

UW Board of Trustees Research and Economic Development Committee
 Agenda
 March 20, 2024, at 1:00 pm – 3:00 pm

Public Session:

Agenda #	Description: Research Excellence Presentations	Page #
1.	<p>UW-Cardiff Seed grant recipients</p> <p><i>1. Evaluation of the resiliency of forages and plants unique to production systems in Wyoming</i></p> <p>Dr. Paulo M T Lima (UW) & Dr. John Pickett (Cardiff) College of Agriculture, Life Sciences, and Natural Resources</p> <p><i>2. Reinscribing Tourist Sites in Wales & Wyoming: Signs, Stories, and the Challenge of Generative AI</i></p> <p>Professor Caroline McCracken-Flesher (UW) & Dr. Dylan Foster Evans (Cardiff) College of Arts and Sciences, Native American & Indigenous Studies, Haub School of Environment & Natural Resources (WORTH)</p> <p><i>3. AI-driven multi-scale remote sensing: from the individual to the ecosystem and back again.</i></p> <p>Professor Benjamin Koger (UW) & Professor Paul Rosin (Cardiff) College of Engineering and Physical Sciences / School of Computing / Department of Zoology and Physiology</p> <p><i>4. Long-read assembly systematic optimization using machine learning for improved whole genome sequencing interrogation (LASSO-AI)</i></p> <p>Professor Timothy Robinson (UW) & Dr Brad Spiller (Cardiff) Mathematics and Statistics, Engineering & Physical Sciences, Health Sciences</p>	<p>7</p> <p>14</p> <p>24</p> <p>38</p>
2.	REDD Updates – Vice President Chitnis	Oral update

REDC
COMMITTEE MEETING MATERIALS

AGENDA ITEM TITLE: UW-Cardiff Seed grant Presentations: Evaluation of the resiliency of forages and plants unique to production systems in Wyoming - Lima

- OPEN SESSION
 CLOSED SESSION

PREVIOUSLY DISCUSSED BY COMMITTEE:

- Yes
 No

FOR FULL BOARD CONSIDERATION:

- Yes *[Note: If yes, materials will also be included in the full UW Board of Trustee report.]*
 No

Attachments/materials are provided in advance of the meeting.

EXECUTIVE SUMMARY:

This seed fund will support faculty in the development of collaborative research in range management and plant genetics. Topics for research include grassland management of pests involving genome editing and strategies to manage grassland carbon and conserved/maximised grassland nitrogen and phosphorus nutrition, and to evaluate livestock practices to improve ruminant nutrition through a reduction of methane during rumen digestion. Plant genomic projects include improving drought tolerance of soybean and pulse crops. Research is currently being conducted in Wyoming evaluating the improvement and establishment of desirable native plants suitable for reclamation of degraded rangelands. Opportunities for research, teaching, extension, and service projects will be discussed during Drs. John Pickett and Owen Jones visit to Wyoming this summer. Visits will occur at the University of Wyoming Research and Extension Centers in Sheridan, Laramie, and Lingle. These visits will discuss rangeland management, plant communities, high altitude beef cattle production, livestock nutrition, and plant breeding. These discussions will help determine a pathway to develop collaborative project for further funding in the US and UK. Travel is important so that UK colleagues have an opportunity to become familiar with the grassland ecosystems in Wyoming and issues impacting high altitude agriculture in an arid environment.

PRIOR RELATED COMMITTEE DISCUSSIONS/ACTIONS:

NA

WHY THIS ITEM IS BEFORE THE COMMITTEE:

Information only

ACTION REQUIRED AT THIS COMMITTEE MEETING:

None

PROPOSED MOTION:

NA

AGENDA ITEM TITLE: UW-Cardiff Seed grant Presentations: Reinscribing Tourist Sites in Wales & Wyoming: Signs, Stories, and the Challenge of Generative AI – McCracken-Flesher

- OPEN SESSION
 CLOSED SESSION

PREVIOUSLY DISCUSSED BY COMMITTEE:

- Yes
 No

FOR FULL BOARD CONSIDERATION:

