



## *Sustainability Research Network Multi-modal Mentorship Guidelines*

From 2015-2020, the highly interdisciplinary and geographically dispersed Urban Resilience to Extremes Sustainability Research Network (UREx SRN) team developed a diverse suite of methods and tools to confront the challenge of increasing frequency and magnitude of extreme events in cities. The goal of the network was to explore how infrastructure, an important defense against extreme events, can be more resilient, provide ecosystem services, improve social well being, and exploit new technologies in ways that benefit all segments of urban populations.

Collaboration across ten network cities—seven continental U.S. and three Latin American, home to over 35 million residents— the UREx SRN is co-producing knowledge needed to promote resilient, livable cities in a future that will look very different from today. The UREx network includes faculty, postdoctoral, and student researchers; practitioners from local and regional government, industry, and non-governmental organizations; and other stakeholders across >35 institutions and >300 collaborators, who co-produce data, models, images, stories, and on-the-ground projects that show how a new resilient infrastructure can be developed.

Throughout the network's existence, many mentor-protege relationships have been formed resulting in research, reporting, and publication on urban flooding, coastal storms, regional droughts, and extreme heat waves. By observing and querying these successful relationships, the team developed a multi-modal mentorship model. Multi-modal mentorship is the aspect of the UREx SRN that encourages multi-directional mentorship among official advisors, collaborators, postdocs, students, and peers. This form of mentorship was judged to be successful by both mentors and mentees. The following mentorship guidelines and checklists can be used by any person involved in a research network or large, multi-investigator research project who seeks guidance on establishing an effective mentorship experience.



## *Mentoring Plans for Advisors and Mentors of Postdoctoral and Graduate Participants*

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### **Preamble**

*UREx SRN is committed to incorporating interdisciplinary education of graduate and postdoctoral fellows into its research endeavors. Success in this effort will produce leaders in interdisciplinary urban resilience and sustainability scholarship while improving the diversity of the corps of researchers working with practitioners on these challenges.*

**A mentor** is a person with professional experience and expertise that shares knowledge and research guidelines with postdocs/students who are developing as professional scholars. A mentor gives encouragement, constructive criticism, and continuing feedback and works together with the postdoc/student to promote their professional development in their field, in Academia, and in life in general. A mentor is often, but need not always be, the major professor or supervisor of the student/postdoc; mentorship is a two-way process and involves the offer of mentorship by the mentor and the acceptance of mentoring by the protégée. Mentors also may include members of graduate student committees, as guided by the home institution. Informal mentorship includes peer-peer, also called horizontal mentoring, where a more senior student and/or postdoc provides periodic guidance on a specific project or research topic.

**An advisor** ideally possesses all of the attributes of a mentor and is also the main supervisor of a student along their journey as an academic researcher, assisting with navigating degree requirements and university procedures. Bi-directional responsibilities occur between an advisor/protégée in receiving and providing feedback. An advisor is also a mentor, though a mentor may not necessarily be an advisor.

**Multi-modal mentorship** is the aspect of the UREx SRN that encourages multi-directional mentorship among official advisors, collaborators, postdocs, students, and peers. No multi-modal mentorship experience will be exactly like any other; research interests are the common threads for establishing any mentoring relationship. Postdoctoral and graduate researchers (hereafter, postdoctoral and graduate fellows, PF/GFs) can have many mentors and will synthesize the information gained from mentors. All fellows are strongly encouraged to build a multi-modal mentorship network for their own research needs.

**UREx Fellows** are graduate student (GF) and postdoctoral (PF) research participants of the Urban Resilience to Extremes Sustainability Research Network who work collaboratively toward the UREx SRN mission and goals as part of their academic outcomes. Fellows' participation in the UREx SRN may be supported directly by funding or indirectly through network opportunities such as working groups, task forces, meetings, and research support.



## Postdoctoral Fellows

Mentoring program goals are to create a high-quality research training environment and provide opportunities for PFs to acquire the skills, knowledge, and experience needed to succeed in their chosen career paths. PFs work closely with one or more UREx researchers and practitioners at an institution/city but also with researchers across the network. They therefore have responsibilities on both institutional and network levels, and mentors may come from both. Mentoring plans within the network are listed at the end of this document, as they apply to both GFs and PFs.

