

GRANTS for EXPLORATORY ACADEMIC RESEARCH (GEAR)

SC EPSCoR/IDeA Solicitation Number: 09-106

Important Dates

Release Date: Wednesday, December 9, 2009

Submission of Proposals: Monday, March 29, 2010 in the South Carolina EPSCoR/IDeA Office

Anticipated Period of Performance: July 1, 2010 – June 30, 2011

Award Amount: Up to \$100,000

Total Funding Available: \$400,000

Program Information

The goal of the Grants for Exploratory Academic Research (GEAR) Program is to encourage multi-disciplinary research projects that have the ability to be at or beyond the frontiers of scientific discovery. Awards will include support for start-up funding for new junior, tenure-track faculty hires; acquisition of shared equipment; expansion and enhancement of mentoring and research development opportunities for researchers at all levels of career development; student research traineeships; or development of collaborative partnerships. Collaborative projects between South Carolina's institutions, including those with the state's minority serving institutions (MSIs) and technical colleges, and industry-university partnerships are encouraged. The submission of an extramural proposal relevant to the supported activities, peer-reviewed publications, and evidence-based impact on institutional research culture are expected outcomes of GEAR support.

Eligibility

Any tenured or tenure-track faculty member at an institution of higher education in South Carolina is eligible to submit a proposal under this solicitation.

The SC EPSCoR/IDeA Program welcomes proposals from all qualified scientists, engineers and educators and strongly encourages women, minorities and persons with disabilities to compete fully in its programs. In accordance with federal statutes and regulations, no person on grounds of race, color, age, sex, national origin or disability shall be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving financial assistance from the SC EPSCoR/IDeA Program, although some programs may have special requirements that limit eligibility.

Proposal Guidelines

The SC EPSCoR/IDeA Program requires that all GEAR proposals:

- adhere to program objectives as described in this solicitation;
- provide background and rationale for the projects proposed;
- be multi-disciplinary in nature;
- have a scientific focus that is aligned with the SC NSF EPSCoR RII Track-1 award (see Appendix D) and is at the frontier of scientific discovery; and
- provide a budget and explanation of expected costs sufficient and reasonable for completion of the proposed tasks.

Proposals submitted in response to this solicitation must be prepared using the following guidelines and specific forms listed. Proposals must be prepared with 1" margins and a font size no smaller than 11pt. All proposals must include authorized institutional representative signature on both the Cover Sheet and Budget Page.

The Principal Investigator (PI) identified on the Cover Sheet and included in the proposal shall be the designated contact person for the project and is expected to provide leadership in coordinating and integrating its activities. The PI will be held accountable for all scientific and programmatic responsibilities, including required reporting (see Award and Reporting Requirements). The Authorized Institutional Representative identified on the Cover Sheet will be held responsible for all fiscal obligations.

All GEAR proposals must be assembled in the following sequence:

- Cover Sheet for proposal to the SC EPSCoR/IDeA Program (Appendix A). The targeted extramural opportunity must be identified.
 - The proposal resulting from the GEAR award must be submitted within twelve (12) months of the Approved End Date.
- Project Description of the need for such a project and rationale for the choice of topic(s), as well as specific project objectives. Project descriptions must include discussion of proposal requirements as stated above under Proposal Guidelines, and may not exceed ten (10) pages.
 - Management Plan which includes Principal Investigator (PI) and project member roles (if applicable) and responsibilities, as well as appropriate biographical sketches.
 - Sustainability Plan that describes the strategy for sustaining progress resulting from proposed activities.
 - Evaluation and Assessment Plan that includes milestones and metrics designed to assess program impacts.
- Budget Page for the project (Appendix B). See Budget section below for specific instructions.
- Budget Explanation of estimated costs. Include support requested or available from other sources, including institutional, local, and federal agencies (maximum one page). The Budget Explanation should also describe how the requested funds will contribute to a more competitive follow-on grant proposal.
- Biographical Sketches of PI and other senior personnel involved in project (maximum two pages per individual; NSF format).
- Current and Pending Support of PI and other senior personnel involved in project, including title of project, sponsoring agency, period of support, amount, and percent effort for each investigator (Appendix C).