- Yes [*Note: If yes, materials will also be included in the full UW Board of Trustee report.*]
 No

- Attachments/materials are provided in advance of the meeting.*

EXECUTIVE SUMMARY:

In Wales and Wyoming, indigenous/local populations seek income from tourism, but tourist narratives rewrite cultures and landscapes. Colleagues in Wales and Wyoming will explore dual linguistic landscapes and language signage in the tourist context (Wales constitutes a model for such signage; Wyoming provides a field for testing where such signage does not yet exist). This grant, supporting stage 1 of a larger project, will enable faculty exchange to a) research dual-language signage of tourist sites; b) build our theoretical understanding of the motivations and dynamics of such signage; c) develop a robust bi-lateral research community to support the goals and grants we will pursue to elaborate this project in stages 2 and 3.

Stage 2 (to be externally funded) will implement the conclusions of stage 1 by multiple language signage (Shoshoni and Arapaho) at UW and in additional meaningful locations.

Stage 3 (seeking NEH/CHCI external grants) will analyze the challenge that requires the intervention of 1) and 2): generative AI will inevitably remap and inscribe landscapes in the tourist context. We will test AI processes by uploading Wyoming images not in circulation (Art Museum and American Heritage Center) and tracking their appropriation. We will then develop policies and practices to encourage best outcomes for indigenous sites subject to AI sourcing for tourist guiding.

PRIOR RELATED COMMITTEE DISCUSSIONS/ACTIONS:

NA

WHY THIS ITEM IS BEFORE THE COMMITTEE:

Information only

ACTION REQUIRED AT THIS COMMITTEE MEETING:

None

PROPOSED MOTION:

NA

AGENDA ITEM TITLE: UW-Cardiff Seed grant Presentations: AI-driven multi-scale remote sensing: from the individual to the ecosystem and back again - Koger

- OPEN SESSION
 CLOSED SESSION

PREVIOUSLY DISCUSSED BY COMMITTEE:

- Yes
 No

FOR FULL BOARD CONSIDERATION:

- Yes [*Note: If yes, materials will also be included in the full UW Board of Trustee report.*]
 No

- Attachments/materials are provided in advance of the meeting.*

EXECUTIVE SUMMARY:

Ecosystems are inherently multiscale, changing over seconds and meters as grazing animals choose plants to forage on, and also over kilometers and decades in response to changing geographies and climates. Yet, understanding the multiscale dynamics of ecological systems remains a challenge, in part due to a common trade-off between spatial detail and spatial extent of ecological datasets. New imaging techniques and computer vision approaches allow us to study these multiscale dynamics in unprecedented ways. We propose to pioneer techniques that combine large-scale, high-resolution satellite imagery with high-precision drone imagery to better quantify and understand the spatial and temporal dynamics of grassland ecosystems. Specifically, we will combine object detection and super-resolution algorithms to better quantify forage quality patterns across space and time. We will develop our approach at the 9H Ranch, a 50,000-acre private ranch that hosts abundant wildlife. This seed grant will empower us to buy commercial high-resolution satellite imagery and an industry-grade imaging drone to build a unique dataset and processing pipeline that will make us highly competitive for larger grants that target synergies between new technologies and ecological knowledge to understand our dynamic natural world in the face of rapid human development and landscape change.

PRIOR RELATED COMMITTEE DISCUSSIONS/ACTIONS:

NA

WHY THIS ITEM IS BEFORE THE COMMITTEE:

Information only

ACTION REQUIRED AT THIS COMMITTEE MEETING:

None

PROPOSED MOTION:

NA

AGENDA ITEM TITLE: UW-Cardiff Seed grant Presentations: Long-read assembly systematic optimization using machine learning for improved whole genome sequencing interrogation (LASSO-AI) - Robinson

- OPEN SESSION
 CLOSED SESSION

PREVIOUSLY DISCUSSED BY COMMITTEE:

- Yes
 No

FOR FULL BOARD CONSIDERATION:

- Yes *[Note: If yes, materials will also be included in the full UW Board of Trustee report.]*
 No

- Attachments/materials are provided in advance of the meeting.*

EXECUTIVE SUMMARY:

