Kentucky Space Grant Consortium
2017-2018 Request for Proposals

Announcement: RFP-18-001

Release Date: September 11, 2017

Proposals Due: Thursday, October 19, 2017, 4:30 pm ET
Proposal files submitted online at nasa.engr.uky.edu

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Proposal forms, FAQ, and additional information available:
nasa.engr.uky.edu/space-grant and
nasa.engr.uky.edu/requests-for-proposals

Kentucky Space Grant Consortium 2017-2018 Request for Proposals

NASA Kentucky Space Grant Consortium Overview

The NASA Kentucky Space Grant Consortium is a NASA Higher Education program supporting student fellowships/scholarships, research initiation, and workforce development in STEM areas of interest to NASA and Kentucky. Space Grant promotes networking and cooperation among education, industry, and local, state, and federal government. Recruitment and training of US citizens, especially women, underrepresented minorities and persons with disabilities, for careers in aerospace science and technology is a national priority. The NASA Kentucky Space Grant Consortium supports Kentucky faculty, students, and outreach through the award programs in this RFP that address the national interests of NASA and the state needs of Kentucky.

Request for Proposals

NASA Kentucky invites proposal submissions from Kentucky Space Grant Consortium affiliates for the following:

Graduate Fellowship (GF), **Undergraduate Fellowship** (UF), **Team Fellowship** (TF),
Research Initiation (RIA), **Mini-Grant** (MG), and **Enhanced Mini-Grant** (EMG) awards.

Deadline: Proposal files submitted online at nasa.engr.uky.edu by **4:30 pm ET, Thursday, October 19, 2017**.

Period of Performance: Awards up to one year in the period January 1, 2018 to December 31, 2018.

Program Descriptions: Listed on pgs 11-16 of this RFP. New program requirements ***highlighted in red***.

Number of Awards: Number of awards in each program category are determined by sizes of the individual awards and available program funding levels. PIs are limited to one proposal submission per program category.

Submission Instructions

Proposal forms are available at nasa.engr.uky.edu/requests-for-proposals/forms. All proposals must be submitted via the NASA KY website as PDF files. Please title proposal documents according to the specified file naming convention, in which **PI** is the last name of proposer and **PGM** is the program category abbreviation (see Table 1).

- ☐ *SIGNED COVER PAGE:* Scan the signed original and save as PDF
  (File name format: **PI_PGM**_Cover_2018.pdf)
- ☐ *BUDGET FORM AND JUSTIFICATION:* Include justification detailing requested support and cost-share
  (File name format: **PI_PGM**_Budget_2018.pdf)
- ☐ *PROJECT DESCRIPTION:* (File name format: **PI_PGM**_Project_2018.pdf)
  - o 12 point font, 1 inch margins, single spaced
  - o 5 page limit - See specific program category guidelines for required content
  - o Additional pages - See specific program category guidelines for lists of documents
- ☐ *STUDENT INFORMATION FORM (SIF):* Include with GF and UF projects
  (File name format: **SLN_PGM**_SIF_2018, where **SLN** is the student's last name.)

Submit proposals online at nasa.engr.uky.edu by **4:30 pm ET, Thursday October 19, 2017**.

Additional information and FAQ: nasa.engr.uky.edu/space-grant

General Guidelines: Proposals that omit required materials or that exceed page limits may be rejected without review. Proposals from PIs who are delinquent in meeting reporting requirements on current or prior NASA Kentucky awards may be rejected without review. Failure to complete proposed work on prior NASA Kentucky projects will be taken into consideration in selecting proposals. By submitting to this RFP, the proposer acknowledges that NASA Kentucky reserves the right to request backup financial information at any time during the course of an awarded project.

- *Equipment* may not be purchased or used as cost-share in any NASA Kentucky award under this RFP.
- *Travel* funds are restricted to domestic travel only.
- *Cost-share* must be from non-Federal sources.

Eligibility for Space Grant Awards: Proposals will be accepted from NASA Kentucky Space Grant Consortium Affiliate Institutions. Affiliate Institutions are listed on pg. 6 and also may be found at nasa.engr.uky.edu/space-grant. Per NASA training grant guidelines, US citizenship is required for students and faculty receiving direct support or reporting effort as cost-share. Reporting on current and prior awards must be up to date to be eligible for funding under this announcement. PIs are limited to one proposal submission per program category.

Affiliate Participation: Academic affiliates in the NASA Kentucky Space Grant Consortium are eligible for all programs. Non-profit and Industry affiliates can participate in partnership with Academic affiliates or can propose directly involving students of various educational levels via Mini-Grant, Enhanced Mini-Grant, Team Fellowship, and Undergraduate Fellowship programs.

Cost-Share: The NASA Office of Education requires cost-share of all state Space Grant consortia, therefore most NASA Kentucky Space Grant Consortium programs require cost-share. Cost-share must be from non-Federal sources. Students and faculty receiving direct support or reporting effort as cost-share must be US citizens.

F&A Rates: Space Grant is a workforce development program and it is important to propose projects that are well-aligned with the intent of the program, ie. projects that will emphasize science, technology, engineering and math (STEM) and recruit and train US citizens for careers in aerospace-related science and technology. In line with this program, proposing universities and colleges should use an "other" or training grant F&A rate (if one exists) versus a research F&A rate. No F&A is permitted on fellowships (GF, UF, TF) as directed by the NASA Office of Education: "It is a policy of the Space Grant program that neither management fees nor indirect costs shall be charged to NASA stipends, internships, fellowships, or scholarships (NIFS)."

