

RESEARCH AND RELATED ACTIVITIES (R&RA)**\$8,139,710,000**
+\$1,259,230,000 / 18.3%

The FY 2022 Budget Request for the Research and Related Activities account is \$8,139.71 million. Funding within the R&RA Appropriation invests in early-stage research as well as development of a future-focused science and engineering workforce that can support the private sector and accelerate progress in basic science and engineering research.

NSF is the only federal agency dedicated to funding basic research across all areas of non-biomedical science and engineering. In FY 2022, NSF will continue its longstanding commitment to investing in learning and discovery that will promote the innovations that will be the foundation for the Nation's future prosperity.

This Budget Request establishes a new Directorate for Technology, Innovation, and Partnerships (TIP) to advance research and innovation leading to breakthrough technologies and solutions to national and societal challenges. This directorate will constitute a crosscutting platform that leverages, energizes, and rapidly brings to market and to society the innovations that result from all of NSF's investments. Further, TIP will open up new possibilities for research and education by catalyzing strategic partnerships linking academia, industry, government, philanthropy, investors, and civil society to cultivate 21st-century local, regional, and national innovation ecosystems. See the crosswalk on the next page for more information.

R&RA Funding¹
(Dollars in Millions)

	FY 2020 Actual	FY 2021 Estimate	FY 2022 Request	Change over FY 2021 Estimate	
				Amount	Percent
Biological Sciences	\$809.31	\$818.14	\$948.51	\$130.37	15.9%
Computer & Information Science & Engineering	996.40	1,005.49	1,116.06	110.57	11.0%
Engineering	754.31	761.85	916.79	154.94	20.3%
Geosciences	993.72	1,004.18	1,194.92	190.74	19.0%
Mathematical & Physical Sciences	1,530.12	1,580.48	1,690.74	110.26	7.0%
Social, Behavioral & Economic Sciences	280.35	282.06	319.66	37.60	13.3%
Technology, Innovation, & Partnerships	352.31	364.87	864.87	500.00	137.0%
Office of International Science & Engineering	51.04	51.32	75.32	24.00	46.8%
Office of Polar Programs	480.59	483.35	506.29	22.94	4.7%
Integrative Activities ²	352.97	527.14	504.90	-22.24	-4.2%
U.S. Arctic Research Commission	1.60	1.60	1.65	0.05	3.1%
Total	\$6,602.70	\$6,880.48	\$8,139.71	\$1,259.23	18.3%

¹ To account for the creation of TIP in FY 2022, funding in FY 2020 and FY 2021 is restated for comparability across fiscal years. Impacted programs include Convergence Accelerator, NSF Innovation Corps, Partnerships for Innovation, and SBIR/STTR (including operations).

² The Graduate Research Fellowship Program will be consolidated into the Directorate for Education and Human Resources in FY 2022. Funding in FY 2020 and FY 2021 is removed from IA for comparability across fiscal years. See the EHR chapter for more information.

Research and Related Activities

Restatement of Programs to the Directorate for Technology, Innovation, and Partnerships (TIP)
(Dollars in Millions)