Advancements in the mechanics of processing genomic DNA for faster and higher through-put whole genome sequencing has resulted in reduced costs for examining clonal outbreak investigation of multi-drug resistant bacteria. Oxford Nanopore Technology methods in particular are continually improving their chemistry and accuracy, with ability to multi-plex combined numbers of isolates on each run without the requirement for large capital equipment expenditure. However, this has led to an increasing pressure on the accuracy and rate of being able to analyse exponential quantities of tera-byte output. This proposal looks to combine internationally recognized strengths of both applicants: The Spiller laboratory's expertise in streamlining long-read processing of clinical samples for analysis (including use in LMIC low-resource settings) matched with the Robinson laboratory's expertise in applying machine learning to the healthcare research sector. The bilateral exchange of unique expertise will benefit both applicant sites equally and is expected to result in a combined ability to significantly advance the speed and capacity of pathogen whole genome sequence analysis for the field. This initial collaboration will serve as the foundation of future research opportunities as well as the development to training materials that will benefit scientists from both institutions (e.g. Nanopore sequencing, high performance computing and machine learning workshops).

PRIOR RELATED COMMITTEE DISCUSSIONS/ACTIONS:

NA

WHY THIS ITEM IS BEFORE THE COMMITTEE:

Information only

ACTION REQUIRED AT THIS COMMITTEE MEETING:

None

PROPOSED MOTION:

NA

AGENDA ITEM TITLE: REDD Updates - Chitnis

- OPEN SESSION
- CLOSED SESSION

PREVIOUSLY DISCUSSED BY COMMITTEE:

- Yes
- No

FOR FULL BOARD CONSIDERATION:

- Yes *[Note: If yes, materials will also be included in the full UW Board of Trustee report.]*
 - No
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EXECUTIVE SUMMARY:

Vice President Chitnis will update the committee on developments within the Division. Oral update only

PRIOR RELATED COMMITTEE DISCUSSIONS/ACTIONS:

NA

WHY THIS ITEM IS BEFORE THE COMMITTEE:

Information only

ACTION REQUIRED AT THIS COMMITTEE MEETING:

None

PROPOSED MOTION:

NA

UW-Cardiff University Seed Grants (2023)

Summer 2023 (cycle 1)

1. Dr. Paulo M T Lima (UW Principal Investigator) & Dr. John Pickett (Cardiff)
(pdemello@uwyo.edu)

Abstract: This seed fund will support faculty in the development of collaborative research in range management and plant genetics. Topics for research include grassland management of pests involving genome editing and strategies to manage grassland carbon and conserved/maximised grassland nitrogen and phosphorus nutrition, and to evaluate livestock practices to improve ruminant nutrition through a reduction of methane during rumen digestion. Plant genomic projects include improving drought tolerance of soybean and pulse crops. Research is currently being conducted in Wyoming evaluating the improvement and establishment of desirable native plants suitable for reclamation of degraded rangelands. Opportunities for research, teaching, extension, and service projects will be discussed during Drs. John Pickett and Owen Jones visit to Wyoming this summer. Visits will occur at the University of Wyoming Research and Extension Centers in Sheridan, Laramie, and Lingle. These visits will discuss rangeland management, plant communities, high altitude beef cattle production, livestock nutrition, and plant breeding. These discussions will help determine a pathway to develop collaborative project for further funding in the US and UK. Travel is important so that UK colleagues have an opportunity to become familiar with the grassland ecosystems in Wyoming and issues impacting high altitude agriculture in an arid environment.