### ***Mentoring Plans within Institutions:***

- PFs will receive orientation into the UREx community as well as related communities at each institution and will be encouraged to develop multi-modal mentorship and collaborative relationships when appropriate
- PFs will develop an Individual Career Development Plan (ICDP) as required by the National Science Foundation (NSF) in consultation with their advisors, to be revised semi-annually. The individual career development plan will specify the PFs' short- and long-term goals, their specific plans to achieve them, and the role of the advisors in helping to reach the goals. Short-term will usually refer to the period of the postdoctoral fellowship (1-2 years), whereas long-term will usually include time required for placement of the PF in his/her ultimately desired professional position (often 5-10 years). Most of the guidelines provided in this document can be incorporated into the individual career development plan.
- The mentor has the responsibility to be available for regular meetings with the PF; to facilitate the PF's integration into the institution, the literature of the field (as needed), and the UREx research community at the institution; and to promote opportunities for professional growth and development of the PF, including such items as:
  - Seeking and encouraging the PF's input at all stages of the research project
  - Providing opportunities for lead authorship on manuscripts resulting from the research
  - Encouraging the PF's exploration of collaborations with other members of the UREx research team
  - Giving feedback on career search and development, such as job application materials, interview seminars, and job offer negotiations
  - Affording opportunities for teaching experience, if teaching is part of the PF's long-term goals
  - Affording opportunities for involvement in grant-proposal writing, if research is part of the PF's long-term goals
  - Providing opportunities for PFs to practice mentorship with graduate or undergraduate students in the research group or UREx REU students
  - Providing support (financial, intellectual) for PFs to attend professional meetings (financially, as available)
- The PF has responsibility to initiate meetings with advisors and mentors and to assume responsibility for the logistics involved with scheduling meeting times. PFs follow through on and complete agreed-upon research and administrative tasks; to keep the advisor/supervisor informed of his/her activities, plans, and products; to produce research publications as agreed to the best of his/her ability; and to schedule and follow through on his/her individual career development plan. PFs are also responsible for



establishing horizontal mentoring opportunities with cross-city peers in the SRN. The PFs are expected to be active, engaged, and hard-working members of the UREx research community.

- The institutions supporting UREx PFs have various programs targeted at the postdoctoral level, addressing such issues as funding, collaboration, getting published, the job interview, course development, lecturing, providing mentorship, and other topics related to teaching. Fellows will be informed of these opportunities and encouraged to participate. The UREx Individual Career Development Plan should inform the institution's post-doctoral development plan (if required) and used for progress reporting and evaluation.

## Graduate Fellows

Mentoring program goals are to promote opportunities for students to work closely with their mentors and advisors in defining and developing the skills, knowledge, and experience needed to progress in their careers as interdisciplinary scientists. Specific to this UREx program, mentoring aims to create opportunities for GFs to learn about and develop research projects on sustainability and resilience from an explicitly social-ecological-technological systems (SETS) perspective.

### ***Mentoring Plans within Institutions:***

- The roles and responsibilities of GFs change dramatically as they move through their graduate programs, and the mentor-protégée relationship therefore may change as well. At the beginning, GFs will be oriented to and integrated into their graduate student communities, as well as the UREx SRN community at their institution.
- The advisor has a responsibility to be available for regular meetings with the GF; initially, these meetings help the student to become familiar with the overall UREx research objectives and important ideas and literature in their field, provide opportunities to discuss research ideas of the student and suggest potential tracks for investigation, inform students about faculty resources at the institution and in the network, and co-develop the student's plan of study. The plan of study includes not just coursework, but also the timeline for development of the research proposal, accomplishment of the research, and writing of the dissertation.
- The student's advisor (and mentors) clearly outline the expectations for research tasks and provide frequent feedback on the student's performance of those tasks. Frequency on feedback processes is determined and clearly defined in initial advisor/mentorship meetings.
- The advisor helps to identify other relevant mentors pertaining to the student's research interests, and encourages the formation of professional relationships with other potential mentors.
- As the GF develops a research proposal and plan of study, the advisor helps identify potential committee members from within the department, institution, and/or the network. If possible, UREx GFs should include a committee member that is an expert in a different domain (i.e., social, ecological, technological) from the one the student is emphasizing. The advisor helps the student to get to know potential committee members from the network and UREx projects.
- Other expectations of mentors in helping GFs to develop and refine their research