NSF Directorates/Office & Divisions	FY 2020	Programs	Restated	FY 2021	Programs	Restated	Change over FY 2021		
	Actual	Moved	FY 2020 Actual	Estimate	Moved	FY 2021 Estimate	FY 2022 Request	Restated Estimate Amount	Percent
Biological Sciences									
Molecular & Cellular Biosciences (MCB)	153.54	-	153.54	155.64	-	155.64	170.74	15.10	9.7%
Integrative Organismal Systems (IOS)	204.05	-	204.05	206.98	-	206.98	227.07	20.09	9.7%
Environmental Biology (DEB)	171.31	-	171.31	178.86	-	178.86	196.22	17.36	9.7%
Biological Infrastructure (DBI)	181.85	-	181.85	167.08	-	167.08	204.89	37.81	22.6%
Emerging Frontiers (EF)	99.71	-1.15	98.56	110.79	-1.21	109.58	149.59	40.01	36.5%
NSF Innovation Corps (I-Corps™)	1.15	-1.15	-	1.21	-1.21	-			
Total, BIO	\$810.46	-\$1.15	\$809.31	\$819.35	-\$1.21	\$818.14	\$948.51	\$130.37	15.9%
Computer & Information Science & Engineering									
Office of Advanced Cyberinfrastructure (OAC)	228.65	-	228.65	230.54	-	230.54	252.19	21.65	9.4%
Computing & Communication Foundations (CCF)	199.34	-	199.34	201.00	-	201.00	218.50	17.50	8.7%
Computer & Network Systems (CNS)	236.14	-	236.14	238.12	-	238.12	259.87	21.75	9.1%
Information & Intelligent Systems (IIS)	216.02	-	216.02	217.87	-	217.87	238.59	20.72	9.5%
Information Technology Research (ITR)	132.13	-15.89	116.24	134.69	-16.73	117.96	146.91	28.95	24.5%
NSF Innovation Corps (I-Corps™)	15.89	-15.89	-	16.73	-16.73	-			
Total, CISE	\$1,012.29	-\$15.89	\$996.40	\$1,022.22	-\$16.73	\$1,005.49	\$1,116.06	\$110.57	11.0%
Engineering									
Chemical, Bioengineering, Enviro. & Transport Systems (CBET)	197.92	-	197.92	199.96	-	199.96	241.05	41.09	20.5%
Civil, Mechanical, & Manufacturing Innovation (CMMI)	238.58	-	238.58	241.13	-	241.13	290.50	49.37	20.5%
Electrical, Communications, & Cyber Systems (ECCS)	122.86	-	122.86	124.05	-	124.05	149.52	25.47	20.5%
Emerging Frontiers & Multidisciplinary Activities (EFMA)	70.88	-	70.88	71.69	-	71.69	86.42	14.73	20.5%
Engineering Education & Centers (EEC)	104.42	19.64	124.06	105.57	19.45	125.02	149.30	24.28	19.4%
Disciplinary/Interdisciplinary Research - shifted from IIP		7.48	7.48		6.17	6.17			
Industry/University Coop. Research Ctrs. (IUCRC) - shifted from IIP		12.04	12.04		12.88	12.88			
Improving Undergraduate STEM Education (IUSE) -- shifted from IIP		0.13	0.13		0.25	0.25			
REU Supplements - shifted from IIP		-	-		0.15	0.15			
Industrial Innovation & Partnerships (IIP)	291.46	-291.46	-	292.98	-292.98	-	-	-	N/A
Disciplinary/Interdisciplinary Research - shifted to EEC		7.48	-7.48		6.17	-6.17			
Industry/University Coop. Research Ctrs. (IUCRC) - shifted to EEC		12.04	-12.04		12.88	-12.88			
Improving Undergraduate STEM Education (IUSE) - shifted to EEC		0.13	-0.13		0.25	-0.25			
REU Supplements - shifted to EEC		-	-		0.15	-0.15			
SBIR/STTR Operations - shifted to TIP		4.93	-4.93		5.00	-5.00			
Small Business Innovation Research (SBIR) - shifted to TIP		196.04	-196.04		199.06	-199.06			
Small Business Technology Transfer (STTR) - shifted to TIP		31.10	-31.10		28.00	-28.00			
NSF Innovation Corps (I-Corps™) - shifted to TIP		17.68	-17.68		18.66	-18.66			
