REPORT TO FACULTY SENATE

FROM: President Robert Robbins  http://president.arizona.edu/

DATE: January 31, 2022

ACCOMPLISHMENTS:

COVID Updates

• Due to the recent omicron wave, we’ve seen the largest positivity numbers in our campus testing program ever. I’m so pleased that we can offer free, convenient testing for our campus community. I strongly encourage every employee and student to test weekly using our testing sites or TakeAway testing, especially during this wave.

• We have updated our mask policy on campus to reflect public health recommendations. Cloth masks are no longer accepted, and surgical grade or higher masks are required. Surgical masks are available at building entrances and in all classrooms. Additionally, instructors can receive free KN95 masks by contacting their building manager.
  - To support this increased masking requirement, we have ordered approximately 1 million surgical and KN95 masks for our campus community.

• Additionally, in consultation with the Pima County Health Department and based on current public health conditions, campus housing residents are now required to test weekly.

Family Friendly Initiatives: Expanded Parental Leave and New Lactation Space Initiative

• On January 13 I was pleased to announce that we have doubled the paid parental leave benefit for benefits-eligible employees from six weeks to 12 weeks paid leave. This change went into effect on Jan. 1, 2022. Parents may also take up to 12 additional weeks using accrued time off or unpaid leave.

• Other updates to the Parental Leave Policy include: the expansion of eligibility to include foster placement, guardianship placement, surrogacy, and stillbirth; the addition of two weeks paid leave for miscarriage; and parental leave can be taken at any time in the first 12 months after a child joins a family.

• Additionally, a new lactation space initiative was recently launched to identify and fund new lactation spaces on campus. Colleges, departments, or units who would like to create a new lactation space in their buildings can apply online for funding. The deadline for submissions is March 16, 2022.

• These initiatives will continue to help make us a competitive market for strong talent and I’m proud to support these family-friendly initiatives that promote a healthy workplace climate.

Native Nation and Tribal Outreach Underway

• On January 13, I hosted the Inaugural Tribal Leaders Advisory Council Meeting. This council will meet quarterly, and I had the pleasure of welcoming the following leaders into this partnership this month: Gila River Indian Community Governor Lewis, Hualapai Chairman Dr. Clarke, Navajo Nation President Nez, Pascua Yaqui Chairman Yucupicio, and Tohono O’odham Nation Chairman Norris, Jr.

• On December 1, I toured the Salt River Pima-Maricopa Indian Community and met with President Harvier, the Tribal Education, and Health Departments. I am pleased that we are
working with the Tribal Community Health Department on providing rotations at the newly construction Health Facility that will open later this quarter.

**Two UA Grads Chosen as NASA astronaut candidates**
- Two of our very own graduates have been chosen as 2021 NASA astronaut candidates. Out of a field of 12,000, only ten applicants were selected.
- Both Christina Birch and Jessica Wittner received degrees from the University of Arizona and will have a chance to go to space following a two-year training. Christina graduated from UA in 2008 with a bachelor’s in biochemistry and mathematics and holds a doctorate from MIT in biological engineering. Jessica received a bachelor’s in aerospace engineering from UA in 2009 and is a test pilot in the US Navy.
- I am always amazed at the incredible success of our graduates as they make meaningful impacts on our community and beyond. Good luck, Christina and Jessica!

**The James Webb Space Telescope Begins its Journey to Space**
- Astronomers at UArizona led the design and development of the Near-Infrared Camera onboard the James Webb Space Telescope, which launched on Christmas Day 2021.
- Regents Professors Marcia and George Rieke were instrumental in developing the technology that will launch a new era of space observation. I invite you to listen to the conversation I had with Marcia and George back in November as we discussed the launch of the new telescope and their work to make this possible.

**Year-over-Year Enrollment is up in all Categories, Particularly in First Generation Students**
- The year-over-year enrollment numbers are up significantly this year. This is following a significant increase last year, as well. The largest increases are in international enrollments, followed by sizeable increases in domestic out-of-state enrollments as well.
- We continue to see an increase in first generation students year-over-year across the enrollment funnel for main campus, first year applicants. I know our Enrollment Management team works hard to support and encourage first generation students to pursue their education at our university, and we are seeing strong results.

**GOALS:**

**Research, Innovation & Impact Future Growth Goals**
- Under the leadership of Betsy Cantwell, RII is holding focused meetings with Deans and ADRs exploring ways to increase research intensity. Our research award numbers are doing well, but there is room for growth in research expenditures to match that same pace consistently among the colleges. RII is working with UITS to improve dashboards that will better track research awards and expenditures for improved decision making in the colleges.
- Additionally, UAaccess Research (UAR) has been updated and is now available for proposal routing and other sponsored project modules. This will make the process more streamlined, convenient, and user friendly. We recognize that research is one of our core missions as an institution and are committed to being a leader in research innovation.
New Academic Program Workflow Form

General

Proposed Name: Ecosystem Genomics GIDP
Transaction Nbr: 00000000000098
Plan Type: Minor
Academic Career: Graduate
Degree Offered:
Do you want to offer a minor? Y
Anticipated 1st Admission Term: Fall 2021

Details

Department(s):

AGSC

<table>
<thead>
<tr>
<th>DEPTMNT ID</th>
<th>DEPARTMENT NAME</th>
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<tbody>
<tr>
<td>1230</td>
<td>Biosystems Engineering</td>
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<tr>
<td>1232</td>
<td>Agricultural Education</td>
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<td>School of Plant Science</td>
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<tr>
<td>1239</td>
<td>School of Natural Resources and the Environment</td>
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GRDC

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<tbody>
<tr>
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SBSC

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<tr>
<td>0481</td>
<td>School of Information</td>
<td>N</td>
</tr>
<tr>
<td>3008</td>
<td>School of Geography and Development</td>
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SCNC

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<tr>
<td>0469</td>
<td>Hydrology and Atmospheric Sciences</td>
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Campus(es):

**MAIN**

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>DESCRIPTION</th>
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</thead>
<tbody>
<tr>
<td>TUCSON</td>
<td>Tucson</td>
</tr>
</tbody>
</table>

**Admission application terms for this plan:** Spring: N Summer: N Fall: Y

**Plan admission types:**
- Freshman: N
- Transfer: N
- Readmit: N
- Graduate: Y
- Non Degree Certificate (UCRT only): Y
- Other (For Community Campus specifics): N

**Plan Taxonomy:** 26.1201, Biotechnology.
- Program Length Type: Program Length Value: 0.00
- Report as NSC Program:
- SULA Special Program:

**Print Option:**
- Diploma: Y
- Ecosystem Genomics Graduate Interdisciplinary Program
- PhD Minor
- Transcript: Y
- Ecosystem Genomics Graduate Interdisciplinary Program
- PhD Minor

**Conditions for Admission/Declaration for this Major:**

We welcome active doctoral students who are enrolled full time at the University of Arizona, with background and training in ecology, evolutionary biology, entomology, plant sciences, biosystems engineering, hydrology, atmospheric science, environmental science, and/or natural resource management. While students from diverse programs will be considered, we anticipate that students generally will be enrolled in a graduate program aligned conceptually with ecosystem genomics (e.g., but not limited to, Ecology and Evolutionary Biology (EEB), Entomology and Insect Sciences (EIS), School of Plant Sciences (SPLS), Biosystems Engineering (BE), Hydrology and Atmospheric Sciences (HAS), Environmental Sciences (ENVS), School of Natural Resources and the Environment (SNRE), School of Information (INFO), and School of Geography, Development, and Environment (GEOG). Students who previously completed the Graduate Certificate in Ecosystem Genomics are not eligible to earn the minor.
**Requirements for Accreditation:**
We will not seek accreditation.

**Program Comparisons**

**University Appropriateness**

The proposed Ecosystem Genomics GIDP fits under two pillars of the University of Arizona's strategic plan: Grand Challenges 2.2A--Preeminence in environmental research and education, by striving to "excel in research on the natural and built environment..."; and Arizona Advantage 3.1A--Strengthen commitment to equity and support of diverse communities by "creat[ing] engaging and empowered campus environments that inspire creativity, enhance our ability to think critically, and challenge us to approach some of society's most complex problems without hesitation, and enriched by diverse perspectives... leading the way toward a society that taps into the talents, wisdom, and strengths that all individuals and communities possess to solve our greatest problems."

The GIDP Co-Chairs, participating faculty, and University leaders such as Dean Carnie and Dr. Folks have a shared commitment to fostering the long-term sustainability and growth of ecosystem genomics as an emerging critical science at University of Arizona, with attention to continued recruitment of faculty; supporting research, teaching, curriculum development, outreach, and mentorship through the ecosystem genomics initiative; and enhancing and formalizing graduate student training through the proposed GIDP.

The University of Arizona is the most appropriate location within the Arizona University System for this GIDP because of our sustained and growing excellence in Ecosystem Genomics, as reflected in our Ecosystem Genomics Initiative, the highly successful Ecosystem Genomics cluster hire, and the thriving focus on ecosystem genomics that connects multiple colleges and units on campus in a new, emergent, convergent science. Moreover, the University of Arizona, as Arizona's land-grant institution, is uniquely positioned to serve stakeholders statewide and regionally with problem-solving that, by working across scales from genomics to ecosystems, can solve grant challenges in human sustainability. Finally, as a Hispanic Serving Institution the University of Arizona has the opportunity to increase the recruitment, inclusion, retention, and visibility of diverse students in graduate programs in STEM. This GIDP aims to enhance graduate recruitment to partner programs with an infusion of support from the National Science Foundation Research Trainee grant (BRIDGES), which supports the initiation and first strategic phase of this GIDP.

**Arizona University System**

<table>
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<tr>
<th>NBR</th>
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<th>DEGREE</th>
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<tr>
<td>1</td>
<td>Ecol. &amp; Environ. Informatics</td>
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<td>NAU (Main-Flagstaff Mountain)</td>
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Peer Comparison

The proposed program is globally unique and complements existing programs in the integrative life sciences by centering on a newly emergent and convergent scientific field, the interdisciplinary science of ecosystem genomics. While many programs exist with major/minor emphases in genomics, ecosystem science, and related disciplines, we did not identify any existing minor (or major) program that focuses on integrating from genes to ecosystems in a manner that reaches from molecules to landscapes, from soils to the atmosphere, from microbes to plants and insects, and from wild lands to agriculture. The closest matches are presented in the comparison table: the T3 option in the INF (Informatics) PhD program at Northern Arizona University; and the Environmental Life Sciences PhD at Arizona State University. Both are oriented toward sustainability and addressing grand challenges in sustainability, the former through informatics and the latter through traditional environmental science. Both are outstanding and successful programs that differ from, and are complementary to, the proposed UArizona GIDP PhD Minor in Ecosystem Genomics: the proposed GIDP brings students in diverse areas together on a convergent training program in an emergent field of ecosystem genomics, rather than drawing only from informatics students or only from students studying environmental science: our partner programs on campus include EEB, BE, EIS, SNRE, HAS, SPLS, ENVS, GEOG, and INFO. The proposed GIDP has a novel core course that spans the emergent discipline and is distinct in its dual foci in ecosystem sciences and genomics. The role of informatics for the proposed GIDP is to advance the synthesis of ecosystem sciences and genomic sciences, advancing the emergent discipline as a tool rather than a focus. Coupled with our outstanding faculty hires in Ecosystem Genomics, our active faculty research programs, and our initial funding through the National Science Foundation, the GIDP in Ecosystem Genomics is conceptualized as a novel and innovative program that will fill an open niche at the leading edge of interdisciplinary science.

Faculty & Resources

Faculty

Current Faculty:

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<tr>
<th>INSTR ID</th>
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<tr>
<td>01868877</td>
<td>Luciano Matzkin</td>
<td>1235</td>
<td>Assoc. Prof</td>
<td>Doctor of Philosophy</td>
<td>.05</td>
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<tr>
<td>01875717</td>
<td>Jana Uren</td>
<td>1230</td>
<td>Assit. Prof</td>
<td>Doctor of Philosophy</td>
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<tr>
<td>02565087</td>
<td>Bonnie Hurwitz</td>
<td>1230</td>
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<tr>
<td>06902489</td>
<td>Andrew Comrie</td>
<td>3008</td>
<td>Professor</td>
<td>Doctor of Philosophy</td>
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<tr>
<td>08609517</td>
<td>Jennifer Croissant</td>
<td>0433</td>
<td>Assoc. Prof</td>
<td>Doctor of Philosophy</td>
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<tr>
<td>11403676</td>
<td>Anne Arnold</td>
<td>1238</td>
<td>Professor</td>
<td>Doctor of Philosophy</td>
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</table>
The GIDP will use existing physical facilities already in use by our partner.
graduate programs. Dr. Jennifer Barton, Director of The BIO5 Institute has agreed to provide office space for the Program Coordinator. No special facilities are required.

Additional Facilities Required & Anticipated:
None.

Other Support

Other Support Currently Available:

Directors/Coordinators/Chairs of Graduate Studies in partner programs have agreed to assist in student recruitment to the GIDP minor. Funds from the National Science Foundation, College of Science, and College of Agriculture and Life Sciences will support the Program Coordinator for the first five years of the GIDP, with plans currently underway to seek private, donor, and institutional support thereafter. Funding for personnel for the GIDP will be non-Graduate College/GIDP resources.

The BIO5 Institute will provide support the Ecosystem Genomics Seminar Series to bring 2-3 domestic and international speakers per year to UA for the first five years of the GIDP. The Co-Chairs of the GIDP are tenured faculty members contributing their leadership as service aligned with the University of Arizona's strategic aims.

Other Support Needed over the Next Three Years:
None.

Comments During Approval Process

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BCOLOMBI

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NEW ACADEMIC PROGRAM- STANDALONE GRADUATE MINOR
ADDITIONAL INFORMATION FORM

I. MINOR DESCRIPTION - provide a marketing/promotional description for the proposed minor. Include the purpose, nature, and highlights of the curriculum, faculty expertise, etc. The description should match departmental and college websites, handouts, promotional materials, etc.

The Ecosystem Genomics Graduate Interdisciplinary Program (GIDP) PhD Minor will support and train diverse, outstanding doctoral students in ecosystem genomics, an emergent discipline that integrates across biotic systems from genes to ecosystems to solve grand challenges in sustainability and innovation in a rapidly changing world. As an innovative, interdisciplinary area of study, ecosystem genomics represents the synthesis of ecosystem- and genomic sciences via the tools of computational biology, modeling, data science, experiments, theory, applications, and the approaches and power of ‘big data’ in a collaborative and convergent framework.