College/department: **College of Agriculture, Life Sciences, and Natural Resources**

UW Research Team

<i>Wyoming</i>			Early Career
Eric Webster	Director, AES	CALSNR, Plant Sciences ewebste2@uwyo.edu	No
Hannah Hollinger	Assistant Professor	CALSNR, Animal Science Hcunnin6@uwyo.edu	Yes
Donn Harris	Assistant Professor	Donna.harris@uwyo.edu	Yes
Scott Lake	Director LREC	Scott.lake@uwyo.edu	No
Paulo de Mello Tavares Lima, Lead	Assistant Professor	pdemello@uwyo.edu	Yes (Principal Investigator)
Shelby Rosasco	Assistant Professor	srosasco@uwyo.edu	Yes
Derek Scasta	Associate Professor	CALSNR, Ecosystem Science & Management jscasta@uwyo.edu	No

2. Professor Brent Ewers (UW Principal Investigator) & Dr. TC Hales (Cardiff)
 [\(BEewers@uwyo.edu\)](mailto:BEewers@uwyo.edu)

Title of proposed project/activity: Community-based, use-inspired research solutions to environmental challenges across iconic locations of biodiversity concern

Abstract: This proposal seeks funding to consolidate a burgeoning research collaboration between two major field centres (Danau Girang Field Centre, AMK Ranch) run by Cardiff and Wyoming. Both field centers have long track records of working with communities to support solutions to local environmental problems and biodiversity conservation. This funding would be used to further consolidate these initial discussions through an exchange of people between the field centers to facilitate future research projects and development of courses. Our field centers are located within areas that are at the locus of major climatic and environmental change. Hence, any successful approach to conserving biodiversity and ecosystem productivity in the face of certain climate change will require new science advances driven by the needs of affected communities. Despite having distinctly different climatic and tectonic settings, communities in these areas are managing similar challenges including ecological fragmentation, issues of water and pollution, and tourism. Both areas are extremely sensitive to climate change and predictive understanding will occur through the use of biophysical models parameterized and tested against data. We have an opportunity to develop research links between these centers that will form the basis for the development of a global network of place-based, use-inspired research.

College/department: **Botany, Biodiversity Institute, Wyoming NSF EPSCoR**

UW Research Team

	Title and full name	Position	Department/College/ Unit etc	Early career? (Y/N)
1	Prof. Michael Dillon	Professor	Zoology	N
2	Dr. Danielle Bernardi	Post-doctoral Fellow	Botany/Wyoming Natural Diversity Database	Y

3. Professor Michael Dillon (UW Principal Investigator) & Dr. Tom Bishop (Cardiff)

(Michael.dillon@uwyo.edu)

Title of proposed project/activity: Quantifying organism responses to shifting thermal and hygric landscapes

Abstract: Changes in temperature and water availability challenge animals, often leading to loss of local populations as habitats that were previously permissive become inhospitable. Predicting how animals will respond to projected changes in climate is thus a primary focus in ecology. Many studies document lethal effects of extreme hot or cold temperatures or of extreme dry conditions; however, even when they don't kill the animal, temperature and water availability have pronounced effects on physiology and behavior that can ultimately determine fitness. Moreover, temperature and water availability are rarely studied together even though their combined effects are likely non-additive. Characterizing interactive sub-lethal effects of changing thermal and water pressures on diverse organisms is urgent given rapidly changing climates. Doing so requires several advances that we aim to tackle with this work. We propose to develop and test high-throughput approaches to characterizing effects of combinations of temperature and humidity on activity. We focus on ants to begin with given their abundance, diversity, and ecological importance; but the long-term goal is to refine these approaches, allowing large-scale estimation of climate risk for diverse small organisms across ecosystems.

College/department: **College of Agriculture, Life Sciences, and Natural Resources, Botany, Zoology**

UW Research Team

	Title and full name	Position	Department/College/UnitECS* (Y/N) etc	
1	Jordan Glass	Postdoctoral scholar	Zoology & Physiology, CALSNR	Y
2	Ellen Keaveny	PhD student	Zoology & Physiology and Program in Ecology and Evolution, CALSNR	Y

4. Professor Michael Cheadle (UW Principal Investigator) & Professor Wolfgang Maier (Cardiff)
Cheadle@uwyo.edu

Title of proposed project/activity: Understanding the origin of platinum-group elements in the Dufek intrusion, Antarctica

