New Faculty Orientation: Research

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Vice Dean for Research
About the Presenter

• Undergrad University of Kansas, PhD MIT 1994
• Asst. Prof of CS at Brandeis ‘94-’97
• Joined USC in 1997 as an assistant professor
• Assistant (1st kid ‘98) → associate (‘01) (2nd kid ’02) → full (’06) (3rd kid ‘09)
• Center director (RASC), Viterbi WiSE Chair, Academic Senate President, Vice Dean for Res.
• Provost’s Strategic Planning Committee, Mentoring Steering Committee, Trustee Academic Affairs Committee, Senate Executive Board, University Committee on Appointments, Promotions and Tenure
• Research: intelligent robotics, from robot teams to socially assistive robots for rehabilitation, training, and education
• Funding: NSF, NASA, NIH, DoD, DoE, DoEd, 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
- 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 (>\$500M): around 10th among private and around 25th among all (ahead of Yale & Harvard)
  - In federal expenditures (>\$200M): 10th among private and 19th among all (ahead of Yale)
  - Viterbi is the 2nd largest contributor (after Keck/Medicine)
- Viterbi’s research expenditures are about 1/3 of USC’s; 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 Vice President Randolph Hall (formerly 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
  • Washington DC branch
Washington DC Branch of USC Office of Research

https://research.usc.edu/about/vp/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: Vice Dean Maja Mataric’ (mataric@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/about/vp/cer/

• 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/for-investigators/funding/uscd/

- Zumberge: small w/ mentor ($10K, year-round) and large interdisciplinary ($85K, annual), competitive
- Collaborative Research Fund ($30K/year, up to 3 yrs)
- Core Instrumentation ($300K), as-needed cost-share (up to $200K), also technician funds
- WiSE: undergrad ($5K/semester), grad top-off, faculty support (up to $50K every 4 yrs), travel ($2500/year)
- Initiatives:
  - Clinical and Translational Health Science ($50K-$80K/year)
  - Ming Hsieh Institute for nanoscience for cancer
  - Many others, see next slide and web page
Internal Funding Opportunities

https://research.usc.edu/for-investigators/funding/uscd

Collaboration Fund; Core Instrumentation Fund; Donald E. & Delia Baxter Foundation Faculty Fellows Program; Eli and Edythe Broad Innovation Award; METTRANS Transportation Center; Ming Hsieh Institute for Research for Engineering-Medicine for Cancer; Mousetrap Fund; Pfizer’s Center for Therapeutic Innovation (CTI); Rose Hills Foundation Innovator Grant Program; Rose Hills Foundation Science and Engineering Fellowships; Saban Research Institute Cores; Southern California Clinical and Translational Science Institute (SC CTSI); Southern California Environmental Health Sciences Center; Southern California Research Center for ALPD & Cirrhosis; Technology Advancement Grants (TAGs); USC Alzheimer Disease Research Center; Undergraduate Research Associates Program; Viterbi Research Innovation Fund; Women in Science and Engineering (WiSE); Zumberge Faculty and Research Innovation Fund
Viterbi Internal Center Incubator (VICI)

- Arid Climate and Water Research Center (AWARE)
- Center for Artificial Intelligence in Society (CAIS)
- Center for Cyber-Physical Systems and the Internet of Things (CCI)
- Center for Human-Applied Reasoning and the Internet of Things (CHARIOT)
- Center for Peptide and Protein Engineering (CPPE)
- Center of Machine Learning (MaSCle)
- Robotics and Autonomous Systems Center (RASC)
- SleepHub
- Vertex Center
Viterbi Internal Center Incubator (VICI)

- CIEBOrg: Center for Integrated Electronics and Biological Organisms
- Biomimicry for Synthesis of Smart Textiles
- Center for Intelligent Environments, Technology and Society (CENTIENTS)
- Center for Machine and Process Intelligence
- Healthcare and Medical Engineering (HealME) Center
Contracts & Grants Administration

- **Central:** Dept. of Contracts and Grants (DCG), run by Jeri Muniz, under the VP for Research Randolph Hall; submits *ALL proposals*
  - Compliance with federal and other funding submission regulations

- **School-level:** Viterbi Business Office (VBO), *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 VBO*

  - These are *services BUT please:*
    - Be mindful of people involved and timing expectations
    - Read the memos
    - Report problems to Nichole Phillips
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 universities don’t give it (e.g., MIT, Stanford)
- 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
• Comprehensive research portal:
  https://viterbischool.usc.edu/researchandinnovation/
• Funding opportunities
  • Faculty research topic database
  • Pre-award and post-award policies
  • University and Viterbi Initiatives
  • Research infrastructure cores
  • Research-relevant resources
Early Career & Young Investigator Awards

- Many agencies have early career awards: NSF, NIH, ONR, Army, Air Force, CDMRP, etc.
- Your odds of getting these are higher than for other types of grants
  - E.g., NSF CISE 20% funding rate for CAREER <10% for standard 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
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 before tenure (e.g., Education Director, Outreach Director, etc.)

https://viterbischool.usc.edu/research-centers/
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
  • MURI
  • NIH centers
  • DoE EFRC, DoD centers, EPA SCPC
  • Corporate and Foundation relationships for basic and applied research
Facilitating Centers & Large Proposals

• Submit the request to Mahta Mogaddam
• Use the center proposal coordination process lead by Nichole Phillips
  • Graphics support
  • Grant writer/editor support
  • Short-term teaching release
• 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 contractors 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 NanolImaging (CNI, Andrea Hodge)
  - John O’Brien NanoFab Core & Cleanroom (Andrea Armani)
  - Center for Peptide and Protein Engineering (CPPE, Rich Roberts)
  - Center for Advanced Manufacturing (CAM, SK Gupta)
  - Quantum Computing Center
  - Machine Shop
- Programs:
  - Provost’s Core Infrastructure Initiative
  - NSF Major Infrastructure Program (MRI)
  - DoD DURIP Program
- Disseminating infrastructure funding opportunities, cost-share
- Networking with existing centers & institutes to leverage resources
Corporate & Private Funding

• Corporate and Foundations Relations Office: Todd Logan
• Foundations: Jennifer Lidar
• 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
Average Expectations: The Dean’s Vision

• At least 3 GRAs funded per year
• Fellowships and TAs are in addition to that
• 25% GRAs not allowed 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 (no fixed order)
• 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)
• Tracking proposal submissions
• Tracking research involvement (co-PI, senior/key personnel, student supervision, etc.)
• 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
Resources for Junior Faculty

- New faculty orientation
- Fall workshop on research administration (new!)
- 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 (mataric@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!**