Reporting Requirements: Principal Investigators (PIs) are required to report research productivity and students supported: 1) during the award period, 2) within 30 days of the end of the award (final technical report), and 3) annual update 1 year post award. Reporting must be current in order for NASA KY to meet NASA and state annual report cycles. Quarterly updates to project reporting are encouraged. Requests for no-cost extensions must include a status report on all tasks listed in the proposal.

Award Processing: All subaward invoices must show appropriate documentation of cost share in relation to expenses. Invoices for subawards made under this RFP must be submitted via the new University of Kentucky Online Subaward Invoicing system.

Attribution: Publications, posters, and presentations resulting from awards made under this RFP should include an attribution statement acknowledging NASA KY support. Example: "*The material is based upon work supported by NASA Kentucky under NASA award No: NNX15AR69H.*"

Table 1. Summary of NASA Kentucky Space Grant Consortium Programs

Funding Source	Award Program Category[1]	Program Acronym	Program Description	US Citizen Required[2]	Max Award	Indirect Costs Allowed	Required Cost-Share ($CS:$Award)	Level of NASA Collaboration
Space Grant	Graduate Fellowships	**GF**	Salary or stipend, tuition, materials and travel for MS and PhD students to conduct NASA-aligned research	Yes	$45,000	No	1:1 including 12.5% faculty FTE[6]	NASA letter of support[3]
Space Grant	Undergraduate Fellowships	**UF**	Salary or stipend, materials and travel for undergrad students to conduct NASA-aligned research	Yes	$6,000	No	None required	Use of NASA resources[4]
Space Grant	Team Fellowships	**TF**	Materials and travel for student teams participating in NASA-related competitions	Yes	$10,000	No	0.5:1	Alignment with NASA objectives[5]
Space Grant	Research Initiation Awards	**RIA**	Faculty directed research to explore NASA collaborations and NASA-aligned research topics	Yes	$15,000	Yes	1:1	NASA letter of support[3]
Space Grant	Mini-Grants	**MG**	Pre-college and science center outreach activities, targeted recruiting and teacher PD	Yes	$5,000	Yes	None required	Alignment with NASA objectives[5]
Space Grant	Enhanced Mini-Grants	**EMG**	Priority given to projects aligned with NASA Kentucky Strategic Themes or NASA Emphases	Yes	$15,000	Yes	1:1	Alignment with NASA objectives[5]

Note: Full Program Descriptions are listed on pgs 11-16 of this RFP, with new program requirements highlighted in red.

[1] *PIs are limited* to one proposal submission per program category.

[2] *US Citizenship* required for students and faculty receiving direct support or reporting effort as cost-share.

[3] *Letter of support* required that commits NASA partnership or collaboration to the project. Letters of support *do not* include letters of affirmation (i.e., letters that only endorse the value or merit of a proposal). Letters of support may be from NASA or affiliated organizations including NASA Institutes/Laboratories such as JPL, Space Telescope Science Institute, National Space Biomedical Institute, CASIS, and others. (See NASA KY FAQ for more information about NASA letters of support.)

[4] *NASA resources* include facilities and collaborators or other resources such as datasets, modeling, source code, curricula, images, etc. developed and made available to the public or researchers by NASA. Links to NASA research results including NASA PubSpace and NASA Data Portal are available at: http://www.nasa.gov/open/researchaccess .

[5] *See following sections* for description of NASA Education and Research objectives.

[6] *Level of faculty full-time equivalent (FTE)* may be limited by institutional or unit policies or practices.

Review Process

Proposals will be rated, ranked, and funded up to the budgeted amount available for each program. NASA KY Space Grant Affiliate Representatives and external content specialists will review proposals and rate the technical content as Definitely Fund, Fund if Possible, or Do Not Fund (Review Criteria). Proposals will be reviewed for budget compliance and programmatic alignment by NASA Kentucky staff. As a panel, the reviewers will recommend proposals for funding to the NASA Kentucky Director. Past reporting and accomplishments will be considered in evaluation of proposals. To avoid conflicts of interest, alternate reviewers may be recruited.

Proposals will be reviewed and rated based on the following criteria:

- SCIENCE: Scientific merit and implementation; NASA mission and research relevance (30%)
- TECHNICAL: Technical merit and feasibility, including cost risk (30%)
- PROGRAMMATIC: Management and evaluation; successful and timely completion of prior proposed NASA Kentucky projects and reporting; alignment with Kentucky Space Grant Consortium Strategic Themes and NASA Education Areas of Emphasis (30%)
- BUDGET: Reasonableness of budget narrative (10%)

Program Alignment and Collaboration

Proposals should align with goals and objectives of the NASA Kentucky Space Grant Program, NASA Education Office and the agency's missions and research, as well as the interests of the state of Kentucky. NASA Kentucky Space Grant programs encourage increasing levels of involvement with NASA, from base alignment with NASA objectives for TF and MG programs, use of NASA resources for the UF program, progressing to a letter of support from a NASA collaborator for GF and RIA. See Table 1, program descriptions, and the following for more information on NASA and programmatic alignment.

Kentucky Science and Technology Strategic Plan

Kentucky has undergone an extensive effort to evaluate and produce a science and technology strategic plan, the 2012 Kentucky Science and Innovation Strategy. Five high-value areas are identified with strong potential to build innovation capacity in the Commonwealth: 1. Agriculture and Bioscience, 2. Energy and Environmental Technologies, 3. Human Health and Personalized Medicine, 4. Information Technology and New Media, and 5. Material Science and Advanced Manufacturing. The strategy also acknowledges that relevant high-value R&D often spans multiple areas, as is the case for aerospace research. The strategy further defines actions to catalyze investment in high-value areas and to build industry/academic partnerships for STEM workforce development, which overlap both NASA Kentucky Space Grant and EPSCoR priorities. NASA Kentucky Space Grant Consortium receives state support through the Kentucky EPSCoR Program, UK, and affiliate committed institutional cost-share.