Budget

GEAR awards are non-renewable, must be expended no later than June 30, 2011, and may not exceed \$100,000 per proposal. **Indirect costs are not allowed**; however, they may be used to show a non-federal cost-share commitment. The GEAR Program is not designed to support the salaries of existing, senior key personnel. GEAR support may not be sub-contracted outside the state of South Carolina. All awards will be cost-reimbursable, and are governed by the federal cost principles for educational institutions (OMB Circular A-21).

Awardees should ensure that costs claimed under SC EPSCoR/IDeA grants are allowable and reasonable. Cost-share is encouraged, but not required. Any matching contributions from the institution or other sources should be listed in the budget and described in the budget explanation. Awardees are responsible for ensuring that costs of all sub-awards under SC EPSCoR/IDeA awards are subject to those cost principles and procedures appropriate to the sub-award type and organization involved.

Submission Instructions

Complete proposals, including a signed Cover Sheet and Budget Page, must be submitted no later than 5:00pm on Monday, March 29, 2010. Award periods of performance may vary, but should not extend beyond June 30, 2011.

All proposals must be submitted as: 1) a single MS Word or PDF file; 2) one printed and signed original; and 3) three printed copies to the South Carolina EPSCoR/IDeA Program. The electronic copies may be saved on a CD-ROM and mailed, along with the printed copies, to the address below.

South Carolina EPSCoR/IDeA Program
1330 Lady Street, Suite 504
Columbia, SC 29201

Incomplete or late submissions will not be accepted.

Submission of a complete proposal, including a signed Cover Sheet, signifies the applicant's agreement that the GEAR proposal will be released for external review. Reviews will be provided to the PIs, excluding the identity of the reviewer. Oversight for the review is provided by the State Committee of the SC EPSCoR/IDeA Program.

Proposal Selection

All proposals that meet the eligibility requirements and guidelines will be evaluated based upon the extent to which they meet specific criteria, including:

- Technical merit of the proposed project;
- Potential to generate mainstream, extramural support and peer-reviewed publications;
- Qualifications of project personnel;
- Likelihood of impact on institutional research culture;
- Alignment with the focus of the SC NSF EPSCoR RII Track-1 award (Appendix D);
- Reasonableness of budget; and
- Significant broader impact on the state's research enterprise (including research training and mentoring of undergraduate students, and involvement of underrepresented minorities: African-Americans, Pacific Islanders, Hispanics or Latinos, Native Americans, women, and/or persons with disabilities).

Please note that activities with access to traditional sources of support will not have funding priority.

Award and Reporting Requirements

Principal Investigators will receive notice of GEAR award/declination via e-mail.

Award recipients are required to provide the SC EPSCoR/IDeA state office with project data for evaluation and reporting purposes. Accordingly, the PI must submit a comprehensive GEAR Progress Report no later than sixty (60) days after the expiration of their award. Further instructions for the preparation and submission of progress reports will be sent to the PI within 30 days after the expiration of the award. Final invoices for reimbursement must be received by July 31, 2011.

The PI is responsible for providing the following:

- Progress reports, including an abstract summary of the supported activity, summary of expenditures, project plans for the future, and project achievements (grants, publications, presentations, etc.) **For a period of time after the expiration of the award, SC EPSCoR/IDeA will continue to contact the PI for outcome-related data such as grants, publications, etc.**
- One copy of submission confirmation page from the proposal resulting from the GEAR award. If an award is made, awardees should provide one copy of the award document(s) from the opportunity to which they submitted.
- Evidence of other outcomes of the project, including but not limited to: publications; presentations; patents; industry-university collaborations; and other partnerships.

