NSF FY 2023 BUDGET REQUEST TO CONGRESS
TABLE OF CONTENTS

For definitions of common acronyms used throughout NSF's FY 2023 Budget Request, see the NOTES found at the beginning of the entire document on pages iii-iv.

OVERVIEW ..... Overview - 1

NSF SUMMARY TABLES ..... Summary Tables - 1

Total NSF Funding
- NSF Summary Table ..... Summary Tables - 3
- NSF Funding Profile ..... Summary Tables - 4
- Number of People Involved in NSF Activities ..... Summary Tables - 5
- NSF Budget Requests and Appropriations by Account: FY 2000-FY 2023 ..... Summary Tables - 7
- NSF Administration Priorities and Crosscutting Research Topics Summary ..... Summary Tables - 8

STEM Education Investments
- NSF Directorate for STEM Education Funding by Division and Program ..... Summary Tables - 11
- CoSTEM Inventory and Postdoctoral Fellowship Programs by Level of Education ..... Summary Tables - 12

Research Infrastructure
- NSF Research Infrastructure Funding by Account and Activity ..... Summary Tables - 13
- NSF Research Infrastructure Summary ..... Summary Tables - 14

NSF AUTHORIZATIONS ..... Authorizations - 1
- NSF Current Authorizations Table ..... Authorizations - 3
- Computer Science Education Research Report in Compliance with Public Law 114-329 ..... Authorizations - 6
- EPSCoR Report in Compliance with Public Law 114-329 ..... Authorizations - 10

NSF-WIDE INVESTMENTS ..... NSF-Wide Investments - 1

Climate Theme (Overview) ..... Climate - 1
- Clean Energy Technology Crosscut ..... Climate - 5
- U.S. Global Change Research Program Crosscut ..... Climate - 8

Equity for Underserved Communities Theme (Overview) ..... Equity - 1
- NSF Programs to Broaden Participation Table ..... Equity - 5

Discovery Engine Theme (Overview) ..... Discovery Engine - 1

Emerging Industries Theme (Internal TOC)..... Emerging Industries - 1
Emerging Industries Overview.....Emerging Industries – 3
Advanced Wireless Research..... Emerging Industries - 8
Advanced Manufacturing..... Emerging Industries - 11
Artificial Intelligence..... Emerging Industries - 13
Biotechnology..... Emerging Industries - 17
Microelectronics and Semiconductors..... Emerging Industries - 20
Quantum Information Science..... Emerging Industries - 23

Research Infrastructure Theme (Internal TOC).....Research Infrastructure - 1
Research Infrastructure Overview.....Research Infrastructure - 3

Major Research Equipment and Facilities Construction Overview.....Research Infrastructure - 7
Antarctic Infrastructure Recapitalization.....Research Infrastructure - 12
High Luminosity - Large Hadron Collider Upgrade .....Research Infrastructure - 21
Regional Class Research Vessels.....Research Infrastructure - 31
Vera C. Rubin Observatory .....Research Infrastructure - 38
Mid-scale Research Infrastructure Track 2.....Research Infrastructure - 46

Major Facilities Overview.....Research Infrastructure - 51
Academic Research Fleet (ARF).....Research Infrastructure - 54
Antarctic Facilities and Operations (AFO).....Research Infrastructure - 58
Arecibo Observatory (AO).....Research Infrastructure - 62
Geodetic Facility for the Advancement of Geoscience (GAGE).....Research Infrastructure - 67
IceCube Neutrino Observatory (ICNO).....Research Infrastructure - 72
International Ocean Discovery Program (IODP).....Research Infrastructure - 76
Large Hadron Collider (LHC).....Research Infrastructure - 80
Laser Interferometer Gravitational Wave Observatory (LIGO).....Research Infrastructure - 84
National Ecological Observatory Network (NEON).....Research Infrastructure - 88
National High Magnetic Field Laboratory (NHMFL).....Research Infrastructure - 93
Ocean Observatories Initiative (OOI) .....Research Infrastructure - 98
Seismological Facility for the Advancement of Geoscience (SAGE) .....Research Infrastructure - 103

Federally Funded Research and Development Centers (FFRDCs)
Green Bank Observatory (GBO).....Research Infrastructure - 108
National Center for Atmospheric Research (NCAR) .....Research Infrastructure - 113
National Radio Astronomy Observatory (NRAO).....Research Infrastructure - 118
National Solar Observatory (NSO).....Research Infrastructure - 123
NSF's National Optical-Infrared Astronomy Research Lab (NOIRLab) .....Research Infrastructure - 128

Other Facilities Funding.....Research Infrastructure - 136

Cross-Theme Topics (Internal TOC) ..... Cross-Theme Topics - 1
Ongoing Major Investments
National Nanotechnology Initiative ..... Cross-Theme Topics - 3
Networking and Information Technology R&D ..... Cross-Theme Topics - 9
NSF Big Ideas ..... Cross-Theme Topics - 15
NSF Centers Programs ..... Cross-Theme Topics - 21
Secure and Trustworthy Cyberspace ..... Cross-Theme Topics – 33
Spectrum Innovation Initiative ..... Cross-Theme Topics - 38
Selected Crosscutting Programs (with funding table) ..... Cross-Theme Topics - 40

