

MATRIX IV: Campus STEM Research Priorities Report

Categories Aligned with FIRST Louisiana High Growth Target Industries

Energy Production - DRAFT

	Research Priorities Aligned with High Growth Target Industries	Specific Research Foci/Strengths
LSU AG	<ul style="list-style-type: none"> • Biobased Production of Liquid Fuels • Continuous Flow Pyrolysis of Biomass 	<ul style="list-style-type: none"> • Louisiana Institute for Biofuels and Bioprocessing \$17.2 million award to build the foundation for a biomass-based fuels and chemicals sector in the State • Numerous industry partners working with LSU Ag Center to test proprietary technologies using Louisiana feedstocks • Continuous flow pyrolysis of biomass, using microwave technology, to produce biodiesel liquid fuel
LSUBR	<ul style="list-style-type: none"> • Conventional & Renewable Energy • Materials Science & Engineering • Individual Behavior & Community Context • Communication & Expression 	<ul style="list-style-type: none"> • Effort to bring together scientific, engineering, economic & social dimensions • \$12.5 million Energy Frontier Research Center (DoE) • Turbine Innovation Energy Research unit • Center for Energy Studies (policy analysis) • Petroleum Engineering Research & Technology (PERTT) Lab unique in the country • Off- and on-shore activities are the core of several high-profile research programs • Success Stories <ul style="list-style-type: none"> • Research cluster studying multiphase flow in chemical process modeling includes major private-sector participation • Center for Atomic Level Catalyst Design supported by a \$12.5 million DoE grant • Leadership of Dr. Ward Plummer • New 85,000 SF Chemistry and Materials building • Plan to facilitate a self-sustaining instrumentation facility • Working toward establishment of an Institute for Advanced Materials • Success Stories <ul style="list-style-type: none"> • Center for Advanced Microstructures and Devices (CAMD) \$1.26 million research equipment award to purchase and install a superconducting multi-pole wiggler at the CAMD synchrotron ring • Renology, a solar-solution start-up company, founded by Yi Li, a PhD student in Physics & Astronomy • Research on individual behavior and cognitive aspects of varied social phenomena such as health, crime, developmental trajectories over the life course, and socioeconomic attainment, and how historical and community contexts produce differential outcomes • Baton Rouge Area Violence Elimination Program (BRAVE) and resulting grant to study the Group Violence Reduction Strategy in Baton Rouge • Several research groups, with one focused on health behaviors and health communication • Supportive research infrastructure includes the Office of Social Service Research and Development and the Public Policy Research Lab • Success Stories <ul style="list-style-type: none"> • BRAVE partnership • Division of Economic Development partnership with/contract work for LED and other State agencies • The scientific, humanistic and artistic dimension of the human communicative experience and how they intersect with and augment in novel ways the process of discovery • Key cluster in political science • Media Effects Lab • Participation in the Alliance for the Arts in Research Universities • Focal area in Cultural Computing • Success Stories <ul style="list-style-type: none"> • Swine Palace Theatre • Language Development and Disorders Lab research in child language development and disorders