Failure to provide any requested materials for award or evaluation purposes will constitute default under this program. In such cases, the SC EPSCoR/IDeA Program reserves the right to recover all previously expended funds issued under the related GEAR award and the right to refuse any future GEAR proposals for consideration of funding.

Contact Information

General inquiries regarding this program should be made to:

Isabel M. Sanchez
Project Coordinator
sanchez@scra.org

1000 Catawba Street
Columbia, SC 29201
Tel: 803.733.9060
Fax: 803.376.1721
www.scepscoridae.org



South Carolina Experimental Program to Stimulate Competitive Research and Institutional Development Awards

COVER SHEET FOR PROPOSAL

| | | | | | |
|--|----------------|---|--|--------------------------------------|--|
| SC EPSCoR/IDeA SOLICITATION NAME AND NUMBER | | | | DATE SUBMITTED | |
| IS THIS PROPOSAL BEING SUBMITTED TO ANOTHER AGENCY? <input type="checkbox"/> YES <input type="checkbox"/> NO IF YES, LIST NAME(S): | | | | | |
| NAME OF AWARDEE INSTITUTION (INSTITUTION OF PI) | | | ADDRESS OF AWARDEE ORGANIZATION, INCLUDING 9 DIGIT ZIP CODE | | |
| NAME OF COLLABORATING ORGANIZATION | | | ADDRESS OF PERFORMING ORGANIZATION, IF DIFFERENT, INCLUDING 9 DIGIT ZIP CODE | | |
| IS AWARDEE ORGANIZATION (Check All That Apply) <input type="checkbox"/> FOR-PROFIT ORGANIZATION <input type="checkbox"/> SMALL BUSINESS <input type="checkbox"/> MINORITY BUSINESS <input type="checkbox"/> WOMAN-OWNED BUSINESS EMPLOYER IDENTIFICATION NUMBER (EIN) OR TAXPAYER IDENTIFICATION NUMBER (TIN) | | | | | |
| TITLE OF PROPOSED PROJECT | | | | | |
| REQUESTED AMOUNT \$ | | PROPOSED DURATION (1-12 MONTHS) Months | | REQUESTED STARTING DATE | |
| TARGETED AGENCY OR ORGANIZATION (IF APPLICABLE) | | SUBTOPIC (IF APPLICABLE) | | FEDERAL PROPOSAL SUBMISSION DEADLINE | |
| CHECK APPROPRIATE BOX(ES) IF THIS PROPOSAL INCLUDES ANY OF THE ITEMS LISTED BELOW <input type="checkbox"/> PROPRIETARY & PRIVILEGED INFORMATION <input type="checkbox"/> VERTEBRATE ANIMALS <input type="checkbox"/> HUMAN SUBJECTS <input type="checkbox"/> HAZARDOUS MATERIALS INCLUDING REGULATED BIOLOGICAL MATERIALS AND/OR RADIOACTIVE AND/OR OTHER REGULATED CHEMICALS/MATERIALS <input type="checkbox"/> INTERNATIONAL COOPERATIVE ACTIVITIES: COUNTRY/COUNTRIES INVOLVED _____ | | | | | |
| NAME | HIGHEST DEGREE | YEAR OF DEGREE | TELEPHONE NUMBER | EMAIL ADDRESS | |
| PI | | | | | |
| Co-PI | | | | | |
| Co-PI | | | | | |
| Co-PI | | | | | |
| PI DEPARTMENT | | | PI MAILING ADDRESS | | |
| PI FAX NUMBER | | | | | |

CERTIFICATION PAGE

Certification for Principal Investigators and Co-Principal Investigators

I certify to the best of my knowledge that:

