



New Faculty Orientation: Research

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About the (first) Presenter



- B.S., University of Kansas, 1986, Ph.D., UIUC, 1991, all degrees in ECE
- NASA Jet Propulsion Laboratory 1991-2003
- University of Michigan EECS 2003-2011 (started as Assoc. Prof., promoted to Prof. in 2008)
- Joined USC in 2012, Ming Hsieh Department of Electrical (and Computer) Engineering
- Research: Applied Electromagnetics, Radar Systems, Remote Sensing, Medical Imaging and Therapy Systems, Wireless Sensor Networks
 - Highly interdisciplinary (ecology, hydrology, medical, etc)
 - Research group of ~15, including students, research staff, post-docs
 - Funding from NASA, NSF, USGS, DoD, industry
- Some of USC roles: Chair of EE Faculty Recruiting Committee, Chair of University Research Committee, Co-Chair of University Committee on Appointments, Promotions and Tenure (UCAPT), Chair of Research Committee of President's Working Group (PWG) on Sustainability, co-Chair of PWG, numerous other committees
- Some of outside roles: NASA Advisory Council ESS Subcommittee, Editor-in-Chief of IEEE Antennas and Propagation Magazine, President of IEEE Antennas and Propagation Society, various other editorial roles, IEEE GRSS and APS AdCom member, membership and chairship of various working groups and workshop/conference organizing steering committees, various National Academies committees....

Goal & Methods



<https://viterbischool.usc.edu/researchandinnovation/>

- Goal: Facilitating and Enhancing Research Excellence
- Methods:
 - Programs for junior faculty
 - Active dissemination of opportunities (gist & web)
 - Leveraging Central Office for Research opportunities
 - Collaborating with other USC schools & units
 - Help with center and other large-scale proposals
 - Visioning exercises and strategic initiatives
 - Viterbi Research Initiatives Committee



Junior Faculty Programs

- At least one mentor for pre-tenure faculty
 - mentoring lunches, meetings
- Funding for travel to meet with sponsors
 - if not already in startup package
- Internal review program for NSF Career proposals
- “Best practice” advice for early career/young investigator program
- Viterbi support for YIP proposals, especially broader impact
 - E.g., reduced indirect costs for DoD, DoE and NASA
- Directed dissemination of YIP funding opportunities
- Personalized advice from the USC Research Strategy & Development

University & Viterbi Research



- USC is a “Research I” university
- USC has consistently risen in national research volume rankings:
 - In total research expenditures (\$955.6m in 20-21 fiscal year): around 11th among private and around 23rd among all (ahead of UC Berkeley, Northwestern)
 - In federal expenditures (>\$500M): 10th among private and 19th among all (ahead of MIT)
 - Viterbi is the 2nd largest contributor (after Keck/Medicine)
- Viterbi’s research expenditures are about 210M per year (3rd among private, after MIT and Stanford, 8th overall) ; this includes all engineering-affiliated centers and faculty and all types of research funding (federal, corporate, and private)
- The funding portfolio is distributed over various sources

Interdisciplinary Research



- USC spotlights **societally relevant research**; such research is inherently interdisciplinary (read USC vision doc)
- Interdisciplinarity is a major strength of USC
- Take advantage of our varied strengths in the numerous schools: Keck, Annenberg, Dornsife, Dentistry, Kinesiology, Gerontology, Cinematic Arts...
- BUT: pre-tenure interdisciplinary research should be undertaken with caution:
 - Must show a major contribution in at least one field, cannot straddle and be OK “overall” or “on average”
 - Promotion letters needed from recognized major figures in the field
- If you are defining a new area, make sure it is recognized and considered a contribution; give talks far and wide, and publish in recognized established journals with good impact factors

Office of Research Initiatives and Infrastructure



<https://research.usc.edu>

- Under Senior Vice President of Research Ishwar Puri
 - reports to the President
- Purpose: help faculty in the process of research:
 - University-level strategy, initiatives, partnerships
 - Training courses via the Center for Excellence in Research (CER)
 - Support for shared equipment cores
 - Cost-share on center proposals
 - Internal funding programs
 - Funding information dissemination
 - Management of institutionally limited funding opportunities
 - Oversight of USC Stevens Center for Innovation
 - Research Strategy and Development (Washington DC office)