Abstract: The clean energy transition will drive considerable growth in the demand for critical minerals/elements such as platinum. and we urgently need to better understand how and where such elements are concentrated. Layered intrusions and their feeder systems host the most important platinum-group element (PGE) deposits. The Dufek intrusion of Antarctica is the second largest mafic layered intrusion on Earth, with a stratigraphic thickness of ~3.5 km and a surface extension of up to 50,000 km². Much of the intrusion is covered by ice. This, combined with the difficulty to reach the intrusion, has resulted in relatively few studies of the presence of PGEs within the intrusion and of their petrogenesis. The Cardiff-Wyoming partnership offers a unique opportunity to study Dufek. Cheadle will make available 610 samples from the base of the intrusion. The samples have been previously characterized for mineral chemistry and textures but remain unstudied with respect to their potential to host and understand the origin of critical PGEs. Maier has access to the analytical facilities to determine their origin. The project will be of interest to a wide range of researchers studying the origin and evolution of large igneous provinces, mafic-intrusions and their associated mineral deposits.

College/department: **Engineering & Physical Sciences, Geology & Geophysics**

UW Research Team

	Title and full name	Position	Department/College/UnitECS* (Y/N) etc	
1	Dr Madeleine Lewis	Asst. Prof. (new hire)	CEPS	Y
2	Dr Joe Biasi	Asst. Prof. (new hire)	CEPS	Y

5. **Professor Conxita Domènech (UW Principal Investigator) & Dr. Tilmann Altenberg (Cardiff)**
(cdomenec@uwyo.edu)

Title of proposed project/activity: From *Tirante el Blanco* to *Las Meninas*: Imagining Early Modern Spain in Graphic Novels

Abstract: This collaborative research project focuses on recent comics that represent the early modern period in both Spain and its American colonies. The project's aim is to generate new knowledge on how long-form comics (commonly referred to as graphic novels) "translate" literary texts as well as historical figures, contexts, and events of the sixteenth and seventeenth centuries for a twenty-first-century readership.

In light of the rise in popularity of graphic novels and their increasing use for the teaching of language, history, literature, and culture, there is an urgent need for sustained and systematic critical reflection on how such graphic narratives imagine the past and adapt literary texts from this historical period to the comics medium.

The project sets out to trailblazer two complementary paths: First, we will organize two mixed-mode (hybrid) colloquia on the representation of early modern Spain in graphic novels; these colloquia offer the opportunity to present and discuss the preliminary findings of our research. Second, we will co-author a scholarly monograph with the title *From Tirante el Blanco to Las Meninas: Imagining Early Modern Spain in Graphic Novels*. The book will comprise a comprehensive introduction, eight analytical chapters, illustrations, a conclusion, an extensive bibliography, and two indices.

College/department: **Arts & Sciences, Modern and Classical Languages**

Conxita & Tilmann are the only collaborators on this project

6. Professor Janelle Krueger (UW Principal Investigator) & Dr. Mathew Smith
jlkrueger@uwyo.edu

Title of proposed project/activity: Developing clinical competence and decision making in student pharmacists: from virtual simulation to practice-based learning.

Abstract: The University of Wyoming (UW) School of Pharmacy and Cardiff University (CU) School of Pharmacy are distinguished programs with a long history of educating student pharmacists, over 77 and 104 years respectively. Successful programs with this longevity maintain solid pedagogical foundations, but critically, are responsive when societal healthcare needs the profession to evolve. We are at a point where our programs must respond to such changes. Pharmacy accrediting bodies in the US and UK have recognized the need for change, publishing revised education standards that place greater emphasis on experiential learning (e.g. simulation and clinical placements) to support the development of graduate skills that support expanded clinical roles of pharmacists.

Funding from the CU-UW Collaborative Seed Fund will be used for:

1) Faculty exchanges (in-person and virtual meetings) to:

- exchange pedagogical expertise and internationalize institutions,
- scope opportunities for international clinical training/rotation sites for each school by meeting relevant stakeholders
- explore differences in pharmacy practice between the two countries

2) Interactive digital simulation development to:

- build clinical confidence and decision-making skills in undergraduate pharmacy students
- develop digital health literacy
- increase cultural competence in pharmacy students and faculty
- equip faculty with expertise in the design and development of interactive digital simulations

