



New Faculty Orientation: Research

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About the Presenter



- Undergrad Osmania Univ. (1988), MS U. of Colorado (1994), PhD Stanford (1998).
- Boston U (2001-2005, Asst. Prof.), RPI (2006-2017, Asst. Prof. -> Assoc. Dean).
- Joined USC in 2018 as a Professor. Interim Vice Dean for Research (2020).
- Research Restart Committee.
- Research: computation and data-driven discovery (CD3) group.
- Funding: NSF, NIH, DoD, DoE, NASA, foundations, industry gifts.....
- **Academia is a great place to continually invent yourself, but do so wisely**



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 Office for Research opportunities
 - Collaborating with other USC schools & units
 - Help with center and other large-scale proposals
 - VICI fund for incubating centers
 - Visioning exercises and strategic initiatives
 - Awards Office
 - Viterbi Research 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 DC Research Office

University & Viterbi Research



- USC is a Research I university
- USC has consistently risen in national research volume rankings:
 - In total research expenditures (~\$890M): 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, Gero, Cinematic Arts...
- BUT: pre-tenure interdisciplinary research has risks:
 - 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

USC Office of Research



<https://research.usc.edu>

- Under Interim Vice President Maja Mataric (of Viterbi)
 - reports to the Provost
- 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 Institute of Innovation
 - Washington DC branch

Washington DC Branch of USC Office of Research



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

- Steve Moldin, Executive Director, 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: Interim Vice Dean Assad Oberai (aoberai@usc.edu)
 - Connection to the Vice President
 - Connection to the DC Office and Steve Moldin

Center for Excellence in Research (CER)



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

- A Senate-Provost initiative that originated in the University Research Committee by M. Matarić
- 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.

Internal Funding Opportunities: University Level



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

- Zumberge: individual (\$30K, year-round), multi-school interdisciplinary (\$85K, annual), diversity and inclusion (30k), and epidemic-related.
- Collaborative Research Fund (\$30K/year, up to 3 yrs)
- Core Instrumentation Fund: Two types. As-needed cost-share (like DURIP).
- WiSE: \$25k support. Deadline in Sept. 2020 and in Jan. 2021.
- Initiatives:
 - SC Clinical and Translational Science Institute (varying amounts and foci)
 - Ming Hsieh Institute for Research of Engineering-Medicine for Cancer and other Diseases (\$150k per year).
 - Many others, see web page

Contracts & Grants Administration



- **Central:** Dept. of Contracts and Grants (DCG), run by Jeri Muniz, under the VP for Research Maja Mataric; *submits ALL proposals*
 - Compliance with federal and other funding submission regulations
 - Amanda Reguengo is the Principal Officer for Viterbi in DCG
- **School-level:** Viterbi Business Affairs Office (VBA), *approves proposals before proceeding to DCG & submission; oversees school-level compliance for pre- and post-award.* Viterbi contact to DCG: Nichole Phillips, Director of Viterbi Research Administration
- **Local/department-level:** Your dept. business manager will assign a research administrator, *who prepares proposals and submits to VBA*
 - These are services **BUT please:**
 - Be mindful of people involved and timing expectations
 - Read the memos/emails
 - Report problems to Nichole Phillips



Viterbi Proposal Timeline

- Notify your Research Administration (VBA-RA) 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 VBA office
 - In General this consists of:
 - RFP/Guidelines
 - Cover Sheet for Signature (if electronic then just print the cover sheet for ex. NSF) unless S2S then not needed.
 - Budget
 - Budget Justification
 - Draft of Scope of Work/Technical Justification
- 3 Business Days Prior to Submission submit all Final documents to the DCG

Overhead



- Overhead = indirect cost, facilities and administration
- Pays for operating expenses of the university & school
- Overhead rate is 65%, determined by USC not Viterbi
- On par with comparable universities
- Of that 65%, ~12 pts (19%) goes to the Central USC Facilities Fund; there is also an overall participation tax (6%)
- 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
- Indirect costs can be cost-shared under appropriate conditions; this is an income loss for the school
- Some federal grant programs and some foundations require it
- 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)
- <https://viterbibusinessaffairs.usc.edu/research-administration/cost-sharing>

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
- COVID-19 FAQ for USC Viterbi Researchers
- Faculty Research Topics
- Faculty Research Resources
- Funding Sources for Undergraduate Research
- NAE Grand Challenges
- Research Addressing COVID-19 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)

NSF CAREER Awards



- Almost all 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
- Dr. Katie Mills from the Viterbi K-12 STEM Center help each faculty member individually design a broader impacts program for Career and other proposals



Viterbi Internal Center Incubator (VICI)

- VICIs created to bolster the transformative vision of the School
 - Goal: enable multiple clusters of faculty to collaborate along high-impact technology and societal directions
- Ten centers selected by the Viterbi Research Committee in 2015-2018 via a competitive proposal process
 - Seed funds of up to \$80k per center
- Several other centers created separately during same time period
 - Seed fund amounts vary

<https://viterbischool.usc.edu/faculty/faculty-research-resources/research-initiatives/viterbi-internal-center-incubator/>