The ultimate aim of the Ecosystem Genomics GIDP is to foster a new generation of diverse transdisciplinary scientists to address the challenges of sustaining natural and managed ecosystems on which humans depend, including wildlands, agricultural systems, forests, arid lands, and marine environments. The coursework supported by this minor will help students think across scales from ‘genes to ecosystems’ as they develop skills in interdisciplinarity, scientific communication, and collaboration. At its core the minor will foster and extend students’ excellence in areas such as data science, microbiology, plant sciences, insect science, environmental science, atmospheric science, biosystems engineering, ecology and evolutionary biology, geography and information science, and it is intended to attract students majoring in these UArizona programs. Ultimately the minor will help students translate ideas into meaningful scientific advances while cultivating deep and broad skill sets and promises to prepare students for important roles in solving grand challenges relevant to regional, national, and international issues in sustainability and innovation.

II. NEED FOR THE MINOR/JUSTIFICATION - provide market analysis data or other tangible evidence of the need for and interest in the proposed minor. This might include results from surveys of current students, alumni, and/or employers or reference to student enrollments in similar programs in the state or region. Curricular Affairs can provide a job posting/demand report by skills obtained/outcomes of the proposed minor. Please contact the Office of Curricular Affairs to request the report for your proposal.

Ecosystem genomics is both a new scientific discipline and a nexus for coalescing UArizona’s existing and emergent strengths in environmental science, microbial ecology, plant science, insect science, hydrology and atmospheric science, biosystems engineering, natural resources, ecology, evolutionary biology, genome-enabled science, and “big data” cyberinfrastructure to address the grand challenge of scaling biological information from genes to ecosystems. This GIDP is motivated by a group of faculty with shared and resonant interests who already have come together as collaborators, co-mentors, and instructors to fill a clear need in the job market, from industry to academia to government and non-governmental organizations. As evidenced by our letters of support from industry, as but one example of the excitement among prospective employers, there is considerable enthusiasm for the program.

This minor will simultaneously advance theory and practical solutions to problems ranging from global climate change to human health. As a science, ecosystem genomics integrates the theory and tools of ecosystem ecology with meta-omics approaches to open a new window on mechanisms that regulate scaling of micro- to macro-scale processes in natural and human-built environments. This minor seeks to advance predictive understandings of how biological information networks regulate natural and human ecosystem responses to change.
The University of Arizona already has supported the development of the Ecosystem Genomics focus area through a faculty cluster hire that resulted in 6 new faculty at the Assistant/Associate Professor level in 5 departments. The foundation for the cluster hire in Ecosystem Genomics emerged from the iBiosphere Working Group that was convened in 2012 at the request of then-Associate VPR Andrew Comrie, and Deans Shane Burgess (CALS) and Joaquin Ruiz (COS). In creating the iBiosphere concept, a group of nine faculty members from six colleges developed a strategic plan for enhancing interfaces among the natural sciences, information sciences and social sciences, with a primary nexus being 'big-data' and 'big-computing'.

Since then, the team of faculty has grown to 15 faculty in nine units. This effort resulted in a successful 5-year NSF Research Training (NRT) grant in Ecosystem Genomics that started in Fall 2020. During the first recruitment cycle more than 45 incoming students applied, suggesting interest and sustainability for a long-term program in this area. Moreover, employers such as Bayer Crop Sciences and Indigo Agriculture have expressed their support for graduate training in Ecosystem Genomics, indicating opportunities for future jobs for students from our program. We anticipate that the training provided by the minor will expand and complement the expertise gained by doctoral students in majors in partner programs (EEB, EIS, BE, SPLS, ENVS, HAS, SNRE, GEOG, INFO) and foster additional hard- and soft-skill training that will propel them as they move on to careers in academia, governmental agencies, non-profits, industry, agriculture, data science, and more.

III. MINOR REQUIREMENTS - complete the table below to list the minor requirements, including minimum number of credit hours, required core, electives, and any special requirements. Note: information in this section must be consistent throughout the proposal documents (comparison charts, curricular/assessment map, etc.).

| Total transfer units that may apply to minor | Three (3), but these may not replace the Ecosystem Genomics Seminar |
| Pre-admissions expectations (i.e., academic training to be completed prior to admission) | We welcome active doctoral students who are enrolled full time at the University of Arizona, with background and training in ecology, evolutionary biology, entomology, plant sciences, biosystems engineering, hydrology, atmospheric science, environmental science, and/or natural resource management. While students from diverse programs will be considered, we anticipate that students generally will be enrolled in a graduate program aligned conceptually with ecosystem genomics (e.g., but not limited to, Ecology and Evolutionary Biology (EEB), Entomology and Insect Sciences (EIS), School of Plant Sciences (SPLS), Biosystems Engineering (BE), Hydrology and Atmospheric Sciences (HAS), Environmental Sciences (ENVS), School of Natural Resources and the Environment (SNRE), School of Information (INFO), and School of Geography, Development, and Environment (GEOG)). |
| Minor requirements. List all minor requirements including core and electives. Courses listed must include course prefix, number, units, and title. Mark new coursework (New). Include any limits/restrictions needed (house number limit, etc.). Provide email(s)/letter(s) of support from home department head(s) for courses not owned by your department. | All courses already exist and are taught regularly in person on the UArizona main campus. We have reached out to instructors and unit/department heads to confirm that the GIDP minor would not create enrollment challenges. Letters of support are included. 11 units required (3 core + 8 or more elective units) |

**Complete 3 units of core coursework:**
- RNR 696A (2) Ecosystems Genomics Seminar, fall
- EIS 596A (1) Ecosystem Genomics Seminar, spring
Complete 3 courses, choosing at least one course from each of three of the following four areas (to be chosen in conjunction with major and minor advisor/doctoral advising committee) for a minimum of 8 units.

All courses already exist and are taught regularly in person on the UArizona main campus. We have reached out to instructors and unit/department heads to confirm that the graduate certificate would not create enrollment challenges. Letters of support are included.

11 units required (3 core + 8 or more elective units)

1. Communication & Dissemination
   - ENVS 508 (3) Scientific Writing for Env., Ag., & Life Sciences
   - ENVS 515 (3) Translating Environmental Science
   - WSM/GEOS 595E (currently 1, will become 3 after fall 2021) Scientific Writing (Topics in Dendrochronology)
   - INFO 520 (3) Ethical Issues in Information
   - INFO 536 (3) Data Science and Public Interests

2. Theory & Concepts: Ecosystem & Earth Science
   - ENVS 511 (3) Environmental Metabolomics
   - ENVS 510 (3) Microbial Biogeochemistry and Global Change
   - RNR 558 (3) Ecosystem Ecology and a Sustainable Future
   - ENVS 525 (3) Environmental Microbiology
   - ECOL 578 (3) Global Change
   - ATMO 536A (3) Fundamentals of Atmospheric Sciences
   - GC 530 (3) The Climate System
   - GC 597A (3) Global Change Research, Application, and Decision Making

3. Theory & Concepts: Genomic Biology
   - ECOL 553 (4) Functional and Evolutionary Genomics
   - ECOL 596A (1) Evolutionary Ecology
   - ECOL 600A (3) Fundamentals of Evolution
   - ECOL 565 (3) Phylogenetic Biology
   - EIS 544 (3) Insect Ecology
   - PLP 550 (4) Principles of Plant Microbiology

4. Tools & Data: Data Analytics
   - BE 534 (3) Biosystem Analytics
   - BE 587 (3) Metagenomics: From Genes to Ecosystems
   - ECOL 580 (3) Mathematical Models in Biology
   - ENVS 567 (3) Introductory Statistics & Multivariate Statistics with R (undergoing course name change to Statistical analysis of ecological and environmental data with R)
   - INFO 533 (3) Medical On-Line Searching
   - INFO 544 (3) Informatics in Biology
   - INFO 597 (1-6) Biodiversity Informatics

**Research methods, data analysis, and methodology requirements (Yes/No). If yes, provide description.**

Yes, integrated into the required Ecosystem Genomics seminar and delivered through training for their majors.

**Internship, practicum, applied course requirements (Yes/No). If yes, provide description.**

No

**Additional requirements (provide description)**

No
### IV. CURRENT COURSES

- using the table below, list all existing courses included in the proposed minor. You can find information to complete the table using the [UA course catalog](#) or [UAnalytics](#) (Catalog and Schedule Dashboard > "Printable Course Descriptions by Department" On Demand Report; right side of screen). If the courses listed belong to a department that is not a signed party to this implementation request, upload the department head’s permission to include the courses in the proposed minor and information regarding accessibility to and frequency of offerings for the course(s). Upload letters of support/emails from department heads to the “Letter(s) of Support” field on the UAccess workflow form. Add rows to the table, as needed.

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<tr>
<th>Course prefix and number (include cross-listings)</th>
<th>Units</th>
<th>Title</th>
<th>Course Description</th>
<th>Pre-requisites</th>
<th>Modes of delivery (online, in-person, hybrid)</th>
<th>Typically offered (F, W, Sp, Su)</th>
<th>Dept. signed party to proposal?</th>
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<tr>
<td>ATMO 536A</td>
<td>3</td>
<td>Fundamentals of Atmospheric Sciences</td>
<td>Broadly covers fundamental topics in the atmospheric sciences. Topics include composition of the atmosphere, atmospheric thermodynamics, atmospheric chemistry, cloud physics, radiative transfer, atmospheric dynamics, and climate. Graduate-level requirements include additional questions on homework and exams plus a term paper on a specialized research topic.</td>
<td>none listed</td>
<td>in person</td>
<td>Sp</td>
<td>Yes</td>
</tr>
<tr>
<td>BE 534</td>
<td>3</td>
<td>Biosystem Analytics</td>
<td>This course provides a comprehensive introduction to Python for data analytics focused on the interpretation of biological data. The course is structured as a series of short lectures covering key concepts and analytical strategies using Python and cutting-edge open source packages for data analytics. The majority of the course focuses on hands-on exercises both in- and out- of class to develop practical coding skills for interpreting and analyzing high-dimensional biological data. Students work in a collaborative learning classroom to gain skills in (1) basic Unix and Python, (2) Python data structures functions, and files, and (3) data wrangling and visualization using IPython, NumPy, and pandas, and (4) analytics using machine-learning methods available in Scikit-Learn.</td>
<td>Online introduction to Linux. Code academy’s Intro to Unix or Command line bootcamp. Apple or Linux computer or Windows machine with Putty. An introductory programming class in python is useful but not required.</td>
<td>in person</td>
<td>F</td>
<td>Yes</td>
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These skills are taught by implementing real-world coding examples to manipulate and process biological data in Python, and effectively use data-oriented Python libraries to analyze and interpret data from biological systems.

