Three NSF Vehicles for Funding

• Programs, such as Molecular and Cellular BioSciences (MCB) & Physics of Living Systems (PoLS)
• Early-Concept Grants for Exploratory Research (EAGER)
• Research Experiences for Undergraduates (REU)
MCB/PoLS

Molecular and Cellular BioSciences (MCB) & Physics of Living Systems (PoLS)
What matters with NSF

• Being Interdisciplinary
• creative new approach ("ahead of the curve") as intellectual merit
• Preliminary results in a publication with high impact
• Ahead of the curve – What is the panel receiving? – right now microbiomes
• Strong team
• Broader impact – ALICE – a new teaching approach and REUs
• Integrate Broader impact with research
• 3 aims
• If truly interdisciplinary, may be able to break up to 2 directorates
• Know your audience
Interdisciplinary                          Creative

Interdisciplinary

Ahead of the curve
Big challenges

Math    Bio    Physics
Being ahead of the curve

• 1989 – do genomics
• 2004 - do systems biology
• 2017 – do single cell approaches
• 2018 - do single cell omics and metabolomics
Creative Integrated* Broader Impact

• **ALICE** – new teaching approach*
• Partnerships with museums on science outreach
• Several REUs
• Involvement with INCLUDES and AGAPE
• Involvement with LSAMP
• Partnerships with companies for student internships*
• International partnerships with UL*
Unpacking Interdisciplinary

• Arnold (Genetics)
• Schuttler (Physics)
• Mao (Engineering)
• Edison (Biochemistry)

• Big challenges tend to require an interdisciplinary approach
• You need experts in each field; you cannot do it all!
• You may not fit it all into one grant – consider multiple directorates
• NSF likes interdisciplinary proposals!
Breaking the project up

- PoLS, a physical explanation
- MCB, a biochemical explanation
What matters with NSF

- Creative
- Broader impact
- Strong team
- Preliminary data
Know your audience
Frequent Mistakes

• Lack of an original idea (in either research OR broader impact)
• Lack of an acceptable rationale (why do it – what is the big challenge?)
• Questionable reasoning in experimental approach
• Uncritical approach (be up front on the limitations of approach)
• Diffuse, superficial, or unfocused research plan (crystal clear)
• Lack of sufficient experimental detail (limits yourself to three aims)
• Lack of knowledge of relevant literature
• Unrealistically large amount of work
• Uncertainty concerning future directions

Holly Wichman
Some Examples of Mistakes

- Insufficient collaborators to cover interdisciplinary problem
- Very large budget (see what level is funded on NSF Web site)
- Lack of prior results and interdisciplinary expertise
- Lack of awareness in limitations of approach
- Outreach is not original
- Not aware of what has been done and published
- Lack of clear strategy to answer the question posed
- NO Assessment of broader impact of proposal
- Questionable experimental approach
EAGER

Early-Concept Grants for Exploratory Research (EAGER)
EAGER

• Novel approach
• Helps to meet the program director in a wider context
• Fits what they want – Quantitative Biological Sciences (QBS) in MCB
Examples for EAGER

• New physical mapping algorithm in 1995
• New approach to education in ALICE in 2016
REU

Research Experiences for Undergraduates (REU)
REU

• Pilot program for a year
• Need sign of university support – a lot at UGA
• Integrate activities of other REUs on campus
• Get a copy of a successful REU application from one of 7 REUs at UGA
• Have an evaluation plan of the program using URSSA rubric
• Select mentors wisely – be sure to get those committed to undergraduates and with a proven track record