Research Strategy and Development (DC Office)



<https://rsd.usc.edu/>

- Steve Moldin, Interim Associate VP, most experience with NIH
- Jim Murday, DoD expertise, especially nano & energy
- Al Olson, intelligence community & other services
- Internal NSF experience from several NSF staff and rotators
- Multiple consultants in DC
- Facilitate large grants, meetings with DC funders, workshops in DC and locally, visits by funders...
- First contact: Vice Dean Mahta Moghaddam (mahta@usc.edu)
 - Connection to the Vice President for Research
 - Connection to the DC Office and Steve Moldin

Center for Excellence in Research (CER)



<https://rii.usc.edu>

- The USC Office of Research supports and houses the program and offers a menu of information and training workshops about obtaining funding from various federal agencies, industry, foundations, etc.
- Point of contact: Silvia da Costa (sdacosta@usc.edu)

Internal Funding Opportunities: University Level



<https://rii.usc.edu/funding/funding-programs-at-a-glance/>

- Awards Opportunities in Four Categories: Research and Infrastructure Planning, Research, Technology Transfer, and Creativity and Scholarship
- Examples:
 - Collaborative Research Planning Awards: Small (\$75k) and Large (\$100k).
 - Instrumentation Awards: Two types. As-needed cost-share (like NSF MRI).
 - Zumberge Awards: STEM Program Award (\$50K), Large Program Award (\$100k), DEI in Research (\$50k).
 - And Many Others! Please see the webpage for details.

Contracts & Grants Administration



- **Central:**

- Dept. of Contracts and Grants (DCG); *submits ALL proposals*
- USC Office of Research
- Office of General Counsel
- Office of Compliance

- **Local/department-level:** You will be assigned a departmental research administrator, *who will work closely with you to prepare proposals and manage your awards*

- **School Level:**

- Viterbi Office of Research
- Viterbi Business Affairs (Finance)
- Viterbi Compliance Office

Viterbi Office of Research



- Mission: To assure that our research enterprise sufficiently supports and catalyzes our vision.
- Preaward Services
 - Reviews and approves proposals and other award actions on behalf of the School
 - Key Contact: Isabel Rodriguez, Senior Research Administrator
- Research Development
 - Provides select support services for large scale proposals
 - Key Contact: Samantha Gordon Danner, Special Project Manager
- Training, Capacity Building, and Post Award Services
 - Provides guidance and key post award services to PIs and departmental administrators in research administration matters
 - Key Contacts: Meggy Frye, Associate Director

Viterbi Proposal Timeline



- Notify your Research Administrator about your intent to submit and provide a link or attachment of announcement
- 7-9 Business Days Prior to Submission the Proposal Packet should reach VOR
 - More time is always better! The closer we get to deadline, the greater the likelihood that a mistake will occur that prevents timely submission
 - Documents we review:
 - RFP/Guidelines
 - Budget
 - Budget Justification
 - Draft of Scope of Work/Technical Justification
 - Proposals that require cost share, new space commitments, and/or large equipment purchases require additional review (and time)
- 3 Business Days Prior to Submission all documents should be to DCG

Facilities and Administration



- Facilities and Administration = indirect cost, overhead
- Pays for operating expenses of the University & School
- Overhead rate is 65%, determined USC's federally negotiated rate
- On par with comparable universities
- Research is not really a revenue source
- Things that do not incur overhead:
 - Equipment (> \$5,000)
 - Tuition
 - Participant support costs
 - Subawards/contracts (only the first \$25k of subs are subject to overhead)
 - Agency-mandated no overhead programs (see cost-share)

Cost-Share



- Cost-Share = Viterbi's subsidy for a specific effort/proposal; a cost to the school
- Facilities and Administration can be reduced or waived under center conditions, particularly when it is required by a sponsor
- Reduced overhead offered for Young Investigator Opportunities
- All cost-share requests must be submitted through the Viterbi online cost-share system at least 14 business days prior to the proposal submission deadline (at least a month for centers and/or other collaborative proposals with multiple schools involved)
- Please reach out to VOR with any questions or concerns – we are here to help you!