Partnerships for Innovation (PFI) - shifted to TIP		22.07	-22.07		22.81	-22.81			
Total, ENG	\$1,026.13	-\$271.82	\$754.31	\$1,035.38	-\$273.53	\$761.85	\$916.79	\$154.94	20.3%
Geosciences									
Atmospheric & Geospace Sciences (AGS)	280.08	-	280.08	283.47	-	283.47	341.71	58.24	20.5%
Earth Sciences (EAR)	199.21	-	199.21	201.36	-	201.36	240.04	38.68	19.2%
Ocean Sciences (OCE)	401.36	-	401.36	403.05	-	403.05	476.14	73.09	18.1%
Integrative & Collaborative Education & Research (ICER)	113.76	-0.69	113.07	117.03	-0.73	116.30	137.03	20.73	17.8%
NSF Innovation Corps (I-Corps™)	0.69	-0.69	-	0.73	-0.73	-			
Total, GEO	\$994.41	-\$0.69	\$993.72	\$1,004.91	-\$0.73	\$1,004.18	\$1,194.92	\$190.74	19.0%
Mathematical & Physical Sciences									
Astronomical Sciences (AST)	279.10	-	279.10	277.05	-	277.05	294.05	17.00	6.1%
Chemistry (CHE)	260.37	-	260.37	259.71	-	259.71	284.14	24.43	9.4%
Materials Research (DMR)	330.15	-	330.15	329.78	-	329.78	349.92	20.14	6.1%
Mathematical Sciences (DMS)	244.09	-	244.09	243.54	-	243.54	259.47	15.93	6.5%
Physics (PHY)	304.39	-	304.39	303.90	-	303.90	316.59	12.69	4.2%
Office of Multidisciplinary Activities (OMA)	113.97	-1.96	112.01	168.56	-2.06	166.50	186.57	20.07	12.1%
NSF Innovation Corps (I-Corps™)	1.96	-1.96	-	2.06	-2.06	-			
Total, MPS	\$1,532.08	-\$1.96	\$1,530.12	\$1,582.54	-\$2.06	\$1,580.48	\$1,690.74	\$110.26	7.0%
Social, Behavioral & Economic Sciences									
Division of Behavioral & Cognitive Sciences (BCS)	98.64	-	98.64	99.41	-	99.41	113.16	13.75	13.8%
Division of Social & Economic Sciences (SES)	99.87	-	99.87	102.83	-	102.83	117.08	14.25	13.9%
National Center for Science & Engineering Statistics (NCSES)	55.20	-	55.20	55.48	-	55.48	61.48	6.00	10.8%
SBE Office of Multidisciplinary Activities (SMA)	27.22	-0.58	26.64	24.95	-0.61	24.34	27.94	3.60	14.8%
NSF Innovation Corps (I-Corps™)	0.58	-0.58	-	0.61	-0.61	-			
Total, SBE	\$280.93	-\$0.58	\$280.35	\$282.67	-\$0.61	\$282.06	\$319.66	\$37.60	13.3%
Integrative Activities									
IA Program Funding	555.45	-\$60.23	495.23	597.14	-70.00	527.14	504.90	-22.24	-4.2%
Convergence Accelerator (CA)	60.23	-60.23	-	70.00	-70.00	-			
Total, IA	\$555.45	-\$60.23	\$495.23	\$597.14	-\$70.00	\$527.14	\$504.90	-\$22.24	-\$0.04
Technology Innovation Partnerships									
Innovation Ecosystems (IE)	-	\$98.18	\$98.18	-	\$110.00	\$110.00	335.00	225.00	204.5%
Convergence Accelerator (CA)		60.23	60.23		70.00	70.00	70.00	-	-
NSF Innovation Corps (I-Corps™)		37.95	37.95		40.00	40.00	40.00	-	-
Partnerships Office (PO)	-	-	-	-	-	-	50.00	50.00	N/A
Technology Frontiers (TF)	-	-	-	-	-	-	150.00	150.00	N/A
Translational Impact (TI)	-	254.13	254.13	-	254.87	254.87	329.87	75.00	29.4%
Partnerships for Innovation (PFI)		22.07	22.07		22.81	22.81	30.00	7.19	31.5%
SBIR/STTR Operations		4.93	4.93		5.00	5.00	5.00	-	-
Small Business Innovation Research (SBIR)		196.04	196.04		199.06	199.06	236.39	37.33	18.8%
Small Business Technology Transfer (STTR)		31.10	31.10		28.00	28.00	33.25	5.25	18.8%
Total, TIP	-	\$352.31	\$352.31	-	\$364.87	\$364.87	\$864.87	\$500.00	137.0%

