Best Practices for Competitive Applications: Research Grants, Fellowships and Career Development Awards

Jaime S. Rubin, Ph.D.
Dept. of Medicine
College of Physicians and Surgeons
Columbia University

Course: “Funding and Grantsmanship for Research and Career Development Activities”
http://grantscourse.columbia.edu/
Course Policies:

Please, No:

- Recording of Presentation
- Screen Shots of Presentation
- Posting to Social Media
- Sharing of Course Material with those Outside of Course

Thanks, Jaime Rubin
Approaches for Competitive Applications

- Identify Funding
- Prepare to Write the Grant Application
- Complete the Grant Application
Identify Funding

- Identify appropriate funding agencies
  - Government
  - Non-government

- Identify appropriate funding mechanisms
  - Research
  - Training

- Create a calendar of application deadlines for identified funding programs
Approaches for Competitive Applications

- Identify Funding
- Prepare to Complete the Grant Application
- Complete the Grant Application
Prepare to Complete the Grant Application

- Speak with Agency Program Officer
- Speak with colleagues who are/were awardees
- Review funded applications if possible
- Review agency’s review criteria
- Review agency’s review process
- Identify what will make the application more competitive
  - Research and/or career development arrangements
  - Access to core facilities/research resources
- Strengthen “Preliminary Work/Pilot Data”
- Who will write confidential letters of reference?

Research and Career Development Arrangements

- Multiple Principal Investigators (research awards)
- Multiple Mentors (mentored awards)
- Advisors (mentored awards)
- Co-investigators/Collaborations
- Subcontracts to other institutions
- Multidisciplinary/Interdisciplinary

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
### Mentors/Advisory Committee

- Scientific area per Mentor/Committee member
- Schedule of meetings

---

#### Research Training Mentors and Advisors

<table>
<thead>
<tr>
<th>Faculty Member</th>
<th>Role</th>
<th>Area of Expertise</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name (Title)</td>
<td>Mentor</td>
<td></td>
</tr>
<tr>
<td>Name (Title)</td>
<td>Co-Mentor</td>
<td></td>
</tr>
<tr>
<td>Name (Title)</td>
<td>Advisory Board Member</td>
<td></td>
</tr>
<tr>
<td>Name (Title)</td>
<td>Advisory Board Member</td>
<td></td>
</tr>
<tr>
<td>Name (Title)</td>
<td>Advisory Board Member</td>
<td></td>
</tr>
<tr>
<td>Name (Title)</td>
<td>Collaborator</td>
<td></td>
</tr>
<tr>
<td>Name (Title)</td>
<td>Consultant</td>
<td></td>
</tr>
</tbody>
</table>

Prepare to Complete the Grant Application

- Identify and meet with Co-investigators, Collaborators, Consultants, Advisors
  - Identify roles and responsibilities
  - Administrative requirements
    (e.g. if other countries/institutions are involved)
- Identify necessary core facilities and other research resources
- Meet with research administrators
- Human subjects, lab animals, and any other regulatory issues?
Approaches for Competitive Applications

- Identify Funding
- Prepare to Complete the Grant Application
- Complete the Grant Application
Complete the Grant Application

- Review the application instructions
- Identify the different components
- Create a checklist (sequence/date of completion)
- Create an outline
  - Content, Length of section (vis a vis page limits)
- Identify and delegate responsibilities for the different components
  - Technical/Scientific
  - Administrative – e.g. budget
  - Regulatory
  - Draft letters of collaboration/support

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
Complete the Grant Application

- Confirm page limits for each component
- Create a schedule for any required meetings
- Determine:
  - Shared computer drive/folders
  - Naming of files (e.g., by version # or date)
  - Track changes?
  - Font, margin, format of literature citation
- Set a firm time-line for each responsibility
  - Writing milestones
  - Absolute deadline date for final compilation

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
Complete the Grant Application

- Read **instructions**
- **Never assume** that reviewers “will know what you mean”
- Refer to **literature** thoroughly and thoughtfully
- Explicitly state the **rationale** of the proposed investigation (“the hypothesis of my study is…”)
- Discuss **limitations** and potential “**challenges**” and how these will be addressed (e.g., “**alternate approaches**”)
- Include well-designed **tables and figures**
- Present an **organized**, lucid write-up (use an **outline**)
- Ask colleagues (““pseudo reviewers””) to **review/comment**
- “See” application from **reviewer’s perspective**
Complete the Grant Application