- proposal and carry their research through to completion of the PhD include:
- Frequently reviewing and co-revising the GF plan of study and research plan
  - Constructive criticism and ongoing dialog of ideas and encouragement
  - Guidance in the field, program, and general life; balancing project loads and setting boundaries
  - Resource identification - teaching and research assistantships beyond UREx fellowship, opportunities for research funding, presentation of research at meetings and conferences, postdoctoral opportunities
  - Assistance in publishing
- Advisors and mentors also will promote opportunities for professional growth and career development, including such items as:
    - Seeking and encouraging the GF's input and contributions to the larger UREx research project
    - Providing opportunities for GFs to develop collaborative research and lead or co-lead projects and resultant manuscripts resulting from the research
    - Providing opportunities for GFs to practice mentorship with undergraduate students in the research group or UREx REU students
    - Giving feedback on career options, postdoctoral opportunities, etc.
      - Early in a PhD program, a mentor can work more generally with a grad fellow on their career aspirations
      - As a fellow progresses in the degree program, advisors are encouraged to become more involved. The Individual Career Development Plan (ICDP) requirements from the NSF for Postdoctoral fellows can be used as general guidelines recommended for grad fellows as well
  - Advisors will encourage and actively support the GF's participation in network activities, including:
    - Participation in, or even leadership of, skills-development workshops or courses offered within or outside of the network
    - Participation in the Urban Resilience Reading Group (URRG), which is a requirement for GFs, to engage students across the network in assessing the state of peer-reviewed literature across multiple disciplines and allow them opportunities for developing relationships with other students (and possibly PFs) in the program
    - Support will be provided for travel to the All Hands meeting of the UREx SRN to present research findings and participate in workshops and sessions

### ***Mentoring Plans within the Network***

One of the objectives of the UREx SRN is to develop a training program that gives GFs and PFs access to a wide range of expertise and allows opportunities for development of professional relationships and a community of research scholars across diverse US and Latin American cities. At a minimum, GFs and PFs will be supported by a project with a common vision and shared research objectives across these cities; ideally, the network will function to provide common mentoring or multi-modal mentoring and a new way to approach graduate and postdoctoral training. As this new kind of mentoring is just being developed, there is a need to establish common expectations for both mentors and those being mentored; view the advisor meeting checklist to help set goals early in a research project. Most of the items below reflect techniques that have been attempted



in the first two years of the UREx GF and PF program to develop these expectations and to build community within the network.

- Senior Fellow: As of Year 4, a 1-year Senior Fellow position is in place to increase representation of GFs' voices in decision-making within the SRN. The senior fellow is selected by his/her peers, leads the URRG, and participates in Executive Management Team meetings. The senior fellow is also encouraged to participate in the Education and Diversity Working Group (EDWG).
- GFs participate in the Urban Resilience Reading Group (URRG). This is the main vehicle for developing collaborations and interactions with peers across the network and for rigorous exploration of interdisciplinary concepts associated with urban resilience. In past years, PFs have served as mentors for the URRG. The new Senior Fellow is also charged with leading the URRG.
  - Graduate students who are not currently supported by UREx fellowships are invited and encouraged to remain part of the UREx graduate community, through participation in reading group, ongoing collaborative research projects, workshops, and All Hands Meetings. This includes Emeritus Fellows as well associated graduate students.
- Participation in Working Groups (WGs)/Task Forces (TFs) as researchers
  - Provided funding is available, each of the six research WGs will have one PF at any given time, who will conduct interdisciplinary research as part of the WG but will also interface with the other WGs (and their associated PFs)
  - Most of the WGs also have an associated GF
  - All fellows who wish to join a WG or TF are encouraged to contact the relevant faculty, PF, or GF lead of that WG or TF
  - Fellows will be strongly encouraged to initiate new task forces and/or develop network-level papers with graduate students, postdocs, and PIs from other institutions that strengthen the generality of SRN approaches to understanding sustainability among our network of cities
- Science communication training held in person
  - Provided funding is available, participation in a 2-day science communication workshop in years 2 and 4 preceding the All Hands meeting
- Scenarios participation (years 2-5)
  - Graduate and postdoctoral fellows have an opportunity to play leading roles in facilitating, providing analyses, models, and/or creating visualizations in all steps of the scenario work to be done throughout the project. This element supports collaborative learning at all stages of the research program from database development through science product outreach.
  - In many cases, training and collaboration for these aspects of the scenario work come from peer PFs and GFs, and can become fodder for fellows' own research development
- Leadership-training
  - Workshop preceding All Hands or Virtual All Hands meetings are offered by the Education WG. Although also open to junior faculty members, this workshop will primarily target PFs and GFs nearing the completion of their PhD programs. Meeting topics will include such issues as collaboration, authorship, obtaining funding, postgraduate research and career opportunities, communicating with the public, funders, and stakeholders, and balancing work and life. This event



will also encourage camaraderie among PFs at different institutions within the network