<table>
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<th>Course Code</th>
<th>Units</th>
<th>Course Title</th>
<th>Description</th>
<th>Lab Fee</th>
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<tbody>
<tr>
<td>BE 587</td>
<td>3</td>
<td>Metagenomics: From Genes to Ecosystems</td>
<td>Environmental genomics is revolutionizing our understanding of microbes from the environment to human health, towards a holistic view of ecosystems or &quot;One-Health&quot;. At its core are new molecular methods called metagenomics to sequence DNA directly from an environmental sample, thus capturing the whole microbial community and bypassing culture. Modern (Next-Gen) sequencing technologies offer vast new datasets of short sequence reads representing these microbial communities, however many hurdles exist in interpreting data with high species complexity and given specialized software for microbial metagenomic analyses. This course focuses on the science of metagenomics towards understanding (1) questions that metagenomics can address, (2) possible approaches for metagenomic sequencing and analysis, and (3) how genes, pathways, and environmental context are translated into ecosystem-level knowledge. This course alternates between traditional lectures and hands-on experience with programming, bioinformatics tools, and metagenomic analysis. The course concludes with several weeks of seminar-format discussions on current research in metagenomic data analysis and a final project of your choice analyzing real-world experimental data.</td>
<td>none listed</td>
<td>in person</td>
<td>F (not in Fall 2021, offered Spring 2022)</td>
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<tr>
<td>ECOL 578</td>
<td>3</td>
<td>Global Change</td>
<td>Analysis of the Earth system through an examination of its</td>
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<td>in person</td>
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</tbody>
</table>
component parts (particularly climate and biogeochemistry) and their interactions with human activities, emphasizing information needed to understand modern and future environmental changes. Graduate-level requirements include an in-depth written exercise and additional activities as described in the syllabus.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Units</th>
<th>Course Title</th>
<th>Description</th>
<th>Prerequisites</th>
<th>Delivery</th>
<th>Days</th>
<th>Core/GA</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECOL 553</td>
<td>4</td>
<td>Functional and Evolutionary Genomics</td>
<td>Computational, functional, and evolutionary approaches to genomics, including bioinformatics and laboratory methods relevant to many modern research approaches in biology. Graduate-level requirements include students completing independently designed lab exercises and relate these to the primary literature in a paper. Undergraduate students will only complete defined lab exercises.</td>
<td>Concurrent registration, ECOL 553L for 1st yr. IGERT fellows. While stated in the catalog, this requisite no longer applies.</td>
<td>in person</td>
<td>F</td>
<td>Yes</td>
</tr>
<tr>
<td>ECOL 600A</td>
<td>3</td>
<td>Fundamentals of Evolution</td>
<td>The fundamentals of modern Evolutionary Biology, including molecular evolution, phylogenetics, macroevolution, and population/quantitative genetics. Graduate-level review of evolution focusing on (i) phenotypic evolution of complex traits, and (ii) molecular evolution.</td>
<td>Graduate status in EEB or related department.</td>
<td>in person</td>
<td>Sp</td>
<td>Yes</td>
</tr>
<tr>
<td>ECOL 565</td>
<td>3</td>
<td>Phylogenetic Biology</td>
<td>Concepts in phylogenetic biology, focusing on the phylogenetic (evolutionary) tree of species. The form of the tree, character evolution, speciation, and gene trees. Graduate-level requirements include a more in-depth term paper.</td>
<td>none listed</td>
<td>in person</td>
<td>Sp, even years</td>
<td>Yes</td>
</tr>
<tr>
<td>ECOL 580</td>
<td>3</td>
<td>Mathematical Models in Biology</td>
<td>For advanced undergraduates and graduate students in biological and ecological sciences, and math students: learn how to apply basic tools of mathematical tools (from simple back-of-the-envelope estimates to formal stability analysis using difference and differential equations) to biological problems including population</td>
<td>MATH 129</td>
<td>in person</td>
<td>Sp</td>
<td>Yes</td>
</tr>
<tr>
<td>Course Code</td>
<td>Units</td>
<td>Course Title</td>
<td>Description</td>
<td>Credits</td>
<td>Mode</td>
<td>Prerequisites</td>
<td>Notes</td>
</tr>
<tr>
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</tr>
<tr>
<td>ECOL 596A</td>
<td>2</td>
<td>Evolutionary Ecology</td>
<td>This seminar-style graduate-level course will explore standing questions at the interface of ecology and evolution, with an emphasis on how evolutionary processes affect the ecology that we observe in natural populations. Underlying concepts will be reviewed briefly in lectures by the instructor, but the majority of class time will be spent discussing current literature and major questions in the field.</td>
<td>none listed</td>
<td>in person</td>
<td>F, even years</td>
<td>Yes</td>
</tr>
<tr>
<td>EIS 544</td>
<td>3</td>
<td>Insect Ecology</td>
<td>The study of how variation in the environment, interactions with other species and the special features of insect &quot;design,&quot; have determined the evolution of diverse insect life histories, the dynamics of insect population and the roles of insects in communities.</td>
<td>none listed</td>
<td>in person</td>
<td>F, odd years</td>
<td>Yes</td>
</tr>
<tr>
<td>ENVS 508</td>
<td>3</td>
<td>Scientific Writing for Env., Ag., &amp; Life Sciences</td>
<td>Effective writing is a valuable tool for any student aspiring for a career in the Environmental, Agricultural, and Life Sciences. This course will cover in-depth technical writing skills needed for scientific writing success, ranging from how to perform comprehensive reviews of the scientific literature, to performing peer reviews of the writing of fellow students. Ultimately, completion of this course will improve students' ability to write technical reports, theses and dissertations, and journal articles. Graduate-level requirements include work on theses, dissertations or journal articles.</td>
<td>none listed</td>
<td>in person</td>
<td>Sp</td>
<td>Yes</td>
</tr>
<tr>
<td>ENVS 515</td>
<td>3</td>
<td>Translating Environmental Science</td>
<td>Scientists speak a different language, a dialect filled with abstract symbolism, hypotheses and references to Latin and Greek. In this course, students learn</td>
<td>none listed</td>
<td>in person</td>
<td>Sp</td>
<td>Yes</td>
</tr>
<tr>
<td>Course Code</td>
<td>Credits</td>
<td>Course Title</td>
<td>Description</td>
<td>Requirements</td>
<td>In Person</td>
<td>Term</td>
<td>Open to Graduate Students</td>
</tr>
<tr>
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<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
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</tr>
<tr>
<td>ENVS 511</td>
<td>3</td>
<td>Environmental Metabolomics</td>
<td>This is a 3 credit hours course aimed to provide an introduction to metabolomics, describes the tools and techniques we use to study the metabolome and explains why we want to study it.</td>
<td>CHEM 142/144 or CHEM 152 or CHEM 162/164 and MCB 181R; or equivalent or instructor consent</td>
<td>in person</td>
<td>Sp</td>
<td>Yes</td>
</tr>
<tr>
<td>ENVS 510</td>
<td>3</td>
<td>Microbial Biogeochemistry and Global Change</td>
<td>Microbes are the drivers of planetary biogeochemistry. They produce half the oxygen on the planet, and fix half the carbon. They introduce bioavailable forms of nitrogen into the biosphere. If human life ceased to exist, the central biogeochemical cycles would continue turning. However, while the planet's biogeochemistry can persist readily in the absence of human life, that does not mean that humankind's presence lacks impact. The Anthropocene (era of human impact) has seen significant changes to planetary stocks and fluxes.</td>
<td>Background in biology or biogeochemistry, and openness to interdisciplinary learning.</td>
<td>in person</td>
<td>F</td>
<td>Yes</td>
</tr>
</tbody>
</table>
of C, N, S, etc. Many of these changes involve or impact microbes, and have significant impacts on biogeochemical cycles. To understand microbial biogeochemistry in today's world, one must include the context of global change. And, conversely, one cannot understand the trajectory of global change without understanding microbial feedbacks via biogeochemical cycles. In this interdisciplinary undergraduate and graduate class we will cover major microbial biogeochemical cycles, and how these cycles are impacted by, and feedback to, global change. To understand the research in this area, we will discuss current methods in both microbial ecology and biogeochemistry, ranging from molecular meta-omics to the use of isotopes as biogeochemical tracers, with a particular emphasis on the challenges and opportunities of integrating these two disciplines. Lectures will be mixed with journal club-style readings and discussions, so active participation is essential. This course is designed for graduate students from diverse backgrounds and advanced undergraduates.

<p>| ENVS 525 | 3 | Environmental Microbiology | Current concepts in water quality, aerobiology and microbial biogeochemistry. Graduate-level requirements include extra journal readings and more comprehensive exams. | none listed | online | F | Yes |
| ENVS 567 | 3 | Introductory Statistics &amp; Multivariate Statistics with R | The course (3-unit class) will teach the fundamentals of coding and programming using the R language (<a href="https://www.r-project.org/">https://www.r-project.org/</a>). The students will use code examples and practice problems to understand the statistical as well as the scientific viewpoint. Using R, students will explore and visualize real-world data and derive meaningful interpretations. The course will cover introductory statistics (descriptive | ENVS 275 or MATH 263, an introductory college-level, statistics course, or instructor consent | in person | Sp | Yes |</p>
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Units</th>
<th>Course Title</th>
<th>Description</th>
<th>Delivery</th>
<th>Offered</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>GC 530</td>
<td>3</td>
<td>The Climate System</td>
<td>Systematic examination of processes and circulations comprising Earth's climate. Emphasis on circulations influencing geographic processes using examples of atmospheric environmental issues. Graduate-level requirements include the completion of a term paper.</td>
<td>none listed</td>
<td>in person</td>
<td>Sp</td>
</tr>
<tr>
<td>GC 597A</td>
<td>3</td>
<td>Global Change Research, Application, and Decision-Making</td>
<td>Integrative experience for natural and social science students with focus on local and regional consequences of global change.</td>
<td>none listed</td>
<td>online</td>
<td>Sp, every other year</td>
</tr>
<tr>
<td>INFO 520</td>
<td>3</td>
<td>Ethical Issues in Information</td>
<td>This course presents an overview and understanding of the intractable and pressing ethical issues as well as related policies in the information fields. Emerging technological developments in relation to public interests and individual well-being are highlighted throughout the course. Special emphasis is placed on case studies and outcomes as well as frameworks for ethical decision-making.</td>
<td>none listed</td>
<td>in person</td>
<td>Yes</td>
</tr>
<tr>
<td>INFO 533</td>
<td>3</td>
<td>Medical On-Line Searching</td>
<td>This course will focus on the online retrieval and evaluation of medical literature and the issues surrounding provision of timely, relevant, peer-reviewed medical information. Emphasis will be on the development of the intellectual acuity required to provide physicians, nurses, pharmacists, allied health professionals, medical researchers and consumers with targeted responses to medical queries. Current search modalities such as Evidence-Based Medicine will be covered both in readings and in class discussions.</td>
<td>none listed</td>
<td>in person</td>
<td>Sp</td>
</tr>
<tr>
<td>Course Code</td>
<td>Credits</td>
<td>Course Title</td>
<td>Description</td>
<td>Instructor</td>
<td>Delivery Format</td>
<td>Semester</td>
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</tr>
<tr>
<td>INFO 536</td>
<td>3</td>
<td>Data Science and Public Interests</td>
<td>This course focuses on the use of modern data science methods to help learners make socially responsible decisions and mitigate harm that arises from issues like bias, discrimination, and threats to one's personal privacy. More and more individuals are needing to make data-driven decisions in a wide variety of contexts including non-governmental organizations, not-for-profit industries, human services, environmental organizations, refugee camps, and more. Students in this class will thus learn about data science and how it can be utilized in contexts where socially-good decisions are desired and emphasized. This active learning class is designed for students who have an interest in the topic but who may have little to no previous experience with data science or programming.</td>
<td>none listed</td>
<td>in person</td>
<td>F</td>
</tr>
<tr>
<td>INFO 544</td>
<td>3</td>
<td>Informatics in Biology</td>
<td>Analyze genomic sequences through understanding and using a variety of bioinformatics algorithms and software tools. Interdisciplinary approach integrating informatics, statistics, and biology. Graduate-level requirements include leading a discussion on a current paper or give a tutorial on a bioinformatics tool as part of the Major Concept Exercises category.</td>
<td>none listed</td>
<td>in person</td>
<td>F</td>
</tr>
<tr>
<td>INFO 597</td>
<td>1-6</td>
<td>Biodiversity Informatics</td>
<td>Modern science has always been data driven but advances in data gathering tools from ground sensors to aerial-based remote sensing increase the researchers’ opportunities and responsibility for the professional management of data to support the reproducibility and validity of science. In this course, biology, engineering, and information science</td>
<td>none listed</td>
<td>in person</td>
<td>Su</td>
</tr>
</tbody>
</table>
students will learn to design and implement research methodologies for field research that effectively combine 1) the discovery and use of existing data with 2) the collection, organization, analysis, dissemination, and preservation of field generated research data. These research methodologies will be implemented/studied within the motivating context of behavioral wildlife observation research. Working in teams, students will build, program and deploy microcontroller-based field sensors to gather animal behavioral information in challenging field conditions. Students will use tools such as R and Jupyter Notebooks to add metadata, document data for publication and deposit the data in a trusted data repository.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credits</th>
<th>Course Title</th>
<th>Description</th>
<th>Prerequisites</th>
<th>Delivery Method</th>
<th>Offered</th>
<th>Corequisite</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLP 550</td>
<td>4</td>
<td>Principles of Plant Microbiology</td>
<td>This course deals with the mechanisms that plants and associated microorganisms use to establish detrimental or beneficial relationships from the molecular level to the population level. Classical and contemporary research are used extensively to evaluate contemporary and emerging theories.</td>
<td>PLP 305 or consent of instructor</td>
<td>in person</td>
<td>Sp, odd years</td>
<td>Yes</td>
</tr>
<tr>
<td>RNR 558</td>
<td>3</td>
<td>Ecosystem Ecology and a Sustainable Future</td>
<td>Rapid changes to Earth’s biosphere will influence how natural and managed ecosystems function and alter the services they provide. Issues from conservation biology to sustainability and global climate change rely on a comprehensive understanding of ecosystem processes. In this class, students will learn the principles of terrestrial ecosystem ecology, examining the influence of biological, ecological, and physical processes on energy and material flows and water and elemental (carbon, nitrogen, phosphorous) cycling in ecosystems.</td>
<td>none listed</td>
<td>in person</td>
<td>Sp</td>
<td>Yes</td>
</tr>
</tbody>
</table>
Graduate level requirements include an additional project and leading class discussions.

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
<th>Title</th>
<th>Description</th>
<th>Mode</th>
<th>Offered</th>
<th>New?</th>
</tr>
</thead>
<tbody>
<tr>
<td>RNR 621</td>
<td>3</td>
<td>Applied Statistics</td>
<td>Statistical methods relevant to the applied sciences, with emphasis on applications in ecology and biology. Fundamentals of inference, estimation, hypothesis testing, and model selection, with a focus on linear models.</td>
<td>in person</td>
<td>F</td>
<td>Yes</td>
</tr>
<tr>
<td>RNR 696A</td>
<td>2</td>
<td>Ecosystem Genomics</td>
<td>The development and exchange of scholarly information, in a small group setting, on selected topics in Natural Resources science and management. Course registrants exchange results of research through discussions, reports, and/or papers.</td>
<td>none listed</td>
<td>in person</td>
<td>F</td>
</tr>
<tr>
<td>TBD</td>
<td>1</td>
<td>&quot;Ecosystem Genomics&quot;</td>
<td>This is a companion course to RNR 696A. Students will practice the outcomes introduced in the fall course.</td>
<td>RNR696A</td>
<td>in person</td>
<td>Sp</td>
</tr>
<tr>
<td>WSM 595E</td>
<td>1</td>
<td>Scientific Writing (Topics in Dendro-chronology)</td>
<td>The exchange of scholarly information and/or secondary research, usually in a small group setting. Instruction often includes lectures by several different persons. Research projects may or may not be required of course registrants.</td>
<td>none listed</td>
<td>in person</td>
<td>F</td>
</tr>
</tbody>
</table>

V. NEW COURSES NEEDED - using the table below, list any new courses that must be created for the proposed program. If the specific course number is undetermined, please provide level (i.e., CHEM 6**). Add rows as needed. Is a new prefix needed? If so, provide the subject description so Curricular Affairs can generate proposed prefix options.

No new courses are required. We expect that our spring companion course to RNR 696A will use an existing prefix and course number.

VI. FACULTY INFORMATION - complete the table below. If UA Vitae link is not provided/available, attach a short CV (2-3 pages) to the end of the proposal or upload to the workflow form. UA Vitae profiles can be found in the UA directory/phonebook. Add rows as needed. NOTE: full proposals are distributed campus-wide, posted on committee agendas and should be considered “publicly visible”. Contact the Office of Curricular Affairs you have concerns about CV information being “publicly visible”.