College/department: **College of Health Sciences, School of Pharmacy**

UW Research Team

	Title and full name	Position	Department/College/Unit etc	ECS* (Y/N)
1	Tracy Mahvan, PharmD, MBA, BCGP	Associate Professor	School of Pharmacy/Health Sciences	No
2	Kem Krueger, PharmD, PhD	Dean	School of Pharmacy/Health Sciences	No

7. Dr. Meredith Minear (UW Principal Investigator) & Dr. Richard Morey (Cardiff)
mminear2@uwyo.edu

Title of proposed project/activity: Gamifying statistics: Augmented Reality in STEM Education

Abstract: Even before COVID-19, higher education has been evolving to meet the needs of a new, more diverse generation of students raised in an age of handheld devices and constant distraction. Better approaches to teaching are needed especially for challenging material such the mathematics and statistics fundamental to success in STEM fields. Augmented reality (AR), in which interactive digital content is combined with the real-world, has shown great promise in promoting active learning using the same phones and tablets that can be so distracting for today's students. We propose to combine the interactive technology of AR with neurocognitively informed assessment to create a mobile application for the improved instruction of statistical reasoning. This initial development process will serve as the foundation of an AR development and assessment pipeline that can be shared with educators across disciplines with the goal of creating multiple cross-university collaborations using AR for both teaching and research.

College/department: **Arts and Sciences, Psychology**

UW Team

	Title and full name	Position	Department/College/UnitECS* (Y/N) etc	
1	Kyle Summerfield	Program Manager	Shell 3D Visualization Center	Y

Fall 2023 (cycle 2)**1. Professor Caroline McCracken-Flesher (UW Principal Investigator) & Dr. Dylan Evans (Cardiff)**
(CMF@uwyo.edu)

Abstract: In Wales and Wyoming, indigenous/local populations seek income from tourism, but tourist narratives rewrite cultures and landscapes. Colleagues in Wales and Wyoming will explore dual linguistic landscapes and language signage in the tourist context (Wales constitutes a model for such signage; Wyoming provides a field for testing where such signage does not yet exist). This grant, supporting stage 1 of a larger project, will enable faculty exchange to a) research dual-language signage of tourist sites; b) build our theoretical understanding of the motivations and dynamics of such signage; c) develop a robust bi-lateral research community to support the goals and grants we will pursue to elaborate this project in stages 2 and 3.

Stage 2 (to be externally funded) will implement the conclusions of stage 1 by multiple language signage (Shoshoni and Arapaho) at UW and in additional meaningful locations.

Stage 3 (seeking NEH/CHCI external grants) will analyze the challenge that requires the intervention of 1) and 2): generative AI will inevitably remap and inscribe landscapes in the tourist context. We will test AI processes by uploading Wyoming images not in circulation (Art Museum and American Heritage Center) and tracking their appropriation. We will then develop policies and practices to encourage best outcomes for indigenous sites subject to AI sourcing for tourist guiding.

College/department: **College of Arts and Sciences, Native American & Indigenous Studies, Haub School of Environment & Natural Resources (WORTH)**

UW Research Team

	Title and full name Position		Department/College/UECS* (Y/N) nit etc	
1	Dr. Mary Keller	APL	Religious Studies/A&S	N
2	Dr. Bridget Groat	Asst Prof	Director Native American & Indigenous Studies	Y Arizona State, Ph.d. 2019
3	Nicole Crawford	Dir. UW Art Museum	UW Art Museum	Ph.D. in progress
4	Tarissa Spoonhunter	Asst. Prof., Director of the High Plains American Indian Research Institute	Haub School of ENR	N U. Arizona, 2014
5	Richard Vercoe	Asst. Lecturer	Haub School of ENR	Y U Georgia, 2021
6	Phineas Kelly	Inst. Tech. Education Specialist,	Information Technology	MA

2. Professor Jinke Tang (UW Principal Investigator) & Professor Sean Giblin (Cardiff)
Jtang2@uwyo.edu

Title of proposed project/activity: Developing a sustainable research and education collaboration on quantum materials between Cardiff University and the University of Wyoming