National NASA Space Grant Program Goal and Objectives

The national goal of Space Grant is to contribute to the nation's science enterprise by funding education, research, and informal education projects through a national network of university-based Space Grant consortia:

- Establish and maintain a national network of universities with interests and capabilities in aeronautics, space and related fields.
- Encourage cooperative programs among universities, aerospace industry, and Federal, state and local governments.
- Encourage interdisciplinary training, research and public service programs related to aerospace.
- Recruit and train U.S. citizens, especially women, underrepresented minorities, and persons with disabilities, for careers in aerospace science and technology.
- Promote a strong STEM education base from elementary through secondary levels while preparing teachers in these grade levels to become more effective at improving student academic outcomes.

NASA Kentucky Space Grant Consortium Program Elements

NASA Internships, Fellowships, and Scholarships (NIFS): Higher education is the top priority of NASA's Space Grant Program. NASA seeks to promote science, technology, engineering and mathematics (STEM) education; encourage interdisciplinary training, research and public service programs related to aerospace; and recruit and train US citizens for careers in aerospace science and technology. Under the NIFS program element, NASA Kentucky offers the **Graduate Fellowship** (GF), **Undergraduate Fellowship** (UF), and **Team Fellowship** (TF) programs in this RFP (see pgs. 11-13).

Research Infrastructure: Alignment with NASA interests and meaningful collaborations with NASA scientists are essential to the development of competitive proposals for Federal funding opportunities. Under the Research Infrastructure program element, NASA Kentucky offers the **Research Initiation Award** (RIA) program (see pg. 14).

Pre-college and Informal Education: Pre-college and informal education activities supported by the NASA Space Grant Program help fill the higher education pipeline with well-prepared, inspired and engaged students motivated to pursue their degrees. NASA seeks to promote science, technology, engineering and mathematics (STEM) education; encourage interdisciplinary training, research and public service programs related to aerospace; and recruit and train US citizens for careers in aerospace science and technology. Under the Pre-College and Informal Education program elements, NASA Kentucky offers **Mini-Grant** (MG) and **Enhanced Mini-Grant** (EMG) programs (see pgs. 15-16).

NASA Kentucky Space Grant Consortium Strategic Themes

In January 2015, a Consortium strategic planning session was conducted for the NASA Kentucky Space Grant program and identified three themes for the 2016-2018 program cycle:

TOTAL SOLAR ECLIPSE 2017: August 21, 2017 presented a unique opportunity for science, public education, and inspiration. People from Oregon to South Carolina witnessed a total solar eclipse, something not seen in the eastern United States since 1970 and not since 1869 in Kentucky. Eclipse totality traversed a swath of western Kentucky, with an area just west of Hopkinsville seeing the point of greatest eclipse nationwide. This theme also includes long-range preparation for a second total solar eclipse touching western Kentucky in 2024.

BIG DATA: Addressing cross-cutting technology issues of "Big Data" is imperative to the future of many research fields as investigators find themselves challenged with analyzing and managing exponentially growing datasets. Kentucky space science researchers are pursuing exo-solar discovery, space-based astronomy, and ground-based astronomy that increasingly involve manipulating very large datasets. Other Kentucky researchers have research directions in earth science, atmospheric science, and meteorology that also produce large amounts of data, capture inputs from distributed sensor networks, and/or analyze satellite data over time.

APPLIED AEROSPACE: "Applied Aerospace" enables NASA Kentucky to emphasize notable trends among the state's aerospace industry, including Kentucky's role as a national manufacturing leader for aerospace products exports, and to support prominent technical and research expertise among faculty and entrepreneurs in engineering, biomedicine, space science, nanotech, physics, energy, and more. This theme advances Kentucky's many aerospace-related research and training specialties and captures growing student interest in NASA's progress to innovate the nation's aviation system, build the deep space SLS rocket, and commercialize space flight and satellite missions to low-Earth orbit and beyond. Students at Consortium institutions have the opportunity to perform aerospace research in areas such as thermal protection systems for spacecraft, ISS experimentation, space science, small satellites, UAV research, long-duration space travel, aviation studies and research, advanced manufacturing, robotics, and nanotechnology, as well as to complete NASA internships.

NASA Kentucky Space Grant Consortium Membership

The Kentucky Space Grant Consortium consists of 17 academic affiliates and 7 non-academic affiliates across the Commonwealth. Affiliate institutions and contact information for affiliate representatives are listed below:

Academic Affiliates

Ashland CTC	Mark Riggs	mark.riggs@kctcs.edu	606-326-2161
Bellarmine University	Dr. Akhtar Mahmood	amahmood@bellarmine.edu	502-272-7599
Berea College	Dr. Tracy Hodge	tracy_hodge@berea.edu	859-985-3301
Bluegrass CTC	Tammy Liles	tammy.liles@kctcs.edu	859-246-6449
Centre College	Dr. Jim Kelly	james.kelly@centre.edu	859-238-5915
Eastern Kentucky University	Dr. Anthony Blose	anthony.blose@eku.edu	859-622-1521
Hopkinsville CC	Sherry McCormack	smccormack0001@kctcs.edu	270-707-3930
Kentucky State University	Dr. Robert Mania	robert.mania@kysu.edu	502-597-6071
Morehead State University	Dr. Tom Pannuti	t.pannuti@moreheadstate.edu	606-783-9591
Murray State University	Dr. Aleck Leedy	aleedy@murraystate.edu	270-809-4917
Northern Kentucky University	Dr. Scott Nutter	nutters@nku.edu	859-572-5369
Owensboro CTC	Shawn Payne	shawn.payne@kctcs.edu	270-686-3789
Thomas More College	Dr. Wes Ryle	wesley.ryle@thomasmore.edu	859-344-3367
University of Kentucky	Dr. Janet Lumpp	jklumpp@uky.edu	859-257-4985
University of Louisville	Dr. John Kielkopf	john.kielkopf@louisville.edu	502-852-5990
University of Pikeville	Dr. Maiyon Park	maiyonpark@upike.edu	606-218-5417
Western Kentucky University	Dr. Mike Carini	mike.carini@wku.edu	270-745-6198

Non-Academic Affiliates

Aviation Museum of Kentucky	Ed Murphy	em1234@twc.com	859-494-3669
Innoviator, LLC	Alan Beaven	alan@innoviator.com	502-316-4750
Kentucky Science and Technology Corporation	Kris Kimel	kkimel@kstc.com	859-246-3223
Kentucky Science Center	Kim Hunter	kim.hunter@louisvilleky.gov	502-560-7175
Kentucky Space, LLC	Twyman Clements	tclements@kentuckyspace.com	859-229-2719
Living Arts and Science Center	Katherine Bullock	kbullock@lasclex.org	606-218-5427
Tribo Flow Separations, LLC	Dr. John Stencel	john@triboflow.com	859-523-8782

NASA Education Strategic Goals and Objectives (from 2014 NASA Strategic Plan)

NASA Strategic Objective 2.4[1]*:* Advance the Nation's STEM education and workforce pipeline by working collaboratively with other agencies to engage students, teachers, and faculty in NASA's missions and unique assets. This Strategic Objective clearly points to the NASA Office of Education as a vital entity in the accomplishment of the NASA Vision: *We reach for new heights and reveal the unknown for the benefit of humankind.*

NASA Office of Education has established next steps for Strategic Objective 2.4 with near-term milestones that set the foundation for achievement of this objective. These milestones include, but are not limited to:

- Create a portfolio of projects consistent with the Federal 5-Year STEM Education Strategic Plan issued by the Office of Science and Technology Policy Committee on STEM Education;
- Ensure that NASA Education efforts are anchored to evidence-based strategies in their design and implementation; and,
- Enhance reporting capabilities for NASA Education's data collection applications.

NASA Education Lines of Business[2]

Primary priorities for Space Grant:

1. NASA internships, fellowships, and scholarships (NIFS) –
   - NASA Internships, Fellowships, and Scholarships (NIFS) leverage NASA's unique missions and programs to enhance and increase the capability, diversity, and size of the Nation's future STEM workforce. NASA continues to invest in the nation's STEM learners by providing opportunities that will launch a new era of learning, innovation, and achievement.

     NASA Internships are competitive awards to support educational work opportunities that provide unique NASA-related experiences for educators and high school, undergraduate, and graduate students. These opportunities engage students with real-world experiences while contributing to the operation of a NASA facility or the advancement of NASA's missions.

     NASA Fellowships are designed to support independently conceived or designed research, or senior design projects by highly qualified faculty, undergraduate, and graduate students, in disciplines needed to help advance NASA's missions, thus affording them the opportunity to directly contribute to advancements in STEM-related areas of study. Fellowship opportunities are focused on innovation and generate measurable research results that contribute to NASA's current and future science and technology goals.

     NASA Scholarships provide financial support to undergraduate and graduate students for studies in STEM disciplines to inspire and support the next generation of STEM professionals.

2. Institutional Engagement (IE) –
   - Institutional Engagement (IE) increases STEM capabilities at formal and informal educational institutions and organizations by incorporating content based on NASA's missions.

     NASA Institutional Engagement builds the capacity of formal and informal education institutions to participate in NASA's mission. IE improves their capabilities to gain support from external sources; fosters

[1] https://www.nasa.gov/sites/default/files/files/FY2014_NASA_SP_508c.pdf
[2] http://www.nasa.gov/sites/default/files/atoms/files/nasa_education_implementation_plan_2015-2017.pdf

interactions between NASA Centers/JPL, academic institutions, and industry; and expands the diversity and geographic representation of institutions nationwide. The institutions and organizations that fit in the IE model cover a diverse spectrum, from academic institutions of higher learning to museums with a STEM focus to national organizations dedicated to improving and enhancing STEM education. Consequently, both formal and informal education entities are significant stakeholders in and collaborators with NASA Education.

NASA Institutional Engagement supports colleges and universities by helping them gain access to cutting-edge engineering and science facilities and personnel. IE also enables informal institutions, such as museums, planetaria, and science centers, to engage their visitors through exhibits and displays that showcase NASA's dynamic content.

NASA Institutional Engagement supports the advancement and development of STEM personnel, programs, and infrastructure to enable formal and informal institutions to conduct NASA-related research and/or deliver NASA-related STEM content. The opportunities IE provides capitalize on the strengths and resources of the agency, including its scientists, engineers, other technical staff, and world-class facilities.