<table>
<thead>
<tr>
<th>Faculty Member</th>
<th>Involvement</th>
<th>UA Vitae link or &quot;CV attached&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Elizabeth Arnold (Betsy)</td>
<td>Teach PLP 550, Faculty advisor, Instructor, Co-chair, GIDP</td>
<td><a href="https://profiles.arizona.edu/person/fungi">https://profiles.arizona.edu/person/fungi</a></td>
</tr>
<tr>
<td>Name</td>
<td>Courses Offered</td>
<td>Faculty Role</td>
</tr>
<tr>
<td>-----------------------</td>
<td>------------------------------------------------------</td>
<td>------------------------------</td>
</tr>
<tr>
<td>Bonnie Hurwitz</td>
<td>Teach BE 534, BE 587 (Co-taught), Faculty advisor, Instructor; Co-Chair, GIDP</td>
<td>Faculty advisor, Instructor; Co-Chair, GIDP</td>
</tr>
<tr>
<td>Laura Meredith</td>
<td>Teach RNR 696A-F (Req), RNR 558, Faculty advisor, Instructor</td>
<td>Faculty advisor, Instructor</td>
</tr>
<tr>
<td>Scott Saleska</td>
<td>Teach ECOL 580, ECOL 578 (Co-taught), Faculty advisor, Instructor</td>
<td>Faculty advisor, Instructor</td>
</tr>
<tr>
<td>Jana U'Ren</td>
<td>Teach BE 587 (Co-taught), Faculty advisor, Instructor</td>
<td>Faculty advisor, Instructor</td>
</tr>
<tr>
<td>Malak Tfaily</td>
<td>Teach ENVS 510, ENVS 511, Faculty advisor, Instructor</td>
<td>Faculty advisor, Instructor</td>
</tr>
<tr>
<td>Albert Barberán</td>
<td>Teach ENVS 567, Faculty advisor, Instructor</td>
<td>Faculty advisor, Instructor</td>
</tr>
<tr>
<td>Luciano Matzkin</td>
<td>Teach EIS 596A-Sp (Req: spring Ecosystem Genomics seminar), ECOL 553 (Co-taught), Faculty advisor, Instructor</td>
<td>Faculty advisor, Instructor</td>
</tr>
<tr>
<td>Katrina Dlugosch</td>
<td>Teach ECOL 596A, Faculty advisor, Instructor</td>
<td>Faculty advisor, Instructor</td>
</tr>
<tr>
<td>Rachel Gallery</td>
<td>Faculty Advisor, Instructor</td>
<td>Faculty Advisor, Instructor</td>
</tr>
<tr>
<td>Regis Ferriere</td>
<td>Faculty Advisor, Instructor</td>
<td>Faculty Advisor, Instructor</td>
</tr>
<tr>
<td>Rod Wing</td>
<td>Faculty Advisor, Instructor</td>
<td>Faculty Advisor, Instructor</td>
</tr>
<tr>
<td>W. Duke Pauli</td>
<td>Faculty Advisor, Instructor</td>
<td>Faculty Advisor, Instructor</td>
</tr>
<tr>
<td>Yang Song</td>
<td>Faculty Advisor, Instructor</td>
<td>Faculty Advisor, Instructor</td>
</tr>
<tr>
<td>Winslow Burleson</td>
<td>Faculty</td>
<td>Faculty</td>
</tr>
<tr>
<td>Andrew Comrie</td>
<td>Faculty</td>
<td>Faculty</td>
</tr>
<tr>
<td>Jennifer Croissant</td>
<td>Faculty Co-Advisor, Faculty Co-Advisor, Contribute to RNR696A and EIS 596A</td>
<td>Faculty Co-Advisor, Faculty Co-Advisor, Contribute to RNR696A and EIS 596A</td>
</tr>
<tr>
<td>Erin Leahey</td>
<td>Faculty Co-Advisor, Faculty Co-Advisor, Contribute to RNR696A and EIS 596A</td>
<td>Faculty Co-Advisor, Faculty Co-Advisor, Contribute to RNR696A and EIS 596A</td>
</tr>
</tbody>
</table>

VII. STUDENT LEARNING OUTCOMES AND CURRICULUM MAP - describe what students should know, understand, and/or be able to do at the conclusion of this minor. Work with the Office of Instruction and Assessment to create a curricular map using Taskstream. Include your curricular map in this section.

Upon concluding the minor in Ecosystem Genomics, doctoral students will:

1. Apply the principles of scientific collaboration and interdisciplinarity, with knowledge of risks and benefits
2. Communicate effectively about ecosystem genomics with diverse peers, stakeholders, partners, mentees, and scientists
3. Identify and develop strategies for addressing grand challenges in sustainability and innovation, for which ecosystem genomics can provide solutions
4. Use, interpret, and communicate the core conceptual, theoretical, analytical, computational, and data elements of ecosystem genomics

These will be achieved via the curriculum, as mapped below. Students will take two successive semesters of the Ecosystem Genomics seminar course (RNR 696A, 2 credits) in fall semester and the companion Ecosystem Genomics (EIS 596A, 1 credit) in spring, with most topics introduced or introduced and practiced in the first semester and practiced and assessed in the second semester. Concurrently or thereafter, they will take electives, choosing one course from three of four core areas at the discretion/direction of their major and minor advisors.

The comprehensive exam for the Ecosystem Genomics GIDP minor may take the form of a written question or a portion of a question with a focus on ecosystem genomics, and/or having
elements of ecosystem genomics in the research proposal, at the discretion of the minor representative and the committee. It also is expected that ecosystem genomics will be represented as a theme in the oral exam, at the discretion of the faculty representing the GIDP minor. This may take the form of a series of questions or discussion points between the student and minor representative with respect to ecosystem genomics.

Courses and outcomes are mapped below for the minor. RNR 696A as the Ecosystem Genomics seminar is listed for both fall and spring, but the spring course is now listed as EIS 596A.

### Ecosystem Genomics Minor
Courses and Activities Mapped to Ecosystem Genomics Minor

<table>
<thead>
<tr>
<th>Courses and Learning Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>RNR 696A</td>
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<tr>
<td>RNR 696A</td>
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<tr>
<td>RNR 696A</td>
</tr>
<tr>
<td>RNR 696A</td>
</tr>
<tr>
<td>EIS 596A</td>
</tr>
<tr>
<td>EIS 596A</td>
</tr>
</tbody>
</table>

### VIII. ASSESSMENT PLAN FOR STUDENT LEARNING
- using the table below, provide a schedule for program assessment of intended student learning outcomes 1) while students are in the program and 2) after completion of the minor. Add rows as needed.

<table>
<thead>
<tr>
<th>Learning Outcomes</th>
<th>Sources(s) of Evidence</th>
<th>Assessment Measures</th>
<th>Data Collection Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outcome 1: Apply the principles of scientific collaboration and interdisciplinarity, with knowledge of risks and benefits</td>
<td>- Course-embedded assessments in the core course, Ecosystem Genomics Seminar (RNR 696A and EIS 596A) - Student: Pre- and post questionnaires</td>
<td>- Formative and summative assessments including discussions, discourse, and presentations in the core course</td>
<td>- Upon declaration and completion of the minor - In core course</td>
</tr>
</tbody>
</table>
| Outcome 2: **Communicate effectively about ecosystem genomics** with diverse peers, stakeholders, partners, mentees, and scientists | - Course-embedded assessments in the core course, Ecosystem Genomics Seminar (RNR 696A and EIS 596A)  
- Student: Pre- and post questionnaires  
- Minor advisor: evaluation during oral comprehensive exam | - Formative and summative assessments including discussions, discourse, and presentations in the core course  
- Self-reflection and ranking of communication  
- Successful passing of the oral exam | - Upon declaration and completion of the minor  
- In core course  
- Oral comprehensive exam |
|---|---|---|---|
| Outcome 3: **Identify and develop strategies for addressing grand challenges in sustainability and innovation**, for which ecosystem genomics can provide solutions | - Course-embedded assessments in the core course, Ecosystem Genomics Seminar (RNR 696A and EIS 596A)  
- Student: Pre- and post questionnaires  
- Minor advisor: evaluation during oral comprehensive exam | - Formative and summative assessments including discussions, discourse, and presentations in the core course  
- Self-reflection and questionnaire responses  
- Successful passing of the oral exam | - Upon declaration and completion of the minor  
- In core course  
- Oral comprehensive exam |
| Outcome 4: **Use, interpret, and communicate the core conceptual, theoretical, computational, and data elements** of ecosystem genomics | - Course-embedded assessments in the core course, Ecosystem Genomics Seminar (RNR 696A and EIS 596A)  
- Student: Pre- and post questionnaires  
- Minor advisor: evaluation during oral comprehensive exam | - Formative and summative assessments including discussions, discourse, and presentations in the core course  
- Self-reflection and questionnaire responses  
- Successful passing of the oral exam | - Upon declaration and completion of the minor  
- In core course  
- Oral comprehensive exam |
IX. ANTICIPATED STUDENT ENROLLMENT - complete the table below. What concrete evidence/data was used to arrive at the numbers?

<table>
<thead>
<tr>
<th></th>
<th>1st Year</th>
<th>2nd Year</th>
<th>3rd Year</th>
<th>4th Year</th>
<th>5th Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Students</td>
<td>6-8</td>
<td>12-16</td>
<td>18-24</td>
<td>24-32</td>
<td>34-40</td>
</tr>
</tbody>
</table>

Data/evidence used to determine projected enrollment numbers: The Ecosystem Genomics PhD Minor is motivated by a 5-year NSF training grant, which will fund approximately 3-4 doctoral fellows and engage approximately 3-4 additional doctoral participants per year.

X. ANTICIPATED MINORS AWARDED - complete the table below, beginning with the first year in which the minor will be awarded. How did you arrive at these numbers? Take into consideration departmental retention rates.

<table>
<thead>
<tr>
<th></th>
<th>1st Year</th>
<th>2nd Year</th>
<th>3rd Year</th>
<th>4th Year</th>
<th>5th Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Minors</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>4</td>
<td>8</td>
</tr>
</tbody>
</table>

Data/evidence used to determine number of anticipated minors awarded annually: We anticipate that currently enrolled graduate students spanning at least nine units on the UArizona campus (EEB, EIS, SPLS, BE, HAS, ENVS, SNRE, INFO, and GEOG) may wish to adopt the new program as their doctoral minor. These will be first-year doctoral students, entering their second semester, such that their graduation dates will be in y5+ of the existence of this program.

XI. PROGRAM DEVELOPMENT TIMELINE - plans and timelines for 1) marketing the minor and 2) student recruitment activities.

The Ecosystem Genomics GIDP recruitment team will contact colleagues at the University of Arizona and other universities; ask GIDP faculty to recruit for the program; request REU program coordinators to share information with their students; and advertise the minor on organizational listservs such as the Ecological Society of America, American Society for Microbiology, and Out in STEM to enhance recruitment of students to existing UArizona graduate majors relevant to ecosystem genomics, with the added opportunity to then minor in the GIDP.

The program will send a representative to recruit at the Annual Biomedical Research Conference for Minority Students (ABRCMS), the Society for Advancement of Chicanos/Hispanics, Native Americans in Science (SACNAS), and/or the American Indian Science and Engineering Society (AISES) as funds permit through fall 2025. The marketing and recruitment process is motivated initially by a five-year training grant. Doctoral fellows and participants accepted into this training grant will automatically be enrolled into the Ecosystem Genomics GIDP PhD minor and will make up most of the students accepted through 2025.

Sample Marketing and Recruitment Timeline

Summer 2021
Update website ahead of recruitment season
Confirm and activate GIDP leadership team
**Fall 2021 (pending approval)**

- Enroll current PhD students in the fall core course, RNR 696A (Ecosystem Genomics Seminar, 2 credits)
- Share flyer/brochure and announcements with Directors of Graduate Studies
- Confirm GIDP faculty commitment and host organizational meeting for GIDP faculty
- Present GIDP as an exciting opportunity for prospective students SACNAS, AISES, peer institutions that are minority-serving, etc.
- Communicate with graduate programs admission committees, directors of graduate studies, and graduate program coordinators about sharing GIDP information with PhD applicants to their programs
- Remind GIDP faculty and graduate program coordinators to direct PhD applicants to GIDP website
- Advise active PhD students in the minor to enroll in elective(s) for spring

**Spring 2022**

- Host online informational meeting for interested applicants to the GIDP who are applying to partner PhD majors at UArizona
- Host online informational meeting for faculty who may wish to join the GIDP; vote in January and at annual intervals thereafter
- Enroll current PhD students who have chosen the minor in the spring core course, EIS 596A (Ecosystem Genomics Seminar, 1 credit); host social event
- Convene GIDP advisory/assessment teams and evaluate program recruitment and marketing
- Offer informational and social opportunity via Zoom for PhD applicants; offer tours and social activities to interested students
- Finalize fall cohort for fall 2023

**Summer 2022**

- Assess recruitment and marketing success; evaluate diversity and revise strategies as needed
- Update recruitment and marketing approaches.
- Host all-GIDP meeting with presentations, social activities, and professional training for all GIDP faculty and students. Repeat all above.

**XII. DIVERSITY AND INCLUSION** - describe how you will recruit diverse students and faculty to this program. In addition, describe retention efforts in place or being developed in order to retain students.

Achieving a diverse GIDP requires focused efforts to find and recruit students. All participating departments/doctoral majors have room to improve diversity, inclusion, equity, and representation among their graduate students, a process that will be aided by this GIDP as a recruitment tool. Such improvements are critical to our vision of successfully implementing this program.

Our GIDP Co-chairs are mindful of this goal and already have established partnerships with Michelle Higgins, UArizona Office of Societal Impact, and Frans Tax, UArizona Graduate College. Their insight and guidance will enhance our efforts to develop recruitment strategies that grow the diversity of the GIDP and its affiliated majors.

We will work closely with the UArizona Graduate College to engage underrepresented-in-STEM students, with four main strategies: reaching out directly to diversity-serving conferences and institutions; presenting the GIDP program to STEM students in UArizona’s cultural centers and at regional peer institutions that are minority serving; working closely with the UArizona Graduate College to develop and leverage complementary funds for underrepresented minority students; and providing student support in the form of a trained program manager/program coordinator with a strong background in inclusion initiatives in STEM.
Graduate Minor Peer Comparison Chart - select two peers for completing the comparison chart from (in order of priority) ABOR-approved institutions, AAU members, and/or other relevant institutions recognized in the field. The comparison chart will be used to identify typically required coursework, themes, and experiences for minor programs within the discipline. The comparison programs are not required to have the same minor name as the proposed UA program. Information for the proposed UA program must be consistent throughout the proposal documents.