- Early-career symposium (year 5)
- As described in the UREx SRN proposal, fellows may conceive, organize, and host a symposium targeted at young professionals. The PFs will be the primary organizers and can invite senior scientists to participate both as mentors and as speakers, enhancing their contacts and networks in science fields.

### **What to do if your advisor and/or mentor pairing is not working well**

Although the utmost care is taken to select GFs for an aligned research experience, should a need arise where the advisor is not meeting a specific need, students are encouraged to first review their own institutional or departmental guidelines for university recommendations on how to resolve any potential issue. However, if additional guidance is needed any member of the Executive Management Team can be contacted. PFs and GFs are encouraged to first work through concerns directly with their advisor and/or mentor, though the multi-modal mentorship model is also designed to help all researchers work through issues collaboratively if/when extra assistance is needed. All advisors and mentors are encouraged to add resources to a mentoring library to assist in this matter. Students are encouraged to review resources in this library and consult with their advisor, mentors, and peers for best results in their research journey.

#### *Mentoring Library Examples:*

Abele A. E. and Wiese B. S. (2008). "The nomological network of self-management strategies and career success." *Journal of Occupational and Organizational Psychology*, 81, 733-749. Retrieved at <https://www.zora.uzh.ch/id/eprint/17181/>

Burgio, K., McDonough MacKenzie, C., Borrelle, S., Ernest, S.K., Gill, J., Ingleman, K... White, E. (2020, August 18). *Ten simple rules for a successful remote postdoc*. [Open Access Publishing]. PeerJ Preprint. <https://peerj.com/preprints/27907/>(ISSN)2167-9843.

Davidson, Cliff I. and Susan A. Ambrose. (1994). [Supervising Graduate Research](#). *The New Professor's Handbook: A Guide to Teaching and Research in Engineering and Science*, (pp. 95-112). Wiley, New York, 1994. ISBN 1-882982-01-0.

Fuhrman, C.N., Hobin, J.A., Lindstaedt, B., & Clifford. (2019). Science careers: Individual development plan [PDF]. Retrieved from <https://myidp.sciencecareers.org/>

National Postdoc Association. (2020). NPA Core Competencies. Retrieved at <https://www.nationalpostdoc.org/page/CoreCompetencies>



## Appendix A: Guidance for Advisor Meetings with graduate (GF) and postdoctoral fellows (PF)

*This checklist is designed for advisors to use as a recommended guiding document with 1st year graduate students. Modification should be made for reuse as a student or postdoc progresses through a research experience. These guidelines can be used for delivery in multiple modalities.*

- A. Discussion of student or postdoc interests, goals, and skills (1st meeting, and revisit)
1. What are your short term goals? (1-2 years)
  2. What are your long term goals for research and your career (academic/ non-academic)?
    - Provide feedback on career search opportunities and what the advisor can do to help the student develop needed skills
    - Ask general questions for what skills students may need to develop/experience to be marketable for their desired career.
    - For long term research goals, connect PF/GF with grant writing opportunities, writing groups, etc.
    - Also help to align students with funding opportunities that fit with their research goals and the network mission and goals.
  3. Who in the network do you have an interest in working with during and beyond the SRN project?
    - Introduce multi-directional mentorship model: mentor/protegee, horizontal/peer mentorship, and opportunities in providing mentorship to newer researchers
    - Help identify additional mentors relevant to student research and encourage the development of professional relationships with those potential mentors.
    - Help identify working groups and/or task forces relevant to PF/GF research interests and pave the way for them to contact leads; some groups are open for new attendees but not all.
    - Encourage cross-city research
  4. What types of research or career skills would you like to be an expert in? Would you like to teach on these topics? Would you like to provide mentorship to others on these topics?
    - Discuss teaching and mentorship opportunities with the PF/GFs
  5. What goals do you have for publication?
    - Help PF/GF set publications goals, help develop a publication plan (and revisit in later meetings)
    - Discuss authorship and the ownership of ideas (see UREx policies)
    - Discuss potential collaborative publications (not with the formal advisor).
  6. In what ways can you best use your UREx experience to move on to the next phase of your career?
  7. Do you have any questions about the mentoring plans document that were not addressed in this meeting?