Secondary priorities for Space Grant:

3. STEM engagement (SE) –
   - STEM Engagement (SE) activities are designed to provide opportunities for participatory and experiential learning activities that connect learners to NASA-unique resources. STEM Engagement activities are based on best practices in motivation, engagement, and learning in formal and informal settings such as Public Education Activities, Experiential Learning Opportunities, and STEM Challenges.

4. Educator Professional Development (EPD) –
   - Educator Professional Development (EPD) uses NASA's missions, education resources, and unique facilities to provide high-quality STEM content and hands-on learning experiences to in-service, pre-service and informal educators. EPD provides educators with the knowledge, skills, and ability to deliver unique STEM content to learners who will ensure the economic growth and competitiveness of our nation.

NASA Education Priorities – Current Areas of Emphasis

NASA has articulated the following emphases for its education programs:

- **E1**. NASA internships, fellowships, and scholarships (NIFS)
- **E2**. Authentic, hands-on student experiences in science and engineering disciplines- the incorporation of active participation by students in hands-on learning or practice with experiences rooted in NASA-related, STEM-focused questions and issues; the incorporation of real-life problem-solving and needs as the context for activities.
- **E3.** Engage middle school teachers in hands-on curriculum enhancement capabilities through exposure to NASA scientific and technical expertise. Capabilities for teachers to provide authentic, hands-on middle school student experiences in science and engineering disciplines.
- **E4.** Summer opportunities for secondary students on college campuses with the objective of increased enrollment in STEM disciplines or interest in STEM careers.
- **E5.** Community Colleges - develop new relationships as well as sustain and strengthen existing institutional relationships with community colleges.

- **E6.** Aeronautics research - research in traditional aeronautics disciplines; research in areas that are appropriate to NASA's unique capabilities; directly address the fundamental research needs of the Next Generation Air Transportation System (NextGen).
- **E7.** Environmental Science and Global Climate Change - research activities to better understand Earth's environments.
- **E8.** Enhance capacity of institutions to support innovative research infrastructure activities to enable early-career faculty to focus their research toward NASA priorities.
- **E9.** Diversity of institutions, faculty, and students (gender, underrepresented, and underserved).

NASA Research and Technology Development Priorities

The NASA Office of Education identifies research and technology priorities based on alignment with NASA's Mission Directorates. The Aeronautics Research Mission Directorate (ARMD), Human Exploration and Operations Mission Directorate (HEOMD), Science Mission Directorate (SMD), and the Space Technology Mission Directorate (STMD) identify their priorities on the NASA website http://www.nasa.gov/about/directorates/index.html. For information on all of NASA's missions, please visit http://www.nasa.gov/missions/index.html.

NASA Mission Directorate (MD) Descriptions

Aeronautics Research Mission Directorate (ARMD) conducts vital research to make air travel more efficient, safe, sustainable, and to uncover leading-edge solutions for the Next Generation Air Transportation System (NextGen) in the United States. ARMD's fundamental research in traditional aeronautical disciplines and emerging disciplines helps address substantial noise, emissions, efficiency, performance, and safety challenges that must be met in order to design vehicles that can operate in the NextGen. NASA aeronautics has made decades of contributions to aviation. Nearly every aircraft today has a NASA-supported technology on board that helps the vehicle fly more safely and efficiently. Aeronautics research continues to play a vital supporting role to air travel and commerce by enabling game-changing technologies and innovation that allows the U.S. aviation industry to continue to grow and maintain global competitiveness. (www.aeronautics.nasa.gov)

Human Exploration and Operations Mission Directorate (HEOMD) provides the Agency with leadership and management of NASA space operations related to human exploration in and beyond low-Earth orbit. HEO also oversees low-level requirements development, policy, and programmatic oversight. The International Space Station represents the NASA exploration activities in low-Earth orbit. Exploration activities beyond low-Earth orbit include the management of Commercial Space Transportation, Exploration Systems Development, Human Space Flight Capabilities, Advanced Exploration Systems, and Space Life Sciences Research & Applications. The directorate is similarly responsible for Agency leadership and management of NASA space operations related to Launch Services, Space Transportation, and Space Communications in support of both human and robotic exploration programs. (www.nasa.gov/directorates/heo/home/index.html)

Science Mission Directorate (SMD) leads the Agency in four areas of research: Earth Science, Heliophysics, Planetary Science, and Astrophysics. SMD works closely with the broader scientific community, considers national initiatives, and uses the results of National Research Council studies to define a set of "Big Questions" in each of these four research areas. These questions, in turn, fuel mission priorities and the SMD research agenda. The SMD also sponsors research that both enables, and is enabled by, NASA's exploration activities. SMD has a portfolio of Education and Public Outreach projects that are connected to its research efforts. (nasascience.nasa.gov)

Space Technology Mission Directorate (STMD) is responsible for developing the crosscutting, pioneering, new technologies and capabilities needed by the agency to achieve its current and future missions. STMD rapidly develops, demonstrates, and infuses revolutionary, high-payoff technologies through transparent, collaborative partnerships, expanding the boundaries of the aerospace enterprise. STMD employs a merit-based competition model with a portfolio approach, spanning a range of discipline areas and technology readiness levels. By investing in bold, broadly applicable, disruptive technology that industry cannot tackle today, STMD seeks to mature the technology required for NASA's future missions in science and exploration while proving the capabilities and lowering the cost for other government agencies and commercial space activities. Research and technology development take place within NASA Centers, in academia and industry, and leverage partnerships with other government agencies and international partners. (www.nasa.gov/directorates/spacetech/home/index.html)

NASA Center Internships

In addition to programs available through this RFP, NASA Kentucky supports Kentucky undergraduate students through internships at NASA Centers. Students are encouraged to visit the NASA OSSI website, build a student profile, and apply to internship, fellowship, and scholarship programs available directly from NASA. OSSI is a NASA-wide system for the recruitment, application, selection and career development of undergraduate and graduate students. Selection for available OSSI opportunities is made by NASA.

https://intern.nasa.gov/ossi/web/public/main/

Graduate Fellowships - $45,000

Description: NASA Kentucky **Graduate Fellowships (GF)** recognize and support students addressing the challenges of aerospace research related to NASA's strategic goals. Research advisors at Affiliate Institutions may apply for a one-year fellowship for a specific graduate student. Research projects must emphasize connections to NASA, address specific goals for the fellowship year, and contribute to program metrics including publications, presentations, and student advancement in disciplines of interest to NASA.