Abstract: Condensed Matter Physics is a constantly evolving area of science leading to real world applications. Nobel prizes are often awarded in this area partly due to beautiful physics resulting quickly in real world applications, the transistor is the most famous example of this. We are in a position to explore new questions based on ideas and technologies that have emerged from our understanding of quantum mechanics. This proposal has two clear goals, 1) to explore topological materials and light matter interactions with our complementary expertise and 2) to use this expertise to jointly propose teaching modules and resources for our students so that they have the expertise to join the emerging quantum workforce. This proposal exploits the complementary strengths in faculty's expertise at the two institutions to address challenging problems in the two proposed areas. In particular, the combination of special methods and tools to explore the proposed physics phenomena in this transatlantic alliance is necessary and unique and will lead to great advances in the research and education in a technologically crucial area. The main objective of the proposal is to establish a strong collaboration by mutual visits to each other's labs and develop joint proposals to sustain this collaborative endeavor.

College/department: **College of Engineering and Physical Sciences, Physics and Astronomy**

UW Research Team

	Title and full name	Position	Department/College/Unit etc	ECS* (Y/N)
1	Prof. Jifa Tian	Assistant Professor	Department of Physics & Astronomy	N
2	Prof. Alex Petrovic	Assistant Professor	Department of Physics & Astronomy	N
3	Prof. TeYu Chien	Associate Professor	Department of Physics & Astronomy	N

3. Dr. Brant Schumaker (UW Principal Investigator) & Professor Stephen Riley (Cardiff)
bschumak@uwyo.edu

Title of proposed project/activity: Minority language and cultural competence in the delivery of rural health to underserved populations.

Abstract: This innovative, collaborative project will seek to share best practice around identification and impact of minority language communities as a way of developing cultural competence for learners, and faculty, in the UK and USA. Equality, diversity, and inclusion are key to developing social accountability for health organisations and the future workforce. Recognising this global imperative and the role of biopsychosocial determinants of health, both Cardiff University and University of Wyoming have implemented a Longitudinal Integrated Clerkship (LIC) which sees cohorts of medical students immersed in rural communities and community primary care practices for an extended period of time. Combining the lenses of indigenous language, knowledge transfer (interdependence, intergenerational), health service provision, and social/health inequality amongst minoritised groups will allow sharing of best practice between the 2 organisations, alongside development of future community-informed teaching resources and research opportunities. Through an exchange of students and faculty it is proposed that best practice can be shared across organisations building effective cultural competence in health professions education thus positively impacting patient care.

College/department: **College of Health Sciences, WWAMI Program**

UW Research Team:

	Title and full name	Position	Department/College/UnitECS* (Y/N) etc	
1	Dr. John Willford	Assistant Director; Clinical Associate Professor	CHS/WWAMI	No
2	Dr Robert Monger	Clinical Associate Professor, Internal Medicine University of Washington School of Medicine	Wyoming WWAMI	No (Dr Monger is a University of Washington faculty member)

4. Professor Benjamin Koger (UW) & Professor Paul Rosin (Cardiff)
bkoger@uwyo.edu

Abstract: Ecosystems are inherently multiscale, changing over seconds and meters as grazing animals choose plants to forage on, and also over kilometers and decades in response to changing geographies and climates. Yet, understanding the multiscale dynamics of ecological systems remains a challenge, in part due to a common trade-off between spatial detail and spatial extent of ecological datasets. New imaging techniques and computer vision approaches allow us to study these multiscale dynamics in unprecedented ways. We propose to pioneer techniques that combine large-scale, high-resolution satellite imagery with high-precision drone imagery to better quantify and understand the spatial and temporal dynamics of grassland ecosystems. Specifically, we will combine object detection and super-resolution algorithms to better quantify forage quality patterns across space and time. We will develop our approach at the 9H Ranch, a 50,000 acre private ranch that hosts abundant wildlife. This seed grant will empower us to buy commercial high-resolution satellite imagery and an industry-grade imaging drone to build a unique dataset and processing pipeline that will make us highly competitive for larger grants that target synergies between new technologies and ecological knowledge to understand our dynamic natural world in the face of rapid human development and landscape change.