➤ Discuss ways they can leverage the UREx SRN after their commitment is complete

#### B. Discussion of expectations for the advisor-advisee relationship

8. How would you like to interact with your advisor so you are able to take maximum advantage of his or her expertise?
  - Determine an appropriate mix of formal meetings on academic progress and program requirements (GFs) or institutional evaluation requirements (PFs) and informal meetings (“check-ins”) for general research project updates and questions.
  - Agree upon time/modality/frequency for check-ins
  - Provide information on project, research team, and other formal meetings/seminars that the GF/PF is expected to attend
  - Establish an agreement on frequency for more formal meetings revisiting long-term and short-term goals, publication plan, etc. (i.e., part A)
9. What do you consider as your advisor’s responsibilities for helping you acquire the knowledge and skills you need for your career?
  - Define expectations for timing of advisor feedback on written documents (i.e., proposals, manuscripts, abstracts, etc.)
  - Discuss advisor’s responsibility to alert GF/PF to opportunities that fit their goals
  - Discuss advisor’s responsibility to communicate with co-mentors, co-advisors
  - Encourage informal meetings with peers through reading groups or other project opportunities
  - Discuss how to work with the practitioner community during their time in the network and beyond

#### C. Discussion of general strategies for success

10. What practices do you currently use to prioritize your work?
  - Offer GF/PF general advice on how to determine when to say yes to a project for career and/or personal advancement and also some general strategies for being selective about new projects and work load balance. For PFs, be sure to include consideration of balancing assigned projects with new, individual research projects
  - Discuss strategies for getting writing tasks done (this is often the most difficult challenge for new researchers)
  - Discuss time allotment for each category of work, for example: teaching, committee responsibilities, meetings to build professional relationships, meetings for collaborative research, research on assigned projects, developing new research, proposal writing, data analysis, writing journal articles
  - General tips and recommendations can be discussed based on the student experiences shared in the first two questions.



## Appendix B: SRN Mentee Meeting Checklist for graduate (GF) and postdoctoral fellows (PF)

*This checklist is designed as a starting point for use for 1st year graduate students and postdocs. Consider your responses to the questions below and come ready to discuss these items with your mentor. Modification will be made for reuse of this recommended, guiding document throughout your research experience. These guidelines can be used for delivery in multiple modalities*

- A. Complete the myIDP Science Careers Individual Skills, Interests, and Values Assessments offered through the American Association for the Advancement of Science at: <https://myidp.sciencecareers.org/>

Share your interests, goals, and skills with your mentor (1st meeting, *and revisit*)

1. What are your short term goals? (1-2 years)
2. What are your long term goals for research and your career (academic/non-academic)? From your skill assessment, which skills do you feel you are most strong in and what skills might you need to develop to reach your desired career?
3. Who in the network do you have an interest in working with during and beyond the SRN project?
  - a. What skills or attributes do they possess that draws you to them?
  - b. From your skills inventory, consider areas where you may benefit in working with other scientists
4. What types of opportunities would you like to be an expert in? Would you like to teach on these topics? Would you like to provide mentorship to others on these topics?
5. Do you have specific goals for publication? What is your current introduction/exposure/experience in the academic publication process?
6. Do you have any questions about the SRN mentoring plans document?

- B. Discussion of expectations for the advisor-advisee relationship

7. Provide your personal meeting style preference and desired frequency of meetings (time/modality/frequency). Do you have any life circumstances that will help your mentor to better respond to your needs?
8. What particular referrals would you like your advisor to best provide for you (i.e. publication peers, international research experiences, co-mentorship opportunities, etc.)?



C. Discussion of general strategies for success

9. What practices do you currently use to prioritize your work? What are some challenges that you face?

D. Future meetings with your advisor and/or mentor:

10. Meeting agendas should be prepared by you the student, outlining which aspects that you like to discuss.
11. Meeting calendar invitations should be sent from students to mentors
12. Start and finish meetings on time