Eligibility: Proposals will be accepted from Principal Investigators at NASA Kentucky Space Grant Consortium Affiliate Institutions on behalf of Master's or Doctoral students in NASA-aligned disciplines. Women and minorities are strongly encouraged to apply. US citizenship is required.

Requirements: The proposed research topic must utilize NASA resources and be aligned with NASA priorities addressed by one or more of the Mission Directorates. NASA letter of support required. Connections with Kentucky companies and/or NASA Kentucky strategic themes will be viewed favorably. (See also Table 1)

Proposal Content: See *Submission Instructions* (pg. 1) for budget, formatting and file naming instructions.

1) Project Description: PI_GF_Project_2018.pdf

- No more than 5 pages including tables and figures describing: abstract (200-300 words), project summary, alignment with NASA Mission Directorate(s), specific goals for the funded period, anticipated outcomes, and progress toward degree.
- Additional pages - included in **PI**_GF_Project_2018.pdf after 5-page project description:
  - Bibliography/References as needed
  - Statement by the student relating the project to their career goals (not to exceed 1 page)
  - Unofficial transcript
  - Student's resume
  - Letter of recommendation from a faculty member other than the research advisor
  - Research Advisor's 2-page CV
  - List of Current and Pending Awards: Award title, sponsor, dates, amount, commitment
  - Executive summary describing results of all prior NASA KY funding (not to exceed 1 page)
  - Letter of support from a NASA collaborator (See NASA KY FAQ for more information)

2) Student Information Form: SLN_GF_SIF_2018.pdf, where SLN is the student's last name - Completed by the student applicant and uploaded with proposal files.

Budget Guidelines: Maximum award level is $45,000 per student per year. Allowable costs include student stipend or salary consistent with recipient institution policies and practices, fringe benefits, tuition and fees, materials and supplies, and student domestic travel. Required cost-share of at least 1:1 ($CS:$Award) must be provided by the proposing institution including a minimum of 12.5% FTE faculty time for the research advisor required as cost-share. Include description of faculty time cost-share detailed in budget justification. The level of faculty FTE for advising graduate students may be limited by institutional or unit policies or practices. Indirect costs are *not* allowed, but unrecovered indirect costs on sub-recipient direct cost-share may be used as cost-share.

Longitudinal Tracking of Students: All students receiving compensation must be reported to NASA KY. Any student receiving $5,000 or more in NASA funding or working 160 hours or more on NASA-supported projects or a combination of both will be longitudinally tracked by NASA for five years using information provided on the NASA KY Student Information Form (SIF). Longitudinally tracked students will need to keep their information current through follow-up correspondence for the 5-year period.

Undergraduate Fellowships - $6,000

Description: NASA Kentucky **Undergraduate Fellowships (UF)** recognize and support students addressing the challenges of aerospace research related to NASA's strategic goals. Research advisors at Affiliate Institutions may apply for a one-year fellowship for a specific undergraduate student to conduct 1-on-1 mentored research. Research projects must emphasize connections to NASA, address specific goals for the fellowship year and contribute to program metrics including publications, presentations and student advancement in disciplines of interest to NASA.

Eligibility: Proposals will be accepted from Principal Investigators at NASA Kentucky Space Grant Consortium Affiliate Institutions on behalf of undergraduate students in NASA-aligned disciplines. Women and minorities are strongly encouraged to apply. US citizenship is required.

Requirements: The proposed research topic must utilize NASA resources and be aligned with NASA priorities addressed by one or more of the Mission Directorates. Connections with Kentucky companies and/or NASA Kentucky strategic themes will be viewed favorably. (See also Table 1)

Proposal Content: See *Submission Instructions* (pg. 1) for budget, formatting and file naming instructions.

1) Project Description: PI_UF_Project_2018.pdf

- No more than 5 pages including tables and figures describing: abstract (200-300 words), project summary, alignment with NASA Mission Directorate(s), specific goals for the funded period, anticipated outcomes, and progress toward degree.
- Additional pages - included in **PI**_UF_Project_2018.pdf after 5-page project description
  - Bibliography/References as needed
  - Statement by the student relating the project to their career goals (not to exceed 1 page)
  - Unofficial transcript
  - Letter of recommendation from a faculty member other than the research advisor
  - Research Advisor's 2-page CV
  - Executive summary describing results of all prior NASA KY funding (not to exceed 1 page)
  - Description of NASA resources to be used
  - If applicable, letter of support from collaborator (NASA or non-NASA)

2) Student Information Form: **SLN**_UF_SIF_2018.pdf, where SLN is the student's last name - Completed by the student applicant and uploaded with proposal files.