<table>
<thead>
<tr>
<th>Minor name, institution</th>
<th>Proposed UA Program: Ecosystem Genomics PhD GIDP Minor</th>
<th>Peer 1: Northern Arizona University Ecological and Environmental Informatics (EEI) T3 Option for PhD students in Informatics</th>
<th>Peer 2: Environmental Life Sciences PhD program at Arizona State University</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minor program description</td>
<td>The Ecosystem Genomics GIDP PhD Minor will support and train diverse, outstanding doctoral students in <strong>ecosystem genomics</strong>, an emergent discipline that integrates across biotic systems from genes to ecosystems to solve grand challenges in sustainability and innovation in a rapidly changing world. As an innovative, interdisciplinary area of study, ecosystem genomics represents the synthesis of ecosystem- and genomic sciences via the tools of computational biology, modeling, data science, experiments, theory, applications, and the approaches and power of 'big data' in a collaborative and convergent framework.</td>
<td>The T³ option in Ecological and Environmental Informatics enhances the Informatics (INF) PhD program at NAU, providing innovative training in informatics, ecology, team-based research, and communication. It is funded by the prestigious National Science Foundation’s Research Traineeship (NRT) program, as is the initial phase of the Ecosystem Genomics NRT at the University of Arizona, through which the Ecosystem Genomics GIDP Minor is being initiated. Students enrolled in the INF PhD program with an emphasis in Ecological and Environmental Informatics have the opportunity to enhance their training through coursework in team science and communication along with cohort-building activities.</td>
<td>The Environmental Life Sciences PhD program is a unique degree that trains students to solve complex environmental challenges and explore ecological questions in the context of natural and human-caused environmental change. Environmental Life Sciences is an interdisciplinary program providing focused training on ecological and environmental questions in a changing world. 84 credits are required, including one core class, electives, seminars, reading groups and research. We encourage you to explore and solve complex questions in the context of natural and anthropogenic environmental change. This program differs from the Ecosystem Genomics GIDP proposed for the University of Arizona in several key ways. • This PhD major does not explicitly train students in the convergent, emergent science of ecosystem genomics. • Electives in the ASU program center on geology, hydrology, behavior, physiology, evolutionary biology/population genetics, ecology, ecosystem science, and sustainability. They are not explicitly oriented specifically to interdisciplinary training, training in collaboration, development of complementary skill sets in genomics and ecosystem sciences, data science, or ‘big data’ – the strengths of the UArizona proposed GIDP.</td>
</tr>
<tr>
<td>Current # of enrolled students</td>
<td></td>
<td>11</td>
<td>29</td>
</tr>
</tbody>
</table>

The ultimate aim of the Ecosystem Genomics GIDP is to foster a new generation of diverse transdisciplinary scientists to address the challenges of sustaining natural and managed ecosystems on which humans depend, including wildlands, agricultural systems, forests, arid lands, and marine environments. The coursework supported by this minor will help students think across scales from 'genes to ecosystems' as they develop skills in interdisciplinarity, scientific communication, and collaboration. At is core the minor will foster and extend students' excellence in areas such as data science, microbiology, plant sciences, insect science, environmental science, atmospheric science, and human-caused environmental change.

Goal: The EEI T3 option seeks to train students to independently and collaboratively leverage cutting-edge informatics tools with skills and knowledge of ecology and related environmental science disciplines to address the most pressing environmental issues facing societies today. This program differs from the Ecosystem Genomics GIDP proposed for the University of Arizona in several key ways.

- T3 is an option within an informatics major, rather than a minor for students in diverse STEM majors.
- T3 is oriented distinctively toward informatics and computation, providing informatics students with ecological and ecosystem thinking skills and context. In contrast, the UArizona
biosystems engineering, ecology and evolutionary biology, geography and informational science, and it is intended to attract students majoring in these UA programs. Ultimately the minor will help students translate ideas into meaningful scientific advances while cultivating deep and broad skill sets and promises to prepare students for important roles in solving grand challenges relevant to regional, national, and international issues in sustainability and innovation.

| Minimum total units required | 11 (3 core + 8 or more elective units) | 60+ (option within a graduate major; T3 option itself, see below) | 80+ (graduate major) |

Ecosystem Genomics GIDP brings together students in seven STEM graduate majors spanning ecosystem science and genomics and connects them with informatics tools/informatics/computation to train them in the emergent, convergent science of ecosystem genomics. • Thus, the programs are distinct and highly complementary.

| Pre-admission expectations (i.e., academic training to be completed prior to admission) | Active graduate student with background and training in the field, enrolled as a doctoral student in a relevant graduate program aligned with ecosystem genomics (e.g., but not limited to, EEB, EIS, SPLS, BE, HAS, ENVS, SNRE, INFO, GEOG). | Admitted to INF PhD program | Admitted to the PhD program of the School of Life Sciences |

<p>| Minor requirements | Active graduate student with a background and training in ecology, evolutionary biology, entomology, plant sciences, biosystems engineering, hydrology, atmospheric science, environmental science, and/or natural resource management; enrolled as a doctoral student in a relevant graduate program aligned with ecosystem genomics (e.g., but not limited to, EEB, EIS, SPLS, BE, HAS, ENVS, SNRE, INFO, GEOG). To apply, an interested student should contact the Program Coordinator or co-chairs. There are no additional GPA requirements beyond a 3.0. | INF Core Requirements: | Core requirement: |
| | | INF501 (Informatics &amp; Computing Seminar), | ELS 501 Grand Challenges in Environmental Life Sciences |
| | | INF502 (Software Development Methodologies), | Electives: At least two elective courses (3 credit hours each) are required from 500+ level courses related to the following topics: Earth sciences (e.g., geology, hydrology); organismal biology (e.g., physiology and behavior); evolutionary biology (e.g., population genetics); ecology/ecosystems/biogeochemistry; sustainability and social/policy |
| | | INF503 (Large-scale data structures and organization), | |
| | | INF504 (Data Mining &amp; Machine Learning), | |
| | | INF 511 &amp; 512 (Modern Regression I &amp; II), INF 605 (Professional &amp; Career Development), | |
| | | Dissertation credits | |
| | | T3 Emphasis Area Requirements: | |
| | | INF 623 (Ecoinformatics Seminar - enroll multiple semesters), | |
| | | INF690 (Team-based Interdisciplinary Research), | |
| | | INF550 (Survey in Ecoinformatics Tools), | |
| | | Electives - 11 credits total - student can choose at least 3 credits from INF | |</p>
<table>
<thead>
<tr>
<th>courses not owned by your department.</th>
<th>Complete 3 units of <strong>core coursework:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>- RNR 696A (2) Ecosystems Genomics Seminar, fall</td>
</tr>
<tr>
<td></td>
<td>- EIS 596A (1) Ecosystem Genomics Seminar, spring</td>
</tr>
</tbody>
</table>

**Complete 3 elective courses.**

Choosing one course from each of three of the following four areas (to be chosen in conjunction with major and minor advisor/doctoral advising committee) for a minimum of 8 units.

All courses already exist and are taught regularly in person on the UA Arizona main campus. We have reached out to instructors and unit/department heads to confirm that the graduate certificate would not create enrollment challenges. Letters of support are included.

11 units required (3 core + 8 or more elective units)

**Complete 3 units of core coursework:**

- RNR 696A (2) Ecosystems Genomics Seminar, fall
- EIS 596A (1) Ecosystem Genomics Seminar, spring

**Complete 3 courses, choosing one course from each of three of the following four areas (to be chosen in conjunction with advisor/graduate advising committee) for a minimum of 8 units**

1. **Communication & Dissemination**
   - ENVS 508 (3) Scientific Writing for Env., Ag., & Life Sciences
   - ENVS 515 (3) Translating Environmental Science
   - WSM/GEOS 595E (currently 1, will become 3 after fall 2021) Scientific Writing (Topics in Dendrochronology)
   - INFO 520 (3) Ethical Issues in Information
   - INFO 536 (3) Data Science and Public Interests

2. **Theory & Concepts: Ecosystem & Earth Science**

   - INF, CS, EE, BIO, FOR, SES, STA, MAT grad courses.
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENVS 511 (3)</td>
<td>Environmental Metabolomics</td>
</tr>
<tr>
<td>ENVS510 (3)</td>
<td>Microbial Biogeochemistry and Global Change</td>
</tr>
<tr>
<td>RNR 558 (3)</td>
<td>Ecosystem Ecology and a Sustainable Future</td>
</tr>
<tr>
<td>ENVS 525 (3)</td>
<td>Environmental Microbiology</td>
</tr>
<tr>
<td>ECOL 578 (3)</td>
<td>Global Change</td>
</tr>
<tr>
<td>ATMO 536A (3)</td>
<td>Fundamentals of Atmospheric Sciences</td>
</tr>
<tr>
<td>GC 530 (3)</td>
<td>The Climate System</td>
</tr>
<tr>
<td>GC 597A (3)</td>
<td>Global Change Research, Application, and Decision Making</td>
</tr>
<tr>
<td>ECOL 553 (4)</td>
<td>Functional and Evolutionary Genomics</td>
</tr>
<tr>
<td>ECOL 596A (1)</td>
<td>Evolutionary Ecology</td>
</tr>
<tr>
<td>ECOL 600A (3)</td>
<td>Fundamentals of Evolution</td>
</tr>
<tr>
<td>ECOL 565 (3)</td>
<td>Phylogenetic Biology</td>
</tr>
<tr>
<td>EIS 544 (3)</td>
<td>Insect Ecology</td>
</tr>
<tr>
<td>PLP 550 (4)</td>
<td>Principles of Plant Microbiology</td>
</tr>
<tr>
<td>BE 534 (3)</td>
<td>Biosystem Analytics</td>
</tr>
<tr>
<td>BE 587 (3)</td>
<td>Metagenomics: From Genes to Ecosystems</td>
</tr>
<tr>
<td>ECOL 580 (3)</td>
<td>Mathematical Models in Biology</td>
</tr>
<tr>
<td>ENVS 567 (3)</td>
<td>Introductory Statistics &amp; Multivariate Statistics with R (undergoing course name change to Statistical analysis of ecological and environmental data with R)</td>
</tr>
<tr>
<td>INFO 533 (3)</td>
<td>Medical On-Line Searching</td>
</tr>
<tr>
<td>INFO 544 (3)</td>
<td>Informatics in Biology</td>
</tr>
<tr>
<td>INFO 597 (1-6)</td>
<td>Biodiversity Informatics</td>
</tr>
</tbody>
</table>

3. Theory & Concepts: Genomic Biology

- ECOL 553 (4) Functional and Evolutionary Genomics
- ECOL 596A (1) Evolutionary Ecology
- ECOL 600A (3) Fundamentals of Evolution
- ECOL 565 (3) Phylogenetic Biology
- EIS 544 (3) Insect Ecology
- PLP 550 (4) Principles of Plant Microbiology

4. Tools & Data: Data Analytics

- BE 534 (3) Biosystem Analytics
- BE 587 (3) Metagenomics: From Genes to Ecosystems
- ECOL 580 (3) Mathematical Models in Biology
- ENVS 567 (3) Introductory Statistics & Multivariate Statistics with R (undergoing course name change to Statistical analysis of ecological and environmental data with R)
- INFO 533 (3) Medical On-Line Searching
- INFO 544 (3) Informatics in Biology
- INFO 597 (1-6) Biodiversity Informatics

Research methods, data analysis, & methodology requirement(s). (Yes/No. If yes, provide description)

- Yes, integrated into the required Ecosystem Genomics seminar and delivered through training for their majors.
- Yes - coursework in software and statistical methods; course in Ecological Informatics tools and products (INF550)
- Part of the graduate training requirement for doctoral students in the program, through their own research; students also must take one quantitative class. No additional research methods/data analysis/methodology requirements.

Internship, practicum, applied course

- No
<table>
<thead>
<tr>
<th>requirements (Yes/No). If yes, provide description.</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Additional requirements (provide description)</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>

*Note: comparison of additional relevant programs may be requested.*
**Name of Proposed Program or Unit:** Graduate Interdisciplinary Program: Ecosystem Genomics

**Budget Contact Person:** Heather Ingram, Program Coordinator; A. Elizabeth Arnold and Bonnie Hurwitz, GIDP CO-Chairs

### METRICS

<table>
<thead>
<tr>
<th></th>
<th>1st Year 2021 - 2022</th>
<th>2nd Year 2022 - 2023</th>
<th>3rd Year 2023 - 2024</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net increase in annual college enrollment UG</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Net increase in college SCH UG</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Net increase in annual college enrollment Grad</td>
<td>2-5</td>
<td>4-10</td>
<td>6-15</td>
<td></td>
</tr>
<tr>
<td>Net increase in college SCH Grad</td>
<td>12-30</td>
<td>48-72</td>
<td>72-96</td>
<td></td>
</tr>
<tr>
<td>Number of enrollments being charged a Program Fee</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>New Sponsored Activity (MTDC)</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td></td>
</tr>
<tr>
<td>Number of Faculty FTE: 34 core faculty, providing admin and teaching in existing courses</td>
<td>0.37</td>
<td>0.37</td>
<td>0.37</td>
<td>Includes admin and instruction. Existing faculty and courses. No new hires or courses.</td>
</tr>
</tbody>
</table>

### FUNDING SOURCES

#### Continuing Sources
- UG RCM Revenue (net of cost allocation)
- Grad RCM Revenue (net of cost allocation)
- Program Fee RCM Revenue (net of cost allocation)
- F and A Revenues (net of cost allocations)
- UA Online Revenues
- Distance Learning Revenues

**College fund balances** $28,000 $28,000 $28,000 Non GIDP funded. Allocated by Dean of COS, Head of EEB, and Assoc Dean for Research, CALS. Funding towards Program Manager/Coordinator

#### Institutional Strategic Investment

#### Gift Funding

**Personnel** $70,169 $71,572 $74,003 NSF NRT: Program Manager/Coordinator (.75 FTE) + ERE; Website developer (Indept. Cont.). Funding for personnel for the GIDP will be non-Graduate College/GIDP resources.

**Other Items** $6,500 $6,500 $6,500 Amount includes the Chair stipend amount for the minor ($4,000) and the certificate ($2,500)- in effect the first year students admitted

**Other items continued** $2,000 $2,000 $2,000 $2,000 operations budget from GIDP Admin

**Total Continuing** $106,669.00 $108,072.00 $110,503.00

#### One-time Sources

**Total One-time** $0.00 $0.00 $0.00

**TOTAL SOURCES** $106,669.00 $108,072.00 $110,503.00

### EXPENDITURE ITEMS

#### Continuing Expenditures

**Faculty** $70,169 $71,572 $74,003 NSF NRT: Program Manager/Coordinator (.75 FTE) + ERE; Website developer (Indept. Cont.). Funding for personnel for the GIDP will be non-Graduate College/GIDP resources.

**Employee Related Expense**

**Graduate Assistships**

**Other Graduate Aid**

**Operations (materials, supplies, phones, etc.)**

**Additional Space Cost**
<table>
<thead>
<tr>
<th></th>
<th>COS</th>
<th>EEB</th>
<th>CALS</th>
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</thead>
<tbody>
<tr>
<td>College fund balances (COS, EEB, and CALS)</td>
<td>$28,000</td>
<td>$28,000</td>
<td>$28,000</td>
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<tr>
<td>Non GIDP funded. Allocated by Dean of COS, Head of EEB, and Assoc Dean for Research. CALS funding towards Program Manager/Coordinator</td>
<td></td>
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<tr>
<td>Other items (attach description)</td>
<td>$6,500</td>
<td>$6,500</td>
<td>$6,500</td>
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<tr>
<td>Amount includes the Chair stipend amount for the minor ($4,000) and the certificate ($2,500)-in effect the first year students admitted</td>
<td></td>
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<tr>
<td>Other items continued</td>
<td>$2,000</td>
<td>$2,000</td>
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<tr>
<td>$2,000 operations budget from GIDP Admin</td>
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<tr>
<td>Total Continuing</td>
<td>$110,503.00</td>
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<td>$110,503.00</td>
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<td>One-time Expenditures</td>
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<tr>
<td>Construction or Renovation</td>
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<tr>
<td>Start-up Equipment</td>
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<tr>
<td>Replace Equipment</td>
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<td></td>
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<tr>
<td>Library Resources</td>
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<tr>
<td>Other items (attach description)</td>
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<td></td>
<td></td>
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<tr>
<td>Total One-time</td>
<td>$0.00</td>
<td>$0.00</td>
<td>$0.00</td>
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<tr>
<td>TOTAL EXPENDITURES</td>
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<td>$110,503.00</td>
<td>$110,503.00</td>
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<tr>
<td>Net Projected Fiscal Effect</td>
<td>$0.00</td>
<td>$0.00</td>
<td>$0.00</td>
</tr>
</tbody>
</table>

*This form includes the budget and expenses for both the GIDP Graduate Certificate and PhD Minor.