See the individual directorate and office narratives in this chapter for more detail.

Appropriations Language

For necessary expenses in carrying out the National Science Foundation Act of 1950 (42 U.S.C. 1861 et seq.), and Public Law 86-209 (42 U.S.C. 1880 et seq.); services as authorized by section 3109 of title 5, United States Code; maintenance and operation of aircraft and purchase of flight services for research support; acquisition of aircraft; and authorized travel; ~~\$6,909,769,000~~ **\$8,139,710,000**, to remain available until September 30, ~~2022~~ **2023**, of which not to exceed \$544,000,000 shall remain available until expended for polar research and operations support, and for reimbursement to other Federal agencies for operational and science support and logistical and other related activities for the United States Antarctic program: *Provided*, That receipts for scientific support services and materials furnished by the National Research Centers and other National Science Foundation supported research facilities may be credited to this appropriation.

**Research and Related Activities
FY 2022 Summary Statement
(Dollars in Millions)**

	Enacted/ Request	Unobligated Balance Available Start of Year	Unobligated Balance Available End of Year	Adjustments to Prior Year Accounts	Transfers	Obligations Actual/ Estimates
FY 2020 Appropriation	\$6,812.20	\$16.21	-\$10.27	\$19.22	-\$22.40	\$6,814.96
FY 2021 Estimated	6,909.77	10.27			-\$29.29	6,890.75
FY 2022 Request	8,139.71					8,139.71
\$ Change from FY 2021 Estimated						\$1,248.96
% Change from FY 2021 Estimated						18.1%

Totals exclude reimbursable amounts.

Explanation of Carryover

Research and Related Activities (R&RA)

Within the R&RA account, \$10.27 million (including \$3.27 million in no-year recoveries) was carried over into FY 2021.

Integrative Activities Research Investment Communications

- Amount: \$1.93 million
- Purpose: Funding will be used on four procurement actions in process that will be completed in time for award this fiscal year.
- Obligation: FY 2021 Quarter 2

Integrative Activities for Convergence Accelerator–Future of Work at the Human Technology Frontier (CA-FW-HTF)

- Amount: \$2.30 million
- Purpose: Grantee failed the Division of Institution and Award Support (DIAS) pre-award administrative/financial review. Cost Analysis and Pre-award Branch (CAP) delayed any re-evaluations until FY 2021; thus, funding is delayed until FY 2021.
- Obligation: FY 2021 Quarter 2 and Anticipated FY 2021 Quarter 3

Integrative Activities for Convergence Accelerator Research

- Amount: \$553,198
- Purpose: Funds will be used to pay for curriculum development and delivery for both the 2019 Cohort Phase II and the 2020 Cohort Phase I.
- Obligation: FY 2021 Quarter 2 and Anticipated FY 2021 Quarter 3

Research and Related Activities

Integrative Activities for Program Planning and Policy Development

- Amount: \$441,580
- Purpose: These funds will be used to support IA's stewardship of merit review process.
- Obligation: FY 2021 Quarter 2 and Anticipated FY 2021 Quarter 3

National Coordination Office for Networking and Information Technology Research and Development

- Amount: \$67,409
- Purpose: Funding to continue government procurements and operational expenses (i.e., credit card purchases, government travel, mailroom operations, etc.).
- Obligation: Anticipated FY 2021 Quarter 4

National Nanotechnology Coordination Office

- Amount: \$2,982
- Purpose: Funding for the National Nanotechnology Coordination Office (NNCO) for NNCO operational expenses.
- Obligation: Anticipated FY 2021 Quarter 4

The remaining \$1.71 million within R&RA consists of funds from throughout the Foundation for projects not funded in FY 2020.