Budget Guidelines: Maximum award level is $6,000 per student per year. Allowable costs include student stipend or salary, fringe benefits, tuition and fees, materials and supplies up to $500, and student domestic travel up to $1,000. Indirect costs are *not* allowed. Cost-share not required.

Longitudinal Tracking of Students: All students receiving compensation must be reported to NASA KY. Any student receiving $5,000 or more in NASA funding or working 160 hours or more on NASA-supported projects or a combination of both will be longitudinally tracked by NASA for five years using information provided on the NASA KY Student Information Form (SIF). Longitudinally tracked students will need to keep their information current through follow-up correspondence for the 5-year period.

Team Fellowships - $10,000

Description: NASA Kentucky **Team Fellowship (TF) awards** provide support for higher education student groups participating in design competitions sponsored by NASA or related engineering and science organizations. Example competitions include but are not limited to: NASA Robotic Mining Competition, NASA University Student Launch, AIAA Design/Build/Fly, AUVSI, and RockOn. An expanded list of examples with links is available at nasa.engr.uky.edu/space-grant.

Eligibility: Proposals will be accepted from Principal Investigators at NASA Kentucky Space Grant Consortium Affiliate Institutions on behalf of teams of students in NASA-aligned disciplines. Women and minorities are strongly encouraged to apply. US citizenship is required.

Requirements: The proposed competition must be aligned with NASA priorities addressed by one or more of the Mission Directorates. Connections with Kentucky companies and/or NASA Kentucky strategic themes will be viewed favorably. (See also Table 1)

Proposal Content: See *Submission Instructions* (pg. 1) for budget, formatting and file naming instructions.

1) **Project Description: PI**_TF_Project_2018.pdf
   - No more than 5 pages including tables and figures describing: abstract (200-300 words), project summary, alignment with NASA Mission Directorate(s), specific goals for the funded period, anticipated outcomes, prior experience with team competitions, and schedule of competition deadlines.
   - Additional pages - included in **PI**_TF_Project_2018.pdf after 5-page project description
     - Bibliography/References as needed
     - Faculty Advisor's 2-page CV
     - Executive summary describing results of all prior NASA KY funding (not to exceed 1 page)
     - If applicable, letter of support from collaborator

Budget Guidelines: Maximum award level is $10,000 per team per year. Allowable costs include registration fees, materials and supplies, shipping costs to/from competition site, and faculty advisor and student team member domestic travel. Required cost-share of at least 0.5:1 ($CS:$Award) must be provided by the proposing institution. Indirect costs are *not* allowed, but unrecovered indirect costs on sub-recipient direct cost-share may be used as cost-share.

Longitudinal Tracking of Students: All students receiving compensation must be reported to NASA KY. Any student receiving $5,000 or more in NASA funding or working 160 hours or more on NASA-supported projects or a combination of both will be longitudinally tracked by NASA for five years using information provided on the NASA KY Student Information Form (SIF). Longitudinally tracked students will need to keep their information current through follow-up correspondence for the 5-year period.

Research Initiation Awards - $15,000

Description: NASA Kentucky **Research Initiation Awards (RIA)** are a flexible funding program for faculty to become familiar with NASA research programs and Mission Directorates, establish and cultivate relationships with NASA scientists, and visit NASA facilities. RIA funding is the first step in the faculty pathway to build capacity to conduct NASA-aligned research. Next steps in the pathway include NASA KY EPSCoR Research Infrastructure Development Grants (RIDG), student support for research through Graduate and Undergraduate Fellowships, and NASA ROSES and other NASA research solicitations. RIA proposals may include travel, experiments to obtain preliminary results, data analysis or manuscript preparation. Any combination of faculty salary, student support, travel, materials and supplies, and corresponding indirect costs may be requested up the $15,000 maximum award amount. Preference will be given to early-career faculty and faculty changing research directions.

Eligibility: Proposals will be accepted from Principal Investigators at NASA Kentucky Space Grant Consortium Affiliate Institutions to develop NASA-aligned research activities. Women and minorities are strongly encouraged to apply. US citizenship is required.

Requirements: The proposed research topic must utilize NASA resources and be aligned with NASA priorities addressed by one or more of the Mission Directorates. NASA letter of support required. Principal Investigators are expected to submit at least one proposal for follow-on funding based on the RIA activities. (See also Table 1)

Proposal Content: See *Submission Instructions* (pg. 1) for budget, formatting and file naming instructions.

1) **Project Description: PI**_RIA_Project_2018.pdf
   - No more than 5 pages including tables and figures describing: abstract (200-300 words), project summary, alignment with NASA Mission Directorate(s), specific goals for the funded period, anticipated outcomes and plans for follow on funding.
   - Additional pages - included in **PI**_RIA_Project_2018.pdf after the 5-page project description
     - Bibliography/References as needed
     - Principal Investigator's 2-page CV
     - List of Current and Pending Awards: Award title, sponsor, dates, amount, commitment
     - Executive summary describing results of all prior NASA KY funding (not to exceed 1 page)
     - Letter of support from a NASA collaborator expressing mutual interest in the research topic and agreement to meet with the Principal Investigator in person at a research facility or a specific conference. (See NASA KY FAQ for more information)

Budget Guidelines: Maximum award level is $15,000 per faculty member per year. Allowable direct costs include faculty salary, student stipend or salary, fringe benefits, tuition, materials and supplies, and domestic travel. Indirect costs are allowed and unrecovered indirect costs may be used as cost-share. Required cost-share of at least 1:1 ($CS:$Award) must be provided by the proposing institution. Space Grant is a workforce development program. In line with this program, proposing institutions should use the "other" or training grant F&A rate (if one exists) versus the research F&A rate and indicate in the budget justification.