- Read instructions
- Never assume that reviewers “will know what you mean”
- Refer to literature thoroughly and thoughtfully
- Explicitly state the rationale of the proposed investigation (“the hypothesis of my study is…”)
- Discuss limitations and potential “challenges” and how these will be addressed (e.g., “alternate approaches”)
- **Include well-designed tables and figures**
- Present an organized, lucid write-up (use an outline)
- Ask colleagues (“pseudo reviewers”) to review/comment
- “See” application from reviewer’s perspective
Include Well-Designed Tables and Figures

- Include explanatory caption with the figure (not buried in text)
- Not overly complicated
- Informative, even if printed in black and white
- Easy for the reviewers to read
- Not too small (including text)
- Not every figure from a presentation (oral, poster) is appropriate for a grant application

Tips:

- Bold label in text (e.g., **Fig. 4**) so it’s easier for reviewers to locate relevant text for individual Figure
- Try to have Figure and relevant text on the same page

Complete the Grant Application

- Read instructions
- Never assume that reviewers “will know what you mean”
- Refer to literature thoroughly and thoughtfully
- Explicitly state the rationale of the proposed investigation (“the hypothesis of my study is…”)
- Discuss limitations and potential “challenges” and how these will be addressed (e.g., “alternate approaches”)
- Include well-designed tables and figures
- Present an organized, lucid write-up (use an outline)
- Ask colleagues (“pseudo reviewers”) to review/comment
- “See” application from reviewer’s perspective
# Timeline for Specific Aims and Benchmarks/Milestones of Research Progress

<table>
<thead>
<tr>
<th>Benchmarks / Milestones</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summary of Specific Aim 1a</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Summary of Specific Aim 1b</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Summary of Specific Aim 2a</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Summary of Specific Aim 2b</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Summary of Specific Aim 3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Timeline for Specific Aims and Benchmarks/Milestones of Research Progress

<table>
<thead>
<tr>
<th>Benchmarks/ Milestones</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summary of Specific Aim 1a</td>
<td>M</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Summary of Specific Aim 1b</td>
<td>M</td>
<td>M</td>
<td></td>
</tr>
<tr>
<td>Summary of Specific Aim 2a</td>
<td>M</td>
<td>M</td>
<td></td>
</tr>
<tr>
<td>Summary of Specific Aim 2b</td>
<td>M</td>
<td>M</td>
<td></td>
</tr>
<tr>
<td>Summary of Specific Aim 3</td>
<td></td>
<td></td>
<td>M</td>
</tr>
</tbody>
</table>
Specific Aims: Milestones

- Specific Aim 1a Milestone:
- Specific Aim 1b Milestone #1:
- Specific Aim 1b Milestone #2:
- Specific Aim 2a Milestone #1:
- Specific Aim 2a Milestone #2:
- Specific Aim 2b Milestone #1:
- Specific Aim 2b Milestone #2:
- Specific Aim 3 Milestone:
Elements of a Good Proposal

- Feasible
- Relevant
- Unique
- Innovative
- Clear
- Brief
- Consistent
Anticipate Questions
and
Answer them before
they are asked
Don’t Do the Minimum

- “Optional”: Does not mean don’t do

- PHS Assignment Request Form: Request an Institute, specific Study Section, reviewers’ areas of expertise

- F and K applications:
  - 3-5 Letters of Reference; May submit up to 5 strong letters

- Research applications:
  - Letters of Support; e.g., from collaborators, core facility directors, provider of a “unique research resource” (in some cases, would also include Biosketch)

- When appropriate, fill the page – ½ page of text means you have nothing more to say

- K awards: “10. Description of Institutional Environment”
PHS Assignment Request Form

Awarding Component Assignment Suggestions (optional)

If you have a suggestion for an awarding component (e.g., NIH Institute/Center) assignment, use the link below to identify the appropriate short abbreviation (e.g., "NCI" for National Cancer Institute) and enter it below in the boxes for "Suggested Awarding Components". All suggestions will be considered; however, not all assignment suggestions can be honored.

Information about Awarding Component can be found here: https://grants.nih.gov/grants/phs_assignment_information.htm#AwardingComponents

Suggested Awarding Components:

Study Section Assignment Suggestions (optional)

If you have a suggestion for a study section assignment, use the link below to identify a study section(s). Enter the short abbreviation for that study section in the boxes for "Suggested Study Sections." Remove all hyphens, parentheses, and spaces. All suggestions will be considered; however, not all assignment suggestions can be honored.

For example, enter "CAMP" if you wish to suggest assignment to the NIH Cancer Molecular Pathobiology study section, or "ZRG1HDMR" if you wish to suggest assignment to the NIH Healthcare Delivery and Methodologies SBIR/STTR panel for informatics.