**The GIDP Graduate Certificate is intended to attract students to our participating graduate programs, with the aim of increasing graduate student enrollment in courses offered by units in our partner colleges.
Hi Scott,

Mike and I will split the $20K/year for the duration of the grants.

Best regards,

Elliott Cheu, Ph.D.
Interim Dean, College of Science
Distinguished Professor of Physics
University of Arizona
(520) 621-4092

On Wed, Oct 21, 2020 at 10:46 AM Antin, Parker B - (pba) <pba@arizona.edu> wrote:

Hi Betsy,

While we don’t directly connect investments such as this to IDC return, the CALS Research Office will be pleased to provide $8000 per year for the next five years to help fund this position.

Best,

Parker
February 5, 2020

Dear Dr. Saleska,

We are pleased to support your team’s proposal to the NSF Research Traineeship program (NRT) in the priority area of Rules of Life (RoL), entitled “NRT-RoL: BRIDGETS – Building Resources for InterDisciplinary training in Genomics and Ecosystem Sciences.”

We commit to collaborating with you to support this important training initiative in concrete ways (see below), and more fundamentally, to advance long-term sustainability of ecosystem genomics as an emerging critical science at University of Arizona (UA), through continued recruitment of new faculty; supporting your team’s endeavors in research, teaching, curriculum development, outreach, and mentorship through the ecosystem genomics initiative; and enhancing and formalizing graduate student training through formation of a new graduate interdisciplinary program (GIDP) in ecosystem genomics.

The University has fostered the growth of an interdisciplinary, interdepartmental faculty cluster in ecosystem genomics: in the last year and a half, we have hired seven new assistant or associate professors across five departments (all of whom are now part of your core team). This represents a multi-million dollar long-term investment in advancing this field at UA, directly illustrating our institutional commitment to recruiting and supporting the kind of faculty needed to make an NRT-catalyzed training program in ecosystem genomics a long-term success.

To support your NSF NRT program in Ecosystem Genomics we will:

• **Provide tuition assistance for the NRT trainees in your program**, in the form of out-of-state tuition waivers (up to 15 waivers annually). These will reduce non-resident tuition to in-state levels for NRT trainees who are not residents of the state of Arizona. The grant would be responsible for covering in-state tuition and fees for trainees as outlined in your budget.

• **Advance the long-term sustainability of ecosystem genomics at UA** through ongoing support of tangible initiatives, as showcased by our commitment to hiring new faculty in this field (above).

• **Advance recruitment of diverse trainees** through the leverage and fostering of strong diversity programs, including UA’s #1 ranking in PhDs awarded to Native Americans, and its recent designation as a Hispanic-Serving Institution. The Graduate College oversees the successful program called University of Arizona/Alfred P. Sloan Indigenous Graduate Partnership (UA/SIGP) that provides fellowships for Native American students to pursue graduate degrees in science, technology, engineering, and mathematics. In addition, the UA Graduate College runs a strong undergraduate diversity mentoring program called the Undergraduate Research Opportunities Consortium (UROC) that works with NSF-affiliated Research Experiences for Undergraduates. The Graduate College office of Diversity and Inclusion, under the directorship of Dr. Frans Tax, commits to work with you to make connections with UROC and UA/SIGP to recruit seniors to the NRT Trainee Program.

• **Support your team’s development of curriculum, mentorship, and training**, in order to leverage the expertise and advance the aims of the PIs, key personnel, and affiliated faculty relevant to the NRT.

• **Support and assist in the creation of a new GIDP**, enabling graduate students based in multiple departments across campus to declare and receive a certificate (minor) in Ecosystem Genomics.
We are pleased that you have received additional internal commitments of partnership and collaboration from diverse professionals, leaders, and partners at the UA, including the following:

- **The BIO5 Institute**, directed by Dr. Jennifer Barton, which promotes excellence in interdisciplinary biosciences research, translation, and education outreach and training, will provide space (offices and laboratories for faculty and students) and a centralized home for the UA’s Ecosystem Genomics Initiative and cluster hire, and if funded, the proposed NRT. This commitment includes offices for NRT Co-PI’s Wing and Hurwitz, offices for the junior faculty who are among the core personnel of the proposed NRT (BarberanTfaily, Meredith, and U’ren), with office and lab space at BIO5 for NRT PI Saleska. We recognize that the availability of common space for scholars from across different Departments and Colleges is invaluable for fostering the sense community and teamwork that is critical to the success of a program like NRT. In addition, Dr. Barton and BIO5 will support an NRT Ecosystem Genomics Seminar series that will bring 2-3 domestic and international speakers per year to UA, thus providing institutional support for the NRT training program.

- **University of Arizona’s Biosphere 2**, directed by Joaquin Ruiz, will provide access to the resources and experimental biomes of Biosphere 2, enabling one of the proposed NRT student research experiences in ecosystem genomics (section C.1.(iii)). Biosphere 2 consists of diverse biomes (desert, savannah, ocean, mangrove, tropical rainforest) and the Landscape Evolutionary Observatory (LEO), which are controlled environments for sampling and studying taxonomic and metabolic diversity in different ecosystem components. These provide a basis for achieving key NRT research goals in genes-to-ecosystem scaling through links to ongoing observations of ecosystem-scale metabolic function (e.g., soil fluxes of greenhouse gases methane, nitrous oxide, carbon dioxide, and water vapor). **Biosphere 2 is also a foundation** for outreach about the globally connected nature of earth’s biosphere to the general public, using Biosphere 2’s biomes as a nexus for connecting with the ~100,000 visitors per year to Biosphere 2’s outreach program;

- **Dr. Uwe Hilgert**, Director of Industry Relations, STEM Training & Workforce Development in BIO5, will assist with coordinating outreach to high school students, connect NRT trainees to career opportunities, and enhance our recruitment and placement of underrepresent students in STEM.

- **Directors/Coordinators/Chairs of Graduate studies** have also agreed to coordinate student recruitment into the NRT of students from participating academic units, including:
  - Drs. Michelle McMahon, Plant Sciences and Plant Pathology, School of Plant Sciences;
  - Dr. Jeremiah Hackett, Associate Department Head, Ecology and Evolutionary Biology;
  - Dr. Marcel Schaap, Environmental Science;
  - Dr. Martha S. (Molly) Hunter, Chair, GIDP in Entomology & Insect Science;
  - Dr. Rachel Gallery, Associate Director, School of Natural Resources & the Environment;
  - Dr. Christopher Castro, Hydrology and Atmospheric Sciences;
  - Dr. Muluneh Yitayew, Biosystems Engineering; and
  - Dr. Lars Fogelin, Anthropology; Dr. Eithne Luibheid, Gender & Women’s Studies

In conclusion, we wish you the best of luck in your proposal submission and look forward to hearing the results of the review of your NRT-RoL proposal at NSF.

Sincerely,

Liesl Folks, PhD, MBA  Andrew Carnie, PhD
Senior Vice President and Provost  Vice Provost/Dean, Graduate Education
October 14, 2021

Dr. Andrew Carnie  
Dean, Graduate College  
Administration 322  
CAMPUS

Dear Andrew:

This letter is to convey my strong support for the newly proposed Graduate Interdisciplinary Program in Ecosystem Genomics, which I understand will offer both a PhD Minor and a Graduate Certificate.

These tracks will provide interdisciplinary education for students working at the boundary of ecosystem sciences and genomics. We anticipate that some of our graduate students in Geography will be interested in these new options. Also, several of our graduate courses will be included in the recommended list for these GIDP students as options for their minor or certificate, including GEOG 530 The Climate System and GC 597a Global Change Research, Application, and Decision-Making (which is taught by one of our faculty members for the Global Change GIDP).

Based on discussions with our faculty, I don’t foresee any conflicts in curriculum or related matters within our School in relation to the establishment of this new GIDP. As mentioned above, we expect this minor to appeal to certain incoming and current students in our program, which will provide useful links between SGDE and the other participating graduate programs.

Sincerely,

Andrew C. Comrie, Ph.D.  
Professor & Director
September 30, 2021

Dr. Andrew Carnie, PhD
Dean, Graduate College
University of Arizona
Administration 322
PO Box 210066
Tucson, AZ 85721-0066

Dear Dean Carnie,

I am writing to express my support for the newly proposed Graduate Interdisciplinary Program in Ecosystem Genomics, which will offer both a PhD Minor and a Graduate Certificate. I understand that these tracks will consist of 12 credit hours over four semesters and will provide interdisciplinary training at the interface of ecosystem sciences and genomics.

We anticipate that several of our graduate courses will be recommended to GIDP students as optional courses for their minor or certificate:

- INFO 520: Ethical Issues in Information
- INFO 533: Medical On-Line Searching
- INFO 536: Data Science and Public Interests
- INFO 554: Informatics in Biology
- INFO 597: Biodiversity Informatics

I foresee no conflicts in curriculum or related matters within my department with the establishment of this GIDP. In fact, I expect this minor to appeal to incoming and current students in our program, and further connect our unit and graduate program with other participating graduate programs on the University of Arizona campus.

Sincerely,

Winslow Burleson, Ph.D.
Professor, Director of Research, & Associate Director, School of Information
04/20/21

Dr. Andrew Carnie, PhD
Dean, Graduate College
University of Arizona
Administration 322
PO Box 210066
Tucson, AZ 85721-0066

Dear Dean Carnie,

I am writing to express support for the newly proposed Graduate Interdisciplinary Program (GIDP) in Ecosystem Genomics at the University of Arizona.

The GIDP will train diverse graduate students to think across scales from ‘genes to ecosystems’. By earning a graduate certificate or PhD minor in the emergent science of ecosystem genomics, students will complement and extend their core disciplinary training in a way that we consider highly promising for successful careers in industry positions such as the ones we offer. One of the grand challenges of our company is to sequence the pangenome of the Earth’s microbes and discover novel therapeutics. The cross-cutting skillsets that this GIDP will provide will leave graduates poised to address such challenges at the bench and at the computer.

The coursework and transdisciplinary research supported by this GIDP will help students develop skills in interdisciplinarity, scientific communication, and collaboration while also fostering their excellence in areas such as data science, microbiology, plant sciences, insect science, environmental science, atmospheric science, biosystems engineering, ecology, and evolutionary biology. The GIDP will help students translate ideas into meaningful scientific advances while cultivating deep and broad skill sets via rich coursework and robust mentorship. This GIDP promises to prepare students for important roles in solving grand challenges relevant to regional, national, and international issues in sustainability and innovation. The University of Arizona has already demonstrated excellence in this area, with two recent UA trainees joining Hexagon Bio and bringing powerful insights given their prior interdisciplinary training. By formalizing this type of training and recognizing it in a minor this GIDP promises to help PhD students advertise these skillsets to potential employers.

Our company is excited to see this kind of training program, as we view the skills and training fostered by this GIDP to be key to preparing new generations of diverse scientists to enter a cutting-edge workforce. The University of Arizona’s GIDP in Ecosystem Genomics is innovative and unique, and it will be a welcome addition to graduate training experiences across diverse disciplines.

Sincerely,

Maureen Hillenmeyer, PhD
Co-founder and CEO, Hexagon Bio
April 20, 2021

Dr. Andrew Carnie, PhD
Dean, Graduate College
University of Arizona
Administration 322
PO Box 210066
Tucson, AZ 85721-0066

Dear Dean Carnie,

I am writing to express support for the newly proposed Graduate Interdisciplinary Program (GIDP) in Ecosystem Genomics at the University of Arizona.

The GIDP will train diverse graduate students to think across scales from ‘genes to ecosystems.’ By earning a graduate certificate or PhD minor in the emergent science of ecosystem genomics, students will complement and extend their core disciplinary training in a way that we consider highly promising for successful careers in industry positions in companies such as Pluton Bio.

The coursework and transdisciplinary research supported by this GIDP will help students develop skills in interdisciplinarity, scientific communication, and collaboration while also fostering their excellence in areas such as data science, microbiology, plant sciences, insect science, environmental science, atmospheric science, biosystems engineering, ecology, and evolutionary biology. The GIDP will help students translate ideas into meaningful scientific advances while cultivating deep and broad skill sets via rich coursework and robust mentorship. This GIDP promises to prepare students for important roles in solving grand challenges relevant to regional, national, and international issues in sustainability and innovation.

Our company is excited to see this kind of training program, as we view the skills and training fostered by this GIDP to be key to preparing new generations of diverse scientists to enter a cutting-edge workforce. The University of Arizona’s GIDP in Ecosystem Genomics is innovative and unique. It will be a welcome addition to graduate training experiences across diverse disciplines.

Sincerely,

Barry Goldman, PhD
CEO/CSO
Pluton Biosciences
MEMORANDUM

Date: March 29, 2021

To: Dr. Andrew Carnie, Dean of the UArizona Graduate College

From: Dr. Matthew A. Jenks, Director for the School of Plant Sciences

Subject: Graduate Interdisciplinary Minor and Certificate in Ecosystem Genomics

Dear Dr. Carnie,

I am writing to express my support for the newly proposed Graduate Interdisciplinary Program in Ecosystem Genomics, which will offer both a PhD Minor and a Graduate Certificate. I understand that these tracks will consist of 12 credit hours over four semesters and will provide interdisciplinary training at the interface of ecosystem sciences and genomics. We anticipate that one of our graduate courses will be recommended to GIDP students as an optional course for their minor or certificate:

PLP 550: Principles of Plant Microbiology

I foresee no conflicts in curriculum or related matters within my School with the establishment of this GIDP. In fact, I expect this minor to appeal to incoming and current students in our program, and further connect our unit and graduate program with other participating graduate programs on the University of Arizona campus.