Longitudinal Tracking of Students: All students receiving compensation must be reported to NASA KY. Any student receiving $5,000 or more in NASA funding or working 160 hours or more on NASA-supported projects or a combination of both will be longitudinally tracked by NASA for five years using information provided on the NASA KY Student Information Form (SIF). Longitudinally tracked students will need to keep their information current through follow-up correspondence for the 5-year period.

Mini-Grants - $5,000

Description: NASA Kentucky **Mini-Grants (MG)** provide support for outreach programs at scientific sites (museums, observatories, planetariums, etc.), hosting pre-college students on campus, and group travel to NASA-related events. Examples of mini-grant programs include but are not limited to: outreach programs at planetariums and observatories; pre-college student fieldtrips or workshops designed to recruit STEM students to the affiliate institution in disciplines of interest to NASA; professional development workshops for K-12 STEM teachers; and small group travel to Affiliate Institutions combined with travel to a NASA-related event such as Space Camp, AirVenture, rocketry competition or scientific site.

Eligibility: Proposals will be accepted from Principal Investigators at NASA Kentucky Space Grant Consortium Affiliate Institutions collaborating with scientific sites (museums, observatories, planetariums, etc.) or institution recruiters. Women and minorities are strongly encouraged to apply. US citizenship is required.

Requirements: The proposed activity must be aligned with NASA priorities addressed by one or more of the Mission Directorates. Small group travel awards must support at least six students on the proposed trip. Connections with Kentucky companies and/or NASA Kentucky strategic themes will be viewed favorably. (See also Table 1)

Proposal Content: See *Submission Instructions* (pg. 1) for budget, formatting and file naming instructions.

1) **Project Description: PI**_MG_Project_2018.pdf
   - No more than 5 pages including tables and figures describing: abstract (200-300 words), project summary, alignment with NASA Mission Directorate(s), specific goals for the funded period, anticipated outcomes and event dates.
   - Additional pages - included in **PI**_MG_Project_2018.pdf after 5-page project description
     - Bibliography/References as needed
     - Principal Investigator's 2-page CV
     - Executive summary describing results of all prior NASA KY funding (not to exceed 1 page)
     - Letter of support from institution partner, scientific site and/or NASA collaborator

Budget Guidelines: Maximum award level is $5,000 per year. Allowable direct costs include registration and entry fees, materials and supplies, salary and fringe benefits for college student assistants, transportation (buses), and domestic travel expenses for faculty advisor, chaperone and students. Indirect costs are allowed. Cost-share not required, but match and in-kind cost-share of allowable costs are viewed favorably.

Longitudinal Tracking of Students: All students receiving compensation must be reported to NASA KY. Any student receiving $5,000 or more in NASA funding or working 160 hours or more on NASA-supported projects or a combination of both will be longitudinally tracked by NASA for five years using information provided on the NASA KY Student Information Form (SIF). Longitudinally tracked students will need to keep their information current through follow-up correspondence for the 5-year period.

Enhanced Mini-Grants - $15,000

Description: NASA Kentucky **Enhanced Mini-Grants (EMG)** provide support for outreach programs at scientific sites (museums, observatories, planetariums, etc.), hosting pre-college students on campus, and group travel to NASA-related events. Examples of projects suited for enhanced mini-grants include but are not limited to: pre-service middle-school teacher training, museum-based projects for students and the general public, or pre-college STEM competitions.

Eligibility: Proposals will be accepted from Principal Investigators at NASA Kentucky Space Grant Consortium Affiliate Institutions collaborating with scientific sites (museums, observatories, planetariums, etc.) or affiliate institution recruiters. Women and minorities are strongly encouraged to apply. US citizenship is required.

Requirements: The proposed activity must be aligned with NASA priorities addressed by one or more of the Mission Directorates. Group travel awards must support an appropriate number of students on the proposed trip. Connections with Kentucky companies and/or NASA Kentucky strategic themes will be viewed favorably. (See also Table 1)

Proposal Content: See *Submission Instructions* (pg. 1) for budget, formatting and file naming instructions.

1) Project Description: PI_EMG_Project_2018.pdf

- No more than 5 pages including tables and figures describing: abstract (200-300 words), project summary, alignment with NASA Mission Directorate(s), specific goals for the funded period, anticipated outcomes and event dates.

- Additional pages - included in **PI**_EMG_Project_2018.pdf after 5-page project description
  - Bibliography/References as needed
  - Principal Investigator's 2-page CV
  - Executive summary describing results of all prior NASA KY funding (not to exceed 1 page)
  - Letter of support from institution partner, scientific site and/or NASA collaborator

Budget Guidelines: Maximum award level is $15,000 per year. Allowable direct costs include registration and entry fees, materials and supplies, salary and fringe benefits for staff or college student assistants, transportation (buses), and domestic travel expenses for faculty advisor, chaperone and students. Indirect costs are allowed. Required cost-share of at least 1:1 ($CS:$Award) must be provided by the proposing institution. Indirect costs are allowed and unrecovered indirect costs may be used as cost-share. In-kind cost-share of all allowable costs is permitted.

Longitudinal Tracking of Students: All students receiving compensation must be reported to NASA KY. Any student receiving $5,000 or more in NASA funding or working 160 hours or more on NASA-supported projects or a combination of both will be longitudinally tracked by NASA for five years using information provided on the NASA KY Student Information Form (SIF). Longitudinally tracked students will need to keep their information current through follow-up correspondence for the 5-year period.