STEM Education and Workforce
Improving Undergraduate STEM Education ..... Cross-Theme Topics - 44
Major Investments in STEM Grad Students and Grad Ed ..... Cross-Theme Topics - 47

RESEARCH AND RELATED ACTIVITIES ..... R&RA Overview - 1

Biological Sciences ..... BIO - 1
Biological Infrastructure ..... BIO - 8
Environmental Biology ..... BIO - 9
Integrative Organismal Systems ..... BIO - 10
Molecular and Cellular Biosciences ..... BIO - 11
Emerging Frontiers ..... BIO - 12

Computer and Information Science and Engineering ..... CISE - 1
Office of Advanced Cyberinfrastructure ..... CISE - 8
Computing and Communication Foundations ..... CISE - 10
Computer and Network Systems ..... CISE - 11
Information and Intelligent Systems ..... CISE - 12
Information Technology Research ..... CISE - 13
Appendix A: Advanced Computing Systems and Services Portfolio ..... CISE - 14

Engineering ..... ENG - 1
Chemical, Bioengineering, Environmental, and Transport Systems ..... ENG - 7
Civil, Mechanical, and Manufacturing Innovation ..... ENG - 9
Electrical, Communications, and Cyber Systems ..... ENG - 11
Engineering Education and Centers ..... ENG - 13
Emerging Frontiers and Multidisciplinary Activities ..... ENG - 15

Geosciences ..... GEO - 1
Atmospheric and Geospace Sciences ..... GEO - 5
Earth Sciences ..... GEO - 7
Research, Innovation, Synergies, and Education (RISE) ..... GEO - 9
Ocean Sciences ..... GEO - 11

Mathematical and Physical Sciences ..... MPS - 1
Astronomical Sciences ..... MPS - 8
Chemistry ..... MPS - 10
Materials Research ..... MPS - 11
Mathematical Sciences ..... MPS - 13
Physics ..... MPS - 14
Office of Multidisciplinary Activities ..... MPS - 16

Social, Behavioral, and Economic Sciences ..... SBE - 1
Behavioral and Cognitive Sciences ..... SBE - 6
Social and Economic Sciences ..... SBE - 7
National Center for Science and Engineering Statistics ..... SBE - 8
SBE Office of Multidisciplinary Activities ..... SBE - 10

Technology, Innovation, and Partnerships ..... TIP - 1
Technology Frontiers ..... TIP - 6
Innovation and Technology Ecosystems ..... TIP - 7
Translational Impacts ..... TIP - 8
Strategic Partnerships Office ..... TIP - 10

Office of International Science and Engineering ..... OISE - 1

Office of Polar Programs ..... OPP - 1

Integrative Activities ..... IA - 1
Established Program to Stimulate Competitive Research (EPSCoR) ..... IA - 7

U.S. Arctic Research Commission ..... USARC - 1

STEM EDUCATION ..... EDU - 1
Equity for Excellence in STEM ..... EDU - 8
Graduate Education ..... EDU - 10
Research on Learning in Formal and Informal Settings ..... EDU - 12
Undergraduate Education ..... EDU - 14
H-1B Nonimmigrant Petitioner Fees ..... EDU - 16

ORGANIZATIONAL EXCELLENCE ..... Organizational Excellence - 1

Human Capital ..... Human Capital - 1

Travel ..... Travel - 1

Information Technology ..... Information Technology – 1

Administrative Support ..... Administrative Support – 1

Office of the National Science Board ..... NSB - 1

Office of Inspector General ..... OIG - 1

PERFORMANCE AND MANAGEMENT ..... Performance & Management - 1
NSF Performance Framework.....Performance & Management - 3
FY 2022-2023 Annual Performance Plan.....Performance & Management - 7
FY 2021 NSF Strategic Objective Progress Update..... Performance & Management - 31
FY 2021 Annual Performance Report ..... Performance & Management - 35
FY 2021 Management Challenge Progress Report..... Performance & Management - 57
GAO-IG Act Exhibits..... Performance & Management - 63
Program Evaluation and Monitoring Information..... Performance & Management - 118
Other Information ..... Performance & Management - 144

TECHNICAL INFORMATION .....Technical Info - 1
FY 2023 NSF Appropriations Language ..... Technical Info - 3
Summary Justification for a Non-Recurring Expenses Fund..... Technical Info - 5
Summary of FY 2023 NSF Budgetary Resources by Account..... Technical Info - 6
NSF FY 2023 Funding by Program ..... Technical Info - 9
NSF by Object Classification..... Technical Info - 13
NSF Reimbursable Activity..... Technical Info - 14
Explanation of FY 2021 Carryover into FY 2022 by Account..... Technical Info - 15

QUANTITATIVE DATA TABLES ..... QDT – 1