Information about Study Sections can be found here: https://grants.nih.gov/grants/phs_assignment_information.htm#StudySection

Suggested Study Sections: Only 20 characters allowed

Rationale for assignment suggestions (optional)

Entry is limited to 1000 characters.

Suggestions are considered with other assignment factors. Not all suggestions can be honored.

Suggestions are considered with other assignment factors. Not all suggestions can be honored.
PHS Assignment Request Form

List individuals who should not review your application and why (optional)

Provide sufficient information (e.g., name, organization, affiliation) to correctly identify each individual. Provide specific reason why an individual should not review your application. Information will be considered, but listing an individual does not guarantee they will not be on review panel.

Identify scientific areas of expertise needed to review your application (optional)

Note: Do not provide names of individuals

Each entry is limited to 40 characters

Limit your answers to expertise. DO NOT enter the names of individuals you’d like to review your application.
Avoid the 3 D’s!!

Day of Deadline Drama!!

- Missing/Incomplete **required component**
- Missing/Incomplete component that would have made the application **more competitive**
- Just realized that research involves **human subjects**
- Problem with **research compliance** issue
- Problem with the **budget**
- Missing **signature**
- Component does not meet **formatting** requirements
Not everything that can be counted counts.
Not everything that counts can be counted.

Research Plan Section
3. Specific Aims
4. * Research Strategy

Candidate Section
2. Candidate Information and Goals for Career Development

Quote Investigator suggests crediting sociologist William Bruce Cameron
http://quoteinvestigator.com/2010/05/26/everything-counts-einstein/

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
Investigator

- Competent
- Enthusiastic
- Thorough
- Professional

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
When describing a previous research experience:

- Why?
  - This Area of Research
  - This Mentor/Lab Group
  - This Institution

- What was the hypothesis/scientific question?

- Why was the study important?

- What were the findings and conclusions?

- What were your role and responsibilities?
Personal Statement/
Candidate’s Background

When describing a previous research experience:

- What did you learn and accomplish?
  - “Intellectual aspects”
  - Do not focus on technical aspects
- Why the transition from one research project/area/mentor/institution to the next?
- How/Why did your interests change or evolve?
- Cite any resulting publications/abstracts
- Describe any honors, awards and resulting conference/workshop presentations

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
Possible Problems Specific for Mentored Fellowship & Career Development Awards

Mentor

- Too many other responsibilities (e.g. administrative, clinical)
- Too many other mentees (e.g. students, post-docs)
- Not appropriate scientifically
- Too junior
- Limited experience as a mentor
- Limited funds to support proposed research
Possible Problems Specific for Mentored Career Development Awards

**Institution**

- Limited scientific/technical resources (e.g., core facilities, biostatistical support, patient population)
- Limited career development opportunities (e.g., courses, workshops)
- Limited opportunities for career advancement
Besides Funding….

- Role Models are Important
- Mentors are Important
- Colleagues are Important
- Be Open to New Ideas and Challenges
- Take Advantage of Unique Opportunities
- Networking – whether by accident or on purpose - is Important
Common Problems with Grant Applications from New Investigators

- Does not address/follow funding agency’s mission, specific instructions, budget limits, etc.
- Overly ambitious
  - e.g., $, time, expertise, career level, resources
- Fishing expedition
- Not hypothesis driven
- Descriptive, not mechanistic project
- No or insufficient preliminary data
  - Demonstrates feasibility of project, scientifically as well as by investigator’s team

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
Common Problems with Grant Applications from New Investigators

- Study design
  - e.g., Control groups(s), Unfocused
- Issues with Statistical aspects/Power analysis/Data analysis
- Does not adequately describe access to “research resources”
- Unrealistic budget (too large or too small)
- Methodologies beyond the expertise of investigator or research team
- Not independent of previous mentor’s research
NIH: one round of applications
Pink Sheet: Reviewers’ Comments
Bell Curve of Reviewer’s Grant Applications

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
Poor Statistics
Research Resources
not Adequately Described

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
Career Development/Research Training Plan not Comprehensive

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
Figure Caption Font too Small
All Components of the Application are as Strong as Possible
Good Luck!

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu
ADVISORY COMMITTEE TO THE DIRECTOR

Next Generation Researchers Initiative Working Group

ACD Working Group on Biomedical Workforce

ACD Physician-Scientist Workforce

ACD Working Group on Diversity

https://acd.od.nih.gov/

Jaime S. Rubin, Ph.D.; http://grantscourse.columbia.edu