

Pursuing EXCELLENCE

FY 2020-2024 STRATEGIC PLAN



The UNIVERSITY of OKLAHOMA
GALLOGLY
COLLEGE OF ENGINEERING



GALLOGLY HALL

VISION

In the *pursuit of excellence*, the Gallogly College of Engineering proposes a bold plan to dramatically improve quality of life and stimulate economic development for our state, region, nation, and world by solving engineering, scientific and technological challenges through leadership in discovery, innovation, education, and engagement.



INITIATIVE 1

Applied Research Institute

Become a leader in the central U.S. in applied aerospace and defense research by building an institute to address current and future needs of the aerospace/defense industry.

GOALS

- Establish an Applied Research Institute focused on aerospace/defense research for the sustainment and modernization of national security systems.
- Establish a collaborative, secure facility that facilitates faculty and industry access.
- Build an effective and aggressive organization that engages at industry speed.
- Continue to enhance preeminence of the Advanced Radar Research Center (ARRC) by furthering initiatives in defense applications.
- Develop and nurture meaningful collaborations through OU and government/industry partnerships to support sustainment and modernization needs of Oklahoma aerospace and defense employers.
- Develop a new graduate student pipeline from industry and government agencies to support interdisciplinary research and build capacity in the Oklahoma workforce.

RESEARCH THEMES

Sensing Systems

Design and development of radar systems to advance capability in communications, electronic warfare, and remote sensing.

Embedded Systems

Design, development, and implementation of embedded software systems and analytics for robust operations of national security systems structures.

Material Systems

Design and production of light-weight