College/department: **College of Engineering and Physical Sciences / School of Computing / Department of Zoology and Physiology**

UW Research Team

Wyoming

	Title and full name	Position	Department/College/Unit etc	ECS* (Y/N)
1	Prof. Ellen Aikens	Assistant Prof.	School of Computing, Haub School of ENR, College of Engineering and Physical Sciences	Y

5. Professor Timothy Robinson (UW Principal Investigator) & Dr Brad Spiller (Cardiff)
TJRobin@uwyo.edu

Title of proposed project/activity: Long-read assembly systematic optimization using machine learning for improved whole genome sequencing interrogation (**LASSO-AI**)

Abstract: Advancements in the mechanics of processing genomic DNA for faster and higher through-put whole genome sequencing has resulted in reduced costs for examining clonal outbreak investigation of multi-drug resistant bacteria. Oxford Nanopore Technology methods in particular are continually improving their chemistry and accuracy, with ability to multi-plex combined numbers of isolates on each run without the requirement for large capital equipment expenditure. However, this has led to an increasing pressure on the accuracy and rate of being able to analyse exponential quantities of tera-byte output. This proposal looks to combine internationally recognized strengths of both applicants: The Spiller laboratory's expertise in streamlining long-read processing of clinical samples for analysis (including use in LMIC low-resource settings) matched with the Robinson laboratory's expertise in applying machine learning to the healthcare research sector. The bilateral exchange of unique expertise will benefit both applicant sites equally and is expected to result in a combined ability to significantly advance the speed and capacity of pathogen whole genome sequence analysis for the field.

This initial collaboration will serve as the foundation of future research opportunities as well as the development to training materials that will benefit scientists from both institutions (e.g. Nanopore sequencing, high performance computing and machine learning workshops).

College/department: **Mathematics and Statistics, Engineering & Physical Sciences, Health Sciences**

UW Research Team

	Title and full name	Position	Department/College/UnitECS* (Y/N) etc	
1	DANNY BURNS	PhD student, Machine learning specialist	UNIVERSITY OF WYOMING	Y
2	TIMOTHY ROBINSON	Professor	UNIVERSITY OF WYOMING	N
3	ROBERT PETIT III	Bioinformatician and developer of the Bactopia and Staphopia workflows	Wyoming Public Health Laboratory, UNIVERSITY OF WYOMING	Y
4	BLEDAR BISHA	METAGENOMICS SPECIALIST / ASSOCIATE PROF.	UNIVERSITY OF WYOMING	N

6. **Dr. Bledar Bisha (UW Principal Investigator) & Dr. Mark Toleman (Cardiff)**
bbisha@uwyo.edu

Title of proposed project/activity: Sewage surveillance of disease causing bacteria

Abstract: This project is a reliable method for generating data about pathogen carriage and risk of disease within communities. In recent years wastewater (sewage) surveillance has become widely accepted due to its success in predicting Covid-19 outbreaks (Dr Bisha, Wyoming University has experience here). Sewage analysis at the treatment facility is very useful since the collection process involves homogenization of huge numbers of individual human gut samples thus giving an accurate assessment of community carriage. Dr Toleman and Jordan Mathias (Cardiff University) have used this methodology to explain *E. coli* sepsis rate differences between Wales and London. This is because only 5-6 strains of the >10,000 known *E. coli* strains cause most sepsis events. The analysis of wastewater from these two locations indicated that the carriage rate of pathogenic *E. coli* types in Wales was twice that of London explaining different sepsis rates. The partnership between Wyoming and Cardiff universities in this proposal will further this research by comparing carriage rates and sepsis rates of pathogenic *E. coli* types between the UK and the US and also extend this work to another common US pathogen Staphylococcus. This is because the US Staphylococcal sepsis rate is dramatically different to the UK. (200)

College/department: **College of Agriculture, Food Microbiology**

UW Research Team:

	Title and full name	Position	Department/College/UnitECS* (Y/N) etc	
1	Dr Bledar Bisha	Wyoming Lead applicant/ Head of Department	University of Wyoming. Food Microbiology.	N
2	Puja Boidya	PhD student	University of Wyoming. Food Microbiology.	Y