Viterbi Dissemination of Opportunities



- Weekly Research Gist
 - Funding opportunities
 - Local meetings/workshops
 - Research-relevant university announcements
 - Email from the vice dean for research
- Comprehensive research portal:

<https://viterbischool.usc.edu/researchandinnovation/>

- Awards
- Faculty Research Topics
- Faculty Research Resources
- Funding Sources for Undergraduate Research
- NAE Grand Challenges
- Research Centers
- Research Infrastructure
- Research Initiatives
- Research Vision
- Student Resources for Undergraduate Research

Early Career & Young Investigator Awards



- Many agencies have early career awards: NSF, NIH, ONR, Army, Air Force, CDMRP, DoE, etc.
- Your odds of getting these are higher than for other types of grants
- These are often considered prestigious (e.g., NSF CAREER, ONR Early Career) and lead toward higher-level honors & awards (NSF and other PECASE awards)
- These pave the way for future awards from the same agency
- These help you get tenure (some type of YIP award is basically expected for promotion in Viterbi)
- When allowed by the sponsor, Viterbi offers reduced F&A

NSF CAREER Awards



- Most of our assistant professors get these
- You can apply up to 3 times
- Plan strategically and be ready:
 - Contact the relevant agency program director to learn more and discuss your plans
 - Take the Provost's training course in May
 - Participate in the internal review program
 - Take broader impact very seriously (for all NSF grants, not just CAREER); it may decide if you get funded among the top candidates
- This advice applies to all other early career proposals as well

Broader Impacts



- NSF and some other agencies focus on broader impact & outreach
- A web page or a standard course not sufficient; instead, consider:
 - A well thought-out outreach program
 - K-12 teacher training & local school visits
 - Partnership with a public institution (e.g., California Science Center)
 - Many more good models, be creative
 - Example: NSF RET Program (supplements and sites) and GK-12 Program (BE-LA)
- Societally relevant research is a key tenet of the USC Vision
- Viterbi K-12 STEM Center help each faculty member individually design a broader impacts program for Career and other proposals (<https://viterbik12.usc.edu>)

Research Institutes and Centers



<https://viterbischool.usc.edu/research/>

- Research centers of excellence are a means of facilitating high-impact usually interdisciplinary research
- Viterbi has many centers
- Participate, enhance your research, collaborate, leverage
- BUT: keep your research contribution clear and identifiable
- AND: don't get involved in a major service role in centers before tenure (e.g., Education Director, Outreach Director, etc.)

Support for “New Research Initiatives”



- Ideation, team-building, and implementation of new research initiatives
- Coordination between faculty research, industry partners, and Advancement activities
- Coordination of convergent research initiatives between USC Viterbi and other entities both on-campus and off-campus
- Targets of specific active pursuit:
 - NSF ERC, STC, and MRSEC proposals
 - MURIs
 - NIH centers
 - DoE EFRC, DoD centers, EPA SCPC
 - Corporate and Foundation relationships for basic and applied research
 - We have been holding annual meetings/webinars to go over these opportunities and provide information/motivation

Facilitating Center-Scale Proposals



- We want to encourage Viterbi leadership on large, center-level proposals
 - Proposal management support, teaching release, discretionary resources, etc.
 - Submit requests to Mahta Moghaddam
- Initiate space request negotiation early on, if needed
- Streamlined cost-share procedures (on-line form)
- Interaction with the VP for Research via Vice Dean for Research to get support for interdisciplinary=multi-school proposals
- Reach out early in order to provide support and contract with outside vendors such as graphic artist and/or writer/editor