- (1) The statements herein (excluding scientific hypotheses and scientific opinions) are true and complete; and
- (2) The text and graphics herein as well as any accompanying publications or other documents, unless otherwise indicated, are the original work of the signatories or individuals working under their supervision. I agree to accept responsibility for the scientific conduct of the project and to provide the required project reports if an award is made as a result of this proposal. I understand that the willful provision of false information or concealing a material fact in this proposal or any other communication submitted is a criminal offense (U.S.Code, Title 18, Section 1001).

| Name (Typed) | Signature | Date |
|--------------|-----------|------|
| PI | | |
| Co-PI | | |
| Co-PI | | |
| Co-PI | | |

Certification for Authorized Organizational/Institutional Representative

By signing and submitting this proposal, the individual applicant or the authorized official of the applicant firm or company certifies that:

- (1) The statements made herein are true and complete to the best of their knowledge;
- (2) It agrees to accept the award terms and conditions and should these terms not be met, to negotiate a fair and reasonable plan to reimburse the South Carolina EPSCoR/IDeA Program/South Carolina Research Authority for expenditures incurred under the award;
- (3) The organization or its principals are not presently disbarred, suspended, proposed for disbarment, declared ineligible, or voluntarily excluded from covered transactions by any Federal or State department or agency;
- (4) The organization is not delinquent on any Federal or State debt;
- (5) The organization operates as a drug-free workplace;
- (6) Will comply with all Federal statutes relating to nondiscrimination. These include but are not limited to: Title VI of the Civil Rights Act of 1964 (P.L. 88-352, Title IX of the Education Amendments of 1972, as amended (20 U.S.C. § 1681-1683, and 1685-1686), Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. § 794), the Age Discrimination Act of 1975, as amended (42 U.S.C. § 6101-6107);
- (7) No funds will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of a Member of Congress in connection with the awarding of any Federal contract, grant, loan or cooperative agreement;
- (8) Submission of a complete proposal, including a signed Cover Sheet and Budget Page, signifies the applicant's agreement to release the proposal for external review; and
- (9) Failure to submit a proposal to the targeted agency or organization as listed on page 1 of the Cover Sheet will constitute DEFAULT under the related program. Further, SC EPSCoR/IDeA reserves the right to recover all previously expended funds issued under the related award and the right to refuse any future proposals for SC EPSCoR/IDeA funding.

| Name (Typed) | Signature | Date |
|------------------|------------|---------------|
| | | |
| Telephone Number | Fax Number | Email Address |
| | | |

1000 Catawba Street
 Columbia, SC 29201
 Tel: 803.733.9060
 Fax: 803.376.1721
 www.scepscoridae.org



South Carolina Experimental Program to Stimulate Competitive Research and Institutional Development Awards