LA Tech	<ul style="list-style-type: none"> Infrastructure, Energy & Environmental Systems Matter, Materials & Multiscale Systems STEM Education, Entrepreneurship & Innovation 	<ul style="list-style-type: none"> Disciplines of engineering, fundamental science, and applied sciences to develop solutions for infrastructure, energy & environmental challenges Research agenda includes advanced materials for sustainable infrastructure, energy harvesting, alternative energy, transportation systems, water and coastal modeling and support Trenchless Technology Center Institute for Micromanufacturing Success Stories: <ul style="list-style-type: none"> Louisiana Technology Product of the Year (Erez Allouche: “green” concrete technology) NSF CAREER Award (Dr. Niel Crews: “Thermal Gradient Microflow Calorimetry using Anisotropic Temperature Sensors”) Disciplines of engineering, computer science, chemistry, physics & mathematics Research topics include micro/nanotechnology for energy, security, and sustainability applications, microfabrication and materials characterization, nuclear and high energy physics, computational electromagnetics and metamaterials, computational materials science & advanced materials and manufacturing Institute for Micromanufacturing Center for Applied Physics Studies Louisiana Alliance for Simulation-Guided Materials Applications (LA-SiGMA) Success Stories: <ul style="list-style-type: none"> NSF CAREER Award (Dr. Leland Weiss: new methods to capture and use solar thermal energy using small-scale devices) Particle Physics image (a summary figure of “inclusive jet production”) selected as international standard Support FIRST LA framework as a whole by educating post-secondary and post-graduate students in all foundational sciences Facilitate innovations in core domains, and ultimately contribute to all target industries Integrated STEM Education Research Center Science and Technology Education Center Center for Entrepreneurship and Information Technology Proof of Concept Center Success Stories <ul style="list-style-type: none"> US Department of Homeland Security funding for Cyber Discovery Camp US Economic Development Administration funding for “i6 green energy challenge”
PBRC		
SUBR	<ul style="list-style-type: none"> Advanced Materials & Nanotechnology 	<ul style="list-style-type: none"> Vision: to build materials research center; to develop methods and tools to study and design nanoscale systems; to reach the control of electrons and photons inside nanostructures for new nanoelectric and nanophotonic devices; to develop functionally graded materials, morphing structures based on shape memory polymers, carbon nanotubes based on gas/chemical/bio sensors, solar cells, and other devices containing sensors and active materials Neutrino Physics Advanced Materials & Energy Production Electron Transport & Magnetic Properties of Materials Superconductivity of Materials Surface Science & Solid State Ionics Neutrino Physics SU Computer Automated Virtual Environment (CAVE) Success Stories <ul style="list-style-type: none"> IceCube South Pole Neutrino Observatory (SU partnership) Next Generations CREST Composite Center

	<ul style="list-style-type: none"> • Energy, Ecosystems & the Environment 	<ul style="list-style-type: none"> • Vision: To build on current sustainable energy-oriented research strengths and to develop new, technically significant research programs; to understand mechanisms driving, and to develop potential solutions for, alternative energy materials, carbon emissions and climate change problems • Success Stories <ul style="list-style-type: none"> • Next Generations CREST Composite Center • Research Project: Developing Biofuels from Sustainable Alternative Non-Food Feedstocks in Louisiana
Tulane	<ul style="list-style-type: none"> • Materials Science • Energy & Environmental Science 	<ul style="list-style-type: none"> • Internationally recognized programs in nanotechnology, polymer science and engineering, electronic materials, energy storage & materials simulations • Major focus areas of microemulsion systems, polymer physics, polymeric drug carriers, thin films and coating & nanomanufacturing • Center for Computational Science • Coordinated Instrumentation Facility • Polymer Reaction Monitoring & Characterization (PolyRMC) • Louisiana Alliance for Simulation-Guided Materials (LASiGMA) • Success Stories: Dr. Vijay John (materials/nanomaterials); Dr. Wayne Reed (polymer physics & biophysics); Dr. Doug Chrisey (advanced materials); Dr. Scott Grayson (polymers) • Internationally recognized programs in energy sources, energy management & environmental sciences • Major focus areas of biofuels, sedimentology, sea-level change & energy supply chain economics • Tulane Energy Institute • Tulane University Biodiversity Research Center • Clean Power and Energy Research Consortium (multi-institutional collaboration) • DOE National Institute for Climate Change Research (multi-institutional collaboration) • Success Stories: Dr. Geoff Parker (markets and supply chains); Dr. Tor Tornqvist (evolution of rivers, oceans and shallow oceans); Dr. David Mullin (alternative fuels/liquid fuels); Dr. Henry Bart (taxonomic/ecological diversity and environmental adaptation)
ULL	<ul style="list-style-type: none"> • Energy & Sustainability 	<ul style="list-style-type: none"> • Research agenda: alternative energy, geological research, sustainable design, petroleum research, unconventional natural gas & energy efficiency • Energy Institute • Marine Survival Training Center (MSTC) • Success Stories <ul style="list-style-type: none"> • ULL/CLECO Partnership for Alternative Energy Research • Architecture leader in sustainable design (faculty & student activities) • MSTC is a global leader in marine safety • Major collaborations with industrial partners
Xavier	<ul style="list-style-type: none"> • Materials Science 	<ul style="list-style-type: none"> • Partnerships for Research & Education in Materials (PREM): \$3.5M NSF grant • Louisiana Alliance for Simulation-Guided Materials Applications (LA-SiGMA) • Success Story <ul style="list-style-type: none"> • PREM partners with Excellatron Solid State INC – provides new capabilities in testing anode materials in a solid-state environment