASEB Journal* 36 (2022).

Krishnan, Jishnu KS, et al. "Effects of diet and torpor on skeletal muscle relaxation in hibernating animals." *The FASEB Journal* 34.S1 (2020): 1-1.

Bagoyo, Editha Angela, Kelly Drew, and Mackenzie Jenkins. "Day and Night Comparison to Maximize Learning in Sprague Dawley Rats (Rattus norvegicus)." *The FASEB Journal* 34.S1 (2020): 1-1.

Jenkins, Mackenzie, **Carla Frare**, and Kelly Drew. "Effect of adenosine A1 receptor agonist induced-hibernation on the arousal pathway in the Arctic Ground Squirrel." *The FASEB Journal* 33.S1 (2019): 791-10.

Mikes, M. L., **Rice, S. A.**, Bibus, D., & Drew, K. L. (2019). Analysis of an Omega 6: 3 Balanced Diet Impact on Hibernation Behavior and Cortisol of Captive Arctic Ground Squirrels. *The FASEB Journal*, *33*(S1), lb304-lb304.

Chauhan, Shubhangi, Kriya Dunlap, and Lawrence K. Duffy. "Effects of methylmercury and theaflavin digallate on adipokines in mature 3T3-L1 adipocytes." *International journal of molecular sciences* 20.11 (2019): 2755.

Witkop, J. J., Vertigan, T., Reynolds, A., Duffy, L., Barati, B., Jerome, S., & Dunlap, K. (2021). Sled dogs as a model for PM2. 5 exposure from wildfires in Alaska. *Environment international*, *156*, 106767.

Kromrey, L., Duffy, L., Reynolds, A., & Dunlap, K. (2019). Monitoring Brown Adipose Tissue in Alaskan Sled Dogs: A Pilot Study. *The FASEB Journal*, *33*(S1), 842-1.