Current Competed VICIs



Center Name	Focus Area	Director
AWARE: Center for Arid Climate Water Research	Water, sustainability, climate	Mahta Moghaddam
Biomimicry for Synthesis of Smart Textiles	Materials engineering	Malancha Gupta
CENTIENTS: Center for Intelligent Environments	Built environment	Burcin Becerik-Gerber
CMPI: Center for Machine and Process Intelligence	Data analytics	Joe Qin
CIEBOrg: Center for Integrated Electronics and Biological Organisms	Materials and neuroscience	Megan McCain Rehan Kapadia
CPPE: Center for Peptide and Protein Engineering	Materials, proteins, peptides	Rich Roberts
HealME: Healthcare and Medical Engineering	Healthcare	Ellis Meng
RASC: Robotics and Autonomous Systems Center	Robotics, AI	Maja Mataric Gaurav Sukhatme
SleepHUB: Center for Sleep Health Using Bioengineering	Sleep disorders	Michael Khoo
Vertex	Networks and Control	Urbashi Mitra

Directed VICIs



Center Name	Focus Area	Director
CAIS: Center for Artificial Intelligence in Society	AI	Bistra Dilkina (co-director)
CAM: Center for Advanced Manufacturing	Manufacturing	SK Gupta
CCI: Center for Cyberphysical Systems and the Internet of Things	IOT	Bhaskar Krishnamachari
MASCLE: Center for Machine Learning	Machine learning	Yan Liu
CSC@USC: Center for Systems and Control	Control systems	Mihailo Jovanovic



Other Research Centers

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

- 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.)

New Research Initiatives Program



- Overseen by Mahta Moghaddam, collaboratively with Research Vice Dean
- Ideation, team-building, and implementation of new research initiatives
- Coordination between faculty research (including Viterbi research centers), 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

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
- Use proposal coordination process led by Nichole Phillips
 - Graphics support (<https://viterbischool.usc.edu/graphic-design-and-web-resources-for-usc-viterbi-faculty-and-staff/>)
 - Grant writer/editor support
- Initiate space request negotiation (Linda Rock)
- 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
- Need to reach out early in order to provide support and contract with outside vendors such as graphic artist and/or writer/editor

Viterbi Awards Office



- Role: to serve as a resource to Viterbi faculty and department chairs in nominating our Viterbi faculty for national and international awards, fellow and advisory committee opportunities
- Structure: two staff members (Kim & Kelly)
- Activity stats: ~ 90 nominations/year, ~30% success rate
- Point of contact:
 - Kim Matsunaga (kim.matsunaga@usc.edu)
 - If you feel ready to be nominated for an award, make sure to contact Kim or your department chair



Awards Notification Tool

- Purpose: notification, tracking, and recognition of faculty awards
- **Faculty** enter their own awards on myViterbi site. Dept. chairs screen and distribute.
- Types of awards to be reported: best paper awards, society awards, fellowship distinctions, and national and international awards.
- No grants and contracts, with the exception of Early Career Awards/Young Investigator Awards/Pioneer Awards which are also distinctions.

Viterbi Core Infrastructure



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

- Shared core infrastructure with user fees:
 - Core Center of Excellence in Nanolmaging (CNI, Andrea Hodge)
 - John O'Brien NanoFab Core & Cleanroom (Andrea Armani)
 - Center for Peptide and Protein Engineering (CPPE, Rich Roberts)
 - 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: Blair Lake
- Foundations: Blair Lake
- Special RFPs with partnering companies (GE, Lockheed Martin)
- IP negotiations can be lengthy...



Industrial Partnerships

- Airbus Institute for Engineering Research (AIER)
- 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)
- TCC Foundation Center for Reduced Emissions Using Plasma
- USC Center for Artificial Intelligence in Society (CAIS)
- USC-Lockheed Martin Quantum Computation Center
- CiSoft: Center funded by Chevron; possible model for other centers

Expectations: Our Vision



- At least 3 GRAs funded per year
- Fellowships and TAs are in addition to that
- Strongly discourages 25% GRAs on grant budgets
- One PhD graduated per year, one new PhD student taken on
- 5 years in the PhD program per student: 1 as TA, one as fellow, and 3+ as GRA
- Each faculty member should submit at least 2 proposals 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 (~10%) 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, go to visit, 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 (VBA)
- 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

Research in the time of COVID-19

- Around mid-March almost all on-campus research stopped.
- Around mid-June on-campus research restarted.
- Current phase 2b: 10' physical distancing, 30% capacity for experimental and 10% capacity for computational/theoretical research groups.
- Moving to 50% for experimental and 20% for computational next week!
- Every lab needs an approved research restart plan for on-campus research.
- PPEs provided by the school to departments and then to faculty.
- Requirements: (a) PPEs, (b) Physical distancing, (c) Trojanlearn module, (d) Trojancheck, (e) no undergrads.
- FAQ Web sites:
- <https://viterbischool.usc.edu/covid-19-faq-for-usc-viterbi-researchers/>
- <https://we-are.usc.edu/faqs/research-faqs/>

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:*
 - Email to me (aoberai@usc.edu) AND assistant: Marjorie Brownbill: brownbil@usc.edu
For appointments contact Marjorie
 - Nichole Phillips: nicholep@usc.edu 213-740-3237
 - Amanda Reguengo: amandas@usc.edu 213-740-6064
- 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!