Sincerely,

Matthew A. Jenks
Director for the School of Plant Sciences
March 13, 2021

Dr. Andrew Carnie, PhD
Dean, Graduate College
University of Arizona
Administration 322
PO Box 210066
Tucson, AZ 85721-0066

Dear Andrew:

I am writing to express my full support for the newly proposed Graduate Interdisciplinary Program in Ecosystem Genomics, which will offer both a PhD Minor and a Graduate Certificate.

I understand that these tracks will consist of 12 credit hours over four semesters and will provide interdisciplinary training at the interface of ecosystem sciences and genomics.

We anticipate that several of our graduate courses will be recommended to GIDP students as optional courses for their minor or certificate:

- RNR 558: Ecosystem Ecology and a Sustainable Future
- RNR 621: Applied Statistics
- RNR 696A: Ecosystem Genomics

I foresee no conflicts in curriculum or related matters within my department with the establishment of this new GIDP. In fact, I expect this minor to appeal to incoming and current students in our program, and further connect our unit and graduate program with other participating graduate programs on the University of Arizona campus.

Sincerely,

Willem J.D. van Leeuwen, Interim Director and Professor
School of Natural Resources and the Environment
March 26, 2021

Dr. Andrew Carnie, PhD  
Dean, Graduate College  
University of Arizona  
Administration 322  
PO Box 210066  
Tucson, AZ 85721-0066

Dear Dean Carnie,

I am writing to express my support for the newly proposed Graduate Interdisciplinary Program in Ecosystem Genomics, which will offer both a PhD Minor and a Graduate Certificate.

I understand that these tracks will consist of 12 credit hours over four semesters and will provide interdisciplinary training at the interface of ecosystem sciences and genomics.

I foresee no conflicts in curriculum or related matters within the Indige-FEWSS GIDP with the establishment of the Ecosystem Genomics GIDP. In fact, I expect this program will complement ours and will further connect graduate programs on the University of Arizona campus.

Please contact me at kchief@arizona.edu or 520-247-6030 if you have any questions.

Sincerely,

Karletta Chief, Associate Professor & Extension Specialist
March 16, 2021

Dr. Andrew Carnie, PhD
Dean, Graduate College
University of Arizona
Administration 322
PO Box 210066
Tucson, AZ 85721-0066

Dear Dean Carnie,

I am writing to express my support for the newly proposed Graduate Interdisciplinary Program in Ecosystem Genomics, which will offer both a PhD Minor and a Graduate Certificate.

I understand that these tracks will consist of 12 credit hours over four semesters and will provide interdisciplinary training at the interface of ecosystem sciences and genomics.

We anticipate that one of our graduate courses will be recommended to GIDP students as an optional course for their minor or certificate:

ATMO 536A: Fundamentals of Atmospheric Sciences

I foresee no conflicts in curriculum or related matters within my department with the establishment of this GIDP. In fact, I expect this minor to appeal to incoming and current students in our program, and further connect our unit and graduate program with other participating graduate programs on the University of Arizona campus.

Sincerely,

Thomas Meixner,
Professor and Head
March 15, 2021

Dr. Andrew Carnie, PhD
Dean, Graduate College
University of Arizona
Administration 322
PO Box 210066
Tucson, AZ 85721-0066

Dear Dean Carnie,

I am writing to express my support for the newly proposed Graduate Interdisciplinary Program in Ecosystem Genomics, which will offer both a PhD Minor and a Graduate Certificate.

I understand that these tracks will consist of 12 credit hours over four semesters and will provide interdisciplinary training at the interface of ecosystem sciences and genomics.

We anticipate that several of our graduate courses will be recommended to GIDP students as optional courses for their minor or certificate:

ENVS 508: Scientific Writing for Env., Ag., & Life Sciences
ENVS 510: Microbial Biogeochemistry and Global Change
ENVS 511: Environmental Metabolomics
ENVS 515: Translating Environmental Science
ENVS 525: Environmental Microbiology

I foresee no conflicts in curriculum or related matters within my department with the establishment of this GIDP. In fact, I expect this minor to appeal to incoming and current students in our program, and further connect our unit and graduate program with other participating graduate programs on the University of Arizona campus.

Sincerely,

Jon Chorover
Professor and Head
Department of Environmental Science
April 11, 2021

Dear Dean Carnie,

I am writing to express my support for the newly proposed Graduate Interdisciplinary Program in Ecosystem Genomics, which will offer both a PhD Minor and a Graduate Certificate. I understand that these tracks will consist of 12 credit hours over four semesters and will provide interdisciplinary training at the interface of ecosystem sciences and genomics.

There is considerable overlap of interests between faculty of this proposed GIDP minor and those of our faculty and students in our program, the GIDP in Entomology & Insect Science. We expect that several EIS students will elect the GIDP in Ecosystem Genomics as their minor. We already have an incoming EIS student who will be a fellow in the inaugural NSF supported BRIDGES program cohort.

We also anticipate that one of our graduate courses will be recommended to GIDP EG students as an optional course for their minor or certificate: **EIS 544: Insect Ecology**

The class is regularly offered as part of our existing curriculum and seats are available. I foresee no conflicts in curriculum or related matters within our graduate program with the establishment of this additional GIDP, especially as I understand the plan for the sustainability of this GIDP Minor will not draw from the current GIDP budget.

Instead, I expect this minor will further connect our graduate program with other participating graduate programs on the University of Arizona campus.

Sincerely,

[Signature]

Martha S. (Molly) Hunter
Professor, Department of Entomology, and Department of Ecology & Evolutionary Biology
Chair, Graduate Interdisciplinary Program in Entomology & Insect Science
mhunter@ag.arizona.edu +1-520-621-9350
April 8, 2021

Dr. Andrew Carnie, PhD
Dean, Graduate College
University of Arizona
Administration 322
PO Box 210066
Tucson, AZ 85721-0066

Dear Dean Carnie,

I am writing to express my support for the newly proposed Graduate Interdisciplinary Program in Ecosystem Genomics, which will offer both a PhD Minor and a Graduate Certificate.

I understand that these tracks will consist of 12 credit hours over four semesters and will provide interdisciplinary training at the interface of ecosystem sciences and genomics.

We anticipate that several of our graduate courses will be recommended to GIDP students as optional courses for their minor or certificate:

ECOL 553: Functional and Evolutionary Genomics
ECOL 565: Phylogenetic Biology
ECOL 578: Global Change
ECOL 580: Mathematical Models in Biology
ECOL 600A: Fundamentals of Evolution

I foresee no conflicts in curriculum or related matters within my department with the establishment of this GIDP. In fact, I expect this minor to appeal to incoming and current students in our program, and further connect our unit and graduate program with other participating graduate programs on the University of Arizona campus.

Sincerely,

Dr. Michael Worobey
Department Head
Louise Foucar Marshall Science Research Professor
Ecology and Evolutionary Biology
March 30, 2021

Dr. Andrew Carnie, PhD
Dean, Graduate College
University of Arizona
Administration 322
PO Box 210066
Tucson, AZ 85721-0066

Dear Dean Carnie,

I am writing to express my support for the newly proposed Graduate Interdisciplinary Program in Ecosystem Genomics, which will offer both a PhD Minor and a Graduate Certificate.

I understand that these tracks will consist of 12 credit hours over four semesters and will provide interdisciplinary training at the interface of ecosystem sciences and genomics.

I foresee no conflicts in curriculum or related matters within the Data Science Institute with the establishment of the Ecosystem Genomics GIDP. In fact, I expect this program will complement our ongoing training and learning activities and will further connect graduate programs on the University of Arizona campus. Students trained in computational and statistical methods in Ecosystem Genomics will also provide valuable capacity of trained students for our campus.

Please feel free to contact me if you need any further information, we look forward to working closely with the Ecosystems Genomics GIDP.

Nirav Merchant
Director, UA Data Science Institute (Data 7)
Co-PI NSF CyVerse
University of Arizona
April 12, 2021

Dr. Andrew Carnie, PhD  
Dean, Graduate College  
University of Arizona  
Administration 322  
PO Box 210066  
Tucson, AZ 85721-0066

Dear Dean Carnie,

I am writing to express my support for the newly proposed Graduate Interdisciplinary Program (GIDP) in Ecosystem Genomics, which will offer both a PhD Minor and a Graduate Certificate.

I understand that these tracks will consist of 12 credit hours over four semesters and will provide interdisciplinary training at the interface of ecosystem sciences and genomics.

We anticipate that two of our graduate courses will be recommended to GIDP students as optional courses for their minor or certificate:

BE 534: Biosystem Analytics  
BE 587: Metagenomics: From Genes to Ecosystems

I foresee no conflicts in curriculum or related matters within my department with the establishment of this GIDP. In fact, I expect this minor to appeal to incoming and current students in our program, and further connect our unit and graduate programs with other participating graduate programs on the University of Arizona campus.

Sincerely,

Kathryn L. Farrell-Poe  
Head, Specialist, and Professor
April 7, 2021

Dr. Andrew Carnie, PhD
Dean, Graduate College
University of Arizona
Administration 322
PO Box 210066
Tucson, AZ 85721-0066

Dear Andrew:

This letter serves to confirm our support for the proposed Graduate Interdisciplinary Program in Ecosystem Genomics, especially with regard to the Ecosystem Genomics seminar (RNR 696A).

The School of Natural Resources and the Environment is listed as the home unit for the Ecosystem Genomics seminar (RNR 696A), a required course included in the initial curriculum listing for the minor. The seminar, currently taught by Dr. Laura Meredith, is regularly offered as part of our existing curriculum and seats are available.

Sincerely,

Willem J.D. van Leeuwen, Interim Director and Professor
School of Natural Resources and the Environment
REPORT TO FACULTY SENATE

FROM: Graduate Council

DATE: February 7, 2022

ACCOMPLISHMENTS:

The Graduate Council met on January 21 to consider and approve the following:

- Graduate Minor in Ecosystem Genomics GIDP
  (proposal_ecosystem_genomics_gidp_grad_minor.pdf)
- Policy Revision – Choice of Catalog Amendment
  choice_of_catalog_amendment.docx
- Policy Revision – Class Attendance, Participation and Administrative Drop
  (policy_revision_draft_-_class_attendance_participation_and_administrative_drop_-_2021.docx)

Graduate Council has 32 members from all UArlonna colleges including the Deans of the Graduate College. Twenty-eight members attended the January meeting.

GOALS:

Ongoing review of new program proposals and Graduate College policies.
Scope

6.01 Scope of Chapter

This chapter applies to all grievances and complaints by or against appointed personnel of the University, including faculty, that are not provided for in UHAP Chapters 3, 4, or 5 and in Arizona Board of Regents (ABOR) Policy Manual, 6-201 and 5 of this Handbook. Those chapters set out rules and procedures for grievances and complaints concerning personnel matters, i.e., matters regarding appointment, performance evaluation, renewal, nonrenewal, promotion, continuing status, tenure, resignation, removal, suspension, dismissal, and releases due to institutional financial emergency or reorganization.

The rules and procedures 6-302. Nothing in this chapter are established pursuant to the ABOR Conditions of Service and shall may be construed so as not to supersede or conflict with any provision contained in those conditions or any provision contained in UHAP Chapters 3, 4, or 5 of this Handbook.

Policy

6.02 General Administrative Procedures

All grievances and complaints by or against appointed personnel shall will be filed with and addressed first by the immediate administrative head of the individual about whom the grievance or complaint is
made. All grievances or complaints shall be filed in writing no later than 90 days from the date on which the grievant becomes aware of the matter that gives rise to the grievance, except for matters related to compensation.

Grievances or complaints regarding compensation shall be filed no later than 30 days from the date the grievant or complainant receives notice of the matter which gives rise to the grievance or complaint.

The written grievance must include the factual basis for the complaint, a summary of any efforts to informally resolve the issue, and a proposed resolution. The written grievance is limited to 5 pages in length.

The immediate administrative head shall review the grievance or complaint and develop any factual information required for a decision on the matter. The administrator may consult with standing committees or appoint a special committee or an individual to investigate the matter. The administrator shall communicate his or her decision in writing to the grieving or complaining party and, if applicable, to the party against whom the grievance or complaint is made, stating the factual basis and reasons for the decision. This process will typically be completed within 30 days of the administrator's receipt of the grievance, however, the administrator may extend this timeframe for good cause.

Within 10 days after receipt of the administrator's decision, the grieving or complaining party may appeal the decision to the next administrative level. The written appeal – no more than 5 pages in length – must outline the basis for appealing the prior decision and a proposed resolution. Additional factual development may be undertaken at the next administrative level if deemed necessary. The decision at that next administrative level is not subject to further administrative review, except as otherwise provided in this chapter.

6.03 Unlawful Discrimination and Unconstitutional Action Review Procedures

If a grievance contains an allegation of unlawful discrimination, the matter will be immediately referred to the Office of Institutional Equity (OIE).

If the grievance alleges other unconstitutional action (including violations of due process or academic freedom) and this aspect of the grievance is not resolved through administrative review under Section 6.02, the grievant may request the Provost's Office to review the matter. Where such a request is made, the Provost will consult with the administrative heads who reviewed the grievance under Section 6.02 and may take action deemed appropriate to resolve the matter.

The Provost's decision is final and is not subject to further administrative review.

6.04 Additional Grievance Procedures for Faculty and Academic Professionals

If a grievance or complaint by a member of the General Faculty (as defined in Article II, Section I of the Constitution of the General Faculty of the University of Arizona) is not resolved through administrative review under Section 6.02 or Section 6.03, the individual may utilize the Grievance Policy and Procedures for Faculty and Academic Professionals found in Article VII of the Bylaws of the General Faculty of the University of Arizona [2].

If a grievance or complaint by a faculty member or academic professional employee who is not a
member of the General Faculty is not resolved through administrative review under section 6.02 or section 6.03, and that grievance is for suspension without pay or dismissal, the individual may file a petition with the Committee on Conciliation and, if conciliation is not possible, then subsequently with the Committee on Academic Freedom and Tenure (CAFT), in alignment with ABOR 6-201L and 6-302I, but following the timelines and process described in ABOR 6-201L.