BUDGET PAGE

| | | | | | | |
|---|-------------------------------|----|----|----------------------------------|----------------------------|-------|
| INSTITUTION | | | | | | |
| PRINCIPAL INVESTIGATOR | | | | | | |
| A. SENIOR PERSONNEL: PI/PD, Co-PI's. Faculty and other Senior Associates(List each separately with title) | EPSCoR/IDeA FUNDED PERS. MOS. | | | FUNDS REQUESTED FROM EPSCoR/IDeA | NON-FEDERAL MATCHING FUNDS | TOTAL |
| | CL | AC | SU | | | |
| 1. | | | | | | |
| 2. | | | | | | |
| 3. | | | | | | |
| 4. | | | | | | |
| 5. | | | | | | |
| 6. () OTHERS (LIST INDIVIDUALLY) | | | | | | |
| 7. () TOTAL SENIOR PERSONNEL (1-6) | | | | | | |
| B. OTHER PERSONNEL (SHOW NUMBERS IN BRACKETS) | | | | | | |
| 1. () POST DOCTORAL ASSOCIATES | | | | | | |
| 2. () OTHER PROFESSIONALS (TECHNICIAN, PROGRAMMER, ETC.) | | | | | | |
| 3. () GRADUATE STUDENTS | | | | | | |
| 4. () UNDERGRADUATE STUDENTS | | | | | | |
| 5. () SECRETARY CLERICAL | | | | | | |
| 6. () OTHER | | | | | | |
| TOTAL SALARIES AND WAGES (A+B) | | | | | | |
| C. FRINGE BENEFITS (IF CHARGED AS DIRECT COSTS) | | | | | | |
| TOTAL SALARIES, WAGES AND FRINGE BENEFITS (A+B+C) | | | | | | |
| D. PERMANENT EQUIPMENT (LIST ITEM AND DOLLAR AMOUNT FOR EACH ITEM EXCEEDING \$1,000) | | | | | | |
| TOTAL PERMANENT EQUIPMENT | | | | | | |
| E. TRAVEL 1. DOMESTIC (INCL. CANADA AND U.S. POSSESSIONS) | | | | | | |
| 2. FOREIGN | | | | | | |
| TOTAL TRAVEL | | | | | | |
| F. PARTICIPANT SUPPORT COSTS | | | | | | |
| TOTAL PARTICIPANT COSTS | | | | | | |
| G. OTHER DIRECT COSTS | | | | | | |
| 1. MATERIALS AND SUPPLIES | | | | | | |
| 2. PUBLICATION COSTS/DOCUMENTATION/DISSEMINATION | | | | | | |
| 3. CONSULTANT SERVICES | | | | | | |
| 4. COMPUTER (ADP) SERVICES | | | | | | |
| 5. SUBCONTRACTS | | | | | | |
| 6. OTHER | | | | | | |
| TOTAL OTHER DIRECT COSTS | | | | | | |
| H. TOTAL DIRECT COSTS (A THROUGH G) | | | | | | |
| I. INDIRECT COSTS (SPECIFY) | | | | | | |
| TOTAL INDIRECT COSTS | | | | | | |
| J. TOTAL DIRECT AND INDIRECT COSTS (H+I) | | | | | | |
| K. AMOUNT OF ANY REQUIRED COST-SHARING FROM NON-FEDERAL SOURCES | | | | | | |
| L. TOTAL COST OF PROJECT (J + K) | | | | | | |
| PRINCIPAL INVESTIGATOR - TYPED NAME AND SIGNATURE | | | | DATE | | |
| AUTHORIZED ORGANIZATIONAL/INSTITUTIONAL REPRESENTATIVE - TYPED NAME AND SIGNATURE | | | | DATE | | |

NSF EPSCOR RII TRACK-1 PROJECT SUMMARY

The South Carolina 2009 NSF EPSCoR RII Track-1 proposal presents an integrated plan to implement a statewide vision that will give South Carolina a competitive edge in the field of biofabrication — an emerging *‘transforming’* technology — operationally defined as computer-aided, layer-by-layer deposition of biologically-relevant material with the purpose of engineering functional 3D tissues and organs. Challenges lie on both the engineering and biological sides. Biology-based questions relate to identifying cell sources, optimizing hydrogels for cell growth and differentiation, and designing “blueprints” for computer-aided printing of functional tissues. A major challenge remains in achieving *vascularization* and maintaining viability of the printed construct. Without a vascular supply, thickness of tissue constructs is limited to four cell layers or less. To proceed to true organ level, one must successfully engineer a vascular supply, which requires creating a branching 3D tree-like construct. This challenge is the subject of the South Carolina Project and the research theme of the 2009 NSF EPSCoR RII Track-1 proposal.