Viterbi Core Infrastructure



<https://viterbischool.usc.edu/shared-research-infrastructure/>

- Shared core infrastructure with user fees:
 - Core Center of Excellence in Nano-Imaging (CNI, Jayakanth Ravichandran and Andrea Hodge)
 - John O'Brien NanoFab Core & Cleanroom (Rehan Kapadia)
 - Viterbi-Dornsife Machine Shop
 - Center for Advanced Manufacturing (CAM, SK Gupta)
 - Structures and Materials Research Laboratory (SMRL, Bora Gencturk)
 - USC-Lockheed Martin Quantum Computing Center (Daniel Lidar)
- Programs:
 - Provost's Core Infrastructure Initiative
 - NSF Major Infrastructure Program (MRI)
 - DoD DURIP Program
- Networking with existing centers & institutes to leverage resources

Corporate & Private Funding



- Corporate and Foundations Relations Office: Maurena Nacheff-Benedict, Executive Director
- <https://viterbischool.usc.edu/giving/corporate-foundation-relations/>
- Special RFPs with partnering companies (GE, Lockheed Martin)
- IP negotiations can be lengthy...



Industrial Partnerships

- Airbus Institute for Engineering Research (AIER)
- Amazon Center for Trusted AI
- Center for Machine Learning (MASCLE)
- Center on Advanced Manufacturing (CAM)
- Cyber-Physical Systems and the Internet of Things (CCI)
- Michelson Center on Convergent Bioscience – Agilent Center of Excellence
- Pratt & Whitney Institute for Collaborative Engineering (PWICE)
- USC Center for Artificial Intelligence in Society (CAIS)
- USC-Lockheed Martin Quantum Computation Center
- Ershaghi Center for Energy Transition (E-CET)
- SoilTech NSF IUCRC

Expectations: Our Vision



- 3 GRAs funded per year can be regarded as a minimum expectation
- Fellowships and TAs are in addition to that
- One PhD graduated per year, one new PhD student taken on
- 5 years in the PhD program per student (could be, e.g., 1 as TA, one as fellow, and 3+ as GRA)
- At least 2 proposal submissions per year as PI, the range goes to 30+
- Co-PI and other roles are extra and encouraged
- These are minimal numbers: do the calculation for how much it takes to sustain a pipeline of 3+ GRAs given funding rates (varies among agencies) and plan proposal submissions accordingly

Pointers for Getting Research Funding



- The economy can always be in better shape; research support has been steady, no telling what will come next
- Basic advice:
 - Connect with program managers/administrators at federal agencies, “visit” if possible, talk to them
 - Serve on review panels as much as possible
 - Read winning proposals and get people to read your proposals and give you honest feedback
 - Talk to research mentors about the content of your research and your research strategy
 - Get your students engaged early in research, writing papers, and helping with proposals
 - **It is necessary to be strategic and well prepared**

We Are Here to Help



- Mentoring programs (this is part of it)
- Help with proposal submission (VOR)
- Faculty forums with key visitors:
 - luminaries
 - representatives from funding agencies
- Weekly research gist
- Memos with important news
- Research portal
- Special programs for junior faculty, as well as PhD students and postdocs
- Extra support for center-level proposals

Resources for Junior Faculty



- New faculty orientation
- NSF Career award internal review program (2 reviews per proposal by previous winners) with Broader Impacts help (Dr. Katie Mills)
- Cost-share on early career awards (except NSF and NIH, where it is not allowed)
- Travel funds for junior faculty
- Reduced teaching load
- Faculty mentoring program



Mentoring

- *Each of you should have a mentor with whom you have a productive relationship*
- All pre-tenure faculty have at least one, preferably two, assigned mentor(s); tell us if it's working
- HOWEVER: assigned mentors are not always ideal
- Tell us your preferred mentor, and we will work to set it up
- Vice Dean Timothy Pinkston will meet with each of you
- Use the following individuals as mentors: assigned mentor, dept. chair, vice deans, (more) senior colleagues you like
- Take the time to network and talk to people

Keep the Dialogue Going



- *Contact info:*

- Mahta Moghaddam: mahta@usc.edu
- Nicole Burelli: burelli@usc.edu

For scheduling needs please contact Jen Sosenko:
sosenko@usc.edu

- We move as fast as possible, but please leave enough time for addressing and iterating on issues
- We want you to succeed. Own the school, it's yours to shape and lead!