6.05 Protection of Employees from Reprisal for the Disclosure of Information: Retaliation: Review Procedure

See ABOR policy 6-914 Protection of Employees from Reprisal for Whistleblowing.
Related Information*

Bylaws of the General Faculty of the University of Arizona [2]

Committee on Conciliation [3] web page

Committee on Academic Freedom and Tenure [4] web page

ABOR policy Policy 6-914 Protection of Employees from Reprisal for Whistleblowing [5]

ABOR Policy 6-201, 302

Revision History*

Section 6.04 revised February 2011

Section 6.05 revised September 2002

Source URL: https://policy.arizona.edu/employment-human-resources/grievances-and-hearings

Links
[1] mailto:facultyaffairs@email.arizona.edu
[2] https://arizona.app.box.com/s/66hyca3wf0k2vrgwy2upf7soceca1hr3
[5] https://public.azregents.edu/Policy%20Manual/6-914-Protection%20of%20Employees%20from%20Reprisal%20for%20Whistleblowing.pdf
The Resolution to Recognize the Contributions of Career-Track Faculty in the Development of the General Education Curriculum Refresh

Whereas the University of Arizona has pursued a commitment of instructional and research excellence, whose goal is to prepare our students to lead in a quickly changing world; and

Whereas these faculty have dramatically succeeded in achieving this overall goal;

We therefore resolve that the University Faculty Senate acknowledges the evident success of Career Track Faculty and all they add to this institution and the lives of the colleagues and students; and

Therefore be it further resolved that the University Faculty Senate extends its sincere appreciation to those Career Track Faculty whose efforts initiated and sustained the General Education Refresh, recognizing, in particular, the important contributions of the following faculty:

Kathryn Alexander, PhD, Honors College
Kevin Cassell, PhD Writing Program, English
Adam Daly, PhD Chemistry and Biochemistry
Tom Fleming, PhD Astronomy and Steward Observatory
Amy Fountain, PhD Department of Linguistics, Social & Behavioral Sciences
Erin Galyen, PhD Office of Instruction and Assessment
Laura Gronewold, PhD Health Promotion Sciences
Rob Groves, PhD Religious Studies and Classics
Lindsay Hansen, PhD Office of Instruction & Assessment
Brandon Harris, PhD Teaching, Learning and Sociocultural Studies
James Hunt, PhD Family Studies and Human Development
Jane Hunter, PhD Strategic Initiatives
Jessica Kapp, PhD Geosciences
Steve Kortenkamp, PhD Lunar and Planetary Sciences
Patricia Lebensohn, MD Family and Community Medicine
Brian Moon, PhD School of Music, Fine Arts
Bill Neumann, PhD Management Information Systems
Matthew Ostermeyer, PhD Teaching, Learning and Sociocultural Studies
Charlette Padilla, PhD Retailing & Consumer Sciences, Family & Consumer Sciences
John Pollard, PhD Chemistry and Biochemistry, Honors College
Tanya Quist, PhD Plant Sciences
Lucinda Rankin, PhD Physiology, Medicine
Jennifer Ravia, PhD Nutritional Sciences
Dereka Rushbrook, PhD Geography Development and Environment
Susie Salmon, JD College of Law
Gabriela Valdez, PhD Health Promotion Sciences, Global Health Institute
University of Arizona
Faculty Senate
Spring 2022
Senate Resolution #2022-xx

Motion Introduced by: Jessica Summers, Chair of the Faculty

Title of Motion: Resolution opposing Senate Bill 1123 - disruption; educational institution; concealed weapon.

Whereas, the University Arizona Faculty Senate previously adopted a Resolution in opposition to ABOR policy (5-303; 5-308) allowing guns in locked vehicles or locked motorcycle containers on campus (September 14, 2009);

Whereas, the Chief of the Arizona State University Police Department has publicly expressed a clear rationale for not allowing firearms on our campuses;

Whereas, the Arizona Board of Regents voted unanimously in 2016 to oppose House Bill 2072 and House Bill 2338 allowing certain permit holders to carry on campus;

Whereas, access and proximity to weapons in an educational environment is not consistent with the goals of learning, open communication and intellectual exchange in the university community;

Therefore, the Faculty Senate, representing over 3,500 faculty members at the University of Arizona, announces its unqualified opposition to SB1123, and any additional guns on campus legislation that might be developed during this current legislative session. The Faculty Senate finds the current proposed legislation to be a clear danger to the safety, security, and sense of well-being of students, staff, and faculty.

Members of the Faculty Senate
Jessica Summers, Chair of the Faculty
Melanie Hingle, Vice Chair of the Faculty
Michael Brewer, Secretary of the Faculty
Faculty Senators (to be listed by vote)
Voting Members of Senate (to be listed by vote)
Item Name: Request for Credit Exception for the University of Arizona

☑️ Action Item

Requested Action: The University of Arizona asks the committee to review and recommend for board approval a credit exception request.

Background/History of Previous Board Action

In April 2007, ABOR approved NAU’s 90/30 program (NAU policy # 100224) that allows the transfer of up to 90 transfer units into a variety of specializations included in their Interdisciplinary Studies degree.

In December 2009, ABOR approved an exception to transfer credit limits, up to 75, for the Bachelor of Applied Sciences (BAS) degree at UArizona.

Additionally, in June 2021 ABOR approved a similar exception for up to 75 transfer credits for the BS in Biological Sciences at NAU.

Discussion

The BGS degree meets the changing needs of students and increases affordability and access for 4-year and transfer students to the university.

Raising the credit transfer limit for the BGS would address equity concerns in Arizona and across our academic locations, as the BGS is offered at Main Campus (Tucson), Arizona Online Campus, Global Direct Campus, and at multiple locations within the Distance Education/Near You Network.

Expanding the limit of transfer credits supports Arizona’s economic development in two primary ways: a) it increases access to higher education and supports Arizona’s Workforce Innovation and Opportunity Act (WIOA) goals.

The passage of Arizona Senate Bill (SB) 1453, which allows community colleges in Arizona to offer four-year bachelor’s degrees, introduces more competition into the higher education landscape in Arizona. This legislation could affect the admission and retention rates of all UArizona campuses, particularly in key areas related to health, the sciences, and education. As a broad multi-disciplinary program offered at multiple campuses, especially through the Near-You-Network, the BGS is well-situated to serve students across the state. Allowing the degree to accept an increased number of

Contact Information:
Liesl Folks, Provost  liesl@arizona.edu  520-621-3325
Chad Sampson, ABOR  chad.sampson@azregents.edu  602-229-2512
transfer credits from community colleges makes UArizona more attractive for many Arizona residents.

This is commensurate with many of our peer institutions.

Statutory/Policy Requirements

ABOR Policy 2-223.F “Academic Locations, Degree Programs, and Organizational Units”
Request to Change Academic Program Credit Requirements

University: University of Arizona

Name of Academic Program: Bachelor of General Studies

Internal Academic Program ID: GNSBGS

Academic Department: College of Humanities

Geographic Site: Main, Online, Distance, Global Direct

Instructional Modality: In-Person, Online, and Hybrid modalities, depending on campus.

Brief Program Description:

The University of Arizona Bachelor of General Studies (BGS) degree is a broad multidisciplinary course of study rather than a traditional major/minor. The degree prepares students to think critically and analytically across a wide range of disciplines or fields of study.

From its conception, the BGS degree program was created to provide a pathway towards a college degree for a population of students that may not find a traditional major the most appropriate route for them. Student populations include:

- Students who have broad interests and who wish to complete a multidisciplinary degree rather than a traditional single-discipline degree
- Transfer students, especially non-traditional students who have already completed general education courses and/or associate degrees
- Students who began as pre-majors in a particular area but have not been admitted to their desired degree program
- Students who have not declared a major but are close to, or over the 60 units/time to declare a major policy

Designed specifically with these students in mind, the BGS degree helps fulfill the land-grant mission of the University of Arizona by providing an opportunity for a diverse segment of our student population, including many who transfer from Arizona community colleges, to complete their college degree in a timely manner. Currently of the BGS program (750+ majors) is one of the most diverse on campus—51% of majors are students of color and 43% first generation college students—and provides pathways to degree completion for these underrepresented students.

Having a BGS degree enhances graduates’ employment possibilities. Building from General Education coursework to upper-division coursework in a particular concentration will make
graduates more competitive in the job market with employers who do not require expertise in a particular discipline but nonetheless want to hire college graduates who are proficient in various modes of communication, critical thinking, and analytic skills.

### Enrollment for the Past Three Years:

<table>
<thead>
<tr>
<th>Year</th>
<th>Enrollment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall '19</td>
<td>843</td>
</tr>
<tr>
<td>Fall '20</td>
<td>896</td>
</tr>
<tr>
<td>Fall '21</td>
<td>775</td>
</tr>
</tbody>
</table>

### Credit Revision Requested

Request to allow up to 75 credit hours to transfer from community colleges and be applied toward the requirements for the Bachelor of General Studies degree.

### Reason for Revising Credit Requirements:

Allowing community college students to apply a higher number of transfer credits will increase affordability and access and will encourage students to complete a degree at the University of Arizona.

UArizona has already taken a progressive step in creating the BGS degree to meet the changing needs of students and maintain affordability and access for 4-year and transfer students to the university. Raising the credit transfer limit for the BGS would address equity concerns in Arizona and across our academic locations, as the BGS is offered at Main Campus (Tucson), Arizona Online Campus, Global Direct Campus, and at multiple locations within the Distance Education/Near You Network. Expanding the limit of transfer credits supports Arizona’s economic development in two primary ways: a) it increases access to higher education and supports Arizona’s Workforce Innovation and Opportunity Act (WIOA) goals to assist adult and dislocated workers find high value employment that require bachelor’s degrees, and b) democratizing access to higher education bolsters a high-value workforce with bachelor’s degrees that attracts more employers to the state.

The passage of Arizona Senate Bill (SB) 1453, which allows community colleges in Arizona to offer four-year bachelor’s degrees, introduces more competition into the higher education landscape in Arizona. This legislation could affect the admission and retention rates of all UArizona campuses, particularly in key areas related to health, the sciences, and education. As a broad multi-disciplinary program offered at multiple campuses, especially through the Near-You-Network, BGS is well-situated to serve students across the state. Allowing the degree to accept an increased number of transfer credits from community colleges makes UArizona more attractive for many Arizona residents.

Comparing UArizona to other institutions that offer Bachelor of General Studies degrees, the majority accept 70 or more credits, including the following: University of Connecticut (75), University of Miami (75), Drexel University (90), Texas Tech University (72), and University of Kansas (75).
EXECUTIVE SUMMARY

There is a wide range in how UArizona’s peer universities treat their local community college systems. Eight of the peer institutions allow the transfer of up to 60 units from a community college to count towards a bachelor's degree, while seven peer institutions allow 75 units or more to count. There is then ample precedent among our peers for increasing the transfer credit limit for the BGS (akin to Bachelor of Arts, which remains the standard option for interdisciplinary degrees at our peer institutions). Moreover, raising the limit of BGS to 75 could still be portrayed as an academically responsible or conservative step as other peer institutions have limits above that.

<table>
<thead>
<tr>
<th>Peer Institution</th>
<th>BGS equivalent</th>
<th>transfer credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>University of California, Davis</td>
<td>&quot;Individual&quot; (create our own) major</td>
<td>80</td>
</tr>
<tr>
<td>University of California, Los Angeles</td>
<td>&quot;Individual&quot; (create our own) major</td>
<td>80</td>
</tr>
<tr>
<td>University of Florida</td>
<td>Interdisciplinary Studies</td>
<td>60</td>
</tr>
<tr>
<td>University of Illinois at Urbana-Champaign</td>
<td>Interdisciplinary Studies</td>
<td>80</td>
</tr>
<tr>
<td>University of Iowa</td>
<td>Liberal Arts</td>
<td>60</td>
</tr>
<tr>
<td>University of Maryland, College Park</td>
<td>Interdisciplinary Studies</td>
<td>60</td>
</tr>
<tr>
<td>Michigan State University</td>
<td>Interdisciplinary Humanities</td>
<td>56</td>
</tr>
<tr>
<td>University of Minnesota, Twin Cities</td>
<td>Individualized Studies</td>
<td>60</td>
</tr>
<tr>
<td>University of North Carolina at Chapel Hill</td>
<td>Interdisciplinary Studies</td>
<td>75</td>
</tr>
<tr>
<td>Ohio State University</td>
<td>Comparative Studies</td>
<td>60</td>
</tr>
<tr>
<td>Pennsylvania State University</td>
<td>Letters, Arts, and Sciences</td>
<td>84</td>
</tr>
<tr>
<td>Texas A&amp;M University</td>
<td>University Studies</td>
<td>up to 75</td>
</tr>
<tr>
<td>University of Texas, Austin</td>
<td>no equivalent</td>
<td>Varies by program</td>
</tr>
<tr>
<td>University of Washington, Seattle</td>
<td>no equivalent</td>
<td>90</td>
</tr>
<tr>
<td>University of Wisconsin, Madison</td>
<td>&quot;Individual&quot; (create our own) major</td>
<td>72</td>
</tr>
</tbody>
</table>

Thinking more broadly about the regional and national goals of UArizona for Online Campus, increasing the credit limit to 75 becomes a necessity to compete with other online institutions. For example, Southern New Hampshire University accepts 90, and The University of Maryland Global Campus allows 70 units from a two-year institution to transfer into their Bachelor of General Studies degree program. Moreover, the University of Arizona Global Campus (formerly Ashford) has a Bachelor of Arts Liberal Arts that will accept 90 transfer credits. Increasing the number of transfer credits will allow the BGS degree program to continue supporting UArizona Online Campus by offering flexibility for its target demographic.

Statutory/Policy Requirement and Precedent

The 1996 Transfer Articulation Task Force Report, approved by the Arizona Board of Regents and the (former) State Board of Directors for the Community Colleges of Arizona, and submitted to the Arizona Legislature, outlines the articulation system between the universities
and community college and limits to 64 the number of credits which transfer from a community college to a university.

In April 2007, ABOR approved NAU’s 90/30 program (NAU policy # 100224) that allows the transfer of up to 90 transfer units into a variety of specializations included in their Interdisciplinary Studies degree that is broadly commensurate with UArizona’s Bachelor of General Studies.

In December 2009, the Arizona Board of Regents approved an exception to transfer credit limits, up to 75, for the Bachelor of Applied Sciences (BAS) degree. In a letter to State Representative John Kavanagh regarding this decision, ABOR’s assistant executive director for Government Affairs wrote: “as part of the on-going efforts to increase baccalaureate degree production, the universities will continue to work with community colleges and other partners to explore mechanisms, including increased transferability of coursework, to allow students to smoothly, quickly and affordably progress to degree completion.” We believe increasing the transfer credit limit for the BGS degree will similarly fulfill this promise.

Additionally, in June 2021 ABOR approved a similar exception for up to 75 transfer credits for the BS in Biological Sciences in NAU.

<table>
<thead>
<tr>
<th>Is this program in an ABOR designated high demand field?</th>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is the revised program in education, health, science, technology, engineering, or math (STEM)?</td>
<td></td>
<td></td>
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</table>