The proposed Research Plan to engineer a 3D vascular tree is divided into five scientific “thrust” areas. All require enabling infrastructure in terms of content expertise and technology systems. Thrust I focuses on analysis of structural-functional properties of an authentic (natural) branched vascular tree. Anticipated research milestones include a computer-aided design or simulation of a natural branched vascular tree based on the acquisition of detailed data inputs from histological, morphometric and immunohistochemical analyses of sequential segments, and biomechanical testing of sequential segments from a natural branched vascular tree. Thrust II focuses on directed differentiation of adult stem cells into monomer units of vascular cell types, specifically to induce stem cells isolated from fat tissue to enter a smooth muscle cell lineage. Thrust III requires functional biomechanical testing of engineered, sequential segments and comparison to naturally occurring (authentic) branched vascular trees. This requires an enabling technology for the scalable production of standard sized, vascular tissue spheroids having a single lumen surrounded by endothelial cells and smooth muscle cells. Thrust IV is biofabrication of a branched vascular tree, or creating linear 3-D, hollow tubular segments representing branches that can be transformed into branched “Y” or “T” vascular units. Thrust V focuses on accelerated tissue maturation of bioprinted, branched vascular tubes. This requires clever design and fabrication of a perfusion bioreactor, as well as evidence that one or more candidate maturogens can accelerate tissue maturation (e.g. growth factors, extracellular matrix or cytokines). Thus, the scientific theme of the RII is broadly based and includes stem cell biology, cell and developmental biology, molecular biology, tissue engineering, extracellular matrix, biomathematics, chemical and mechanical engineering.

The 2009 SC NSF EPSCoR RII focuses on a diverse subset of institutions including 3 research intensive institutions, 3 HBCUs (1 public and 2 private) and 2 other PUIs (1 private and 1 public), with outreach to 2 technical colleges. Together this will form an alliance for tissue biofabrication. The research infrastructure improvement strategies include: (1) engaging a diverse group of institutions that bring complementary approaches to research, education, training and production of South Carolina’s future STEM workforce; (2) recruiting 22 new tenure-track faculty at Claflin, Furman, MUSC, USC and USC-Beaufort, and Voorhees with interests and expertise in one or more of the enabling biofabrication technologies; (3) identifying and mentoring “target” junior faculty who can enhance the potential to successfully implement the SC Project; (4) creating a local and global virtual e-community that will facilitate and hasten the development of sophisticated databases on the vascular tree; (5) creating academic-industrial collaborations needed to overcome the major challenges of biofabrication; (6) integrating statewide initiatives for education, outreach, and communication to the general public; and (7) expanding a current bioprinting program at MUSC into an Advanced Tissue Biofabrication Center that will serve as the S&T hub and sustainable center.

Efforts directed towards strengthening STEM research and education in SC’s graduate and undergraduate institutions and technical colleges, and interfacing with K-12/pre-college level programs, are critical for building SC’s workforce and economy. Proposed RII activities support postdoctoral and graduate research training at Claflin, Clemson, Furman, MUSC, and USC. A new Masters program in Biorobotics and Biofabrication is in development at SC State University. Two 2+2 degree programs between Claflin and Greenville Technical College, and Voorhees and Denmark Technical College, will be supported with appropriate outreach to the K-12 sector.

The integrated 2009 RII plan includes diversity, cyberinfrastructure improvements, outreach and communication, sustainability, management, accountability and evaluation. The South Carolina Light Rail will be expanded to provide statewide high speed, high capacity linkage to regional, national and international cyber-networks and support collaborative e-communities in S&T and education. An Innovative Integration Board will advise, design, implement and review activities that bridge SC’s minority serving programs and integrate with the science, education, communication and sustainability programs of the RII. Educational innovations include development of e-textbooks and new curricula to recruit and train a diverse 21st century workforce. A novel outreach activity will expand the capacity of South Carolina’s reporters, journalists and journalism students to understand and report complex S&T developments and enhance science literacy statewide. The sustainability plan outlines specific approaches to obtain mainstream grants for research, training and technology development, as well as activities for mentoring, career development and technology transfer. An integrated, multi-year evaluation approach will measure progress towards goals, document outcomes and transformative results, and identify areas for improvement. An RII management team and External Advisory and Review Board will ensure implementation of the South Carolina Project and assist the South Carolina EPSCoR/IDeA Committee and its staff in meeting the overarching requirements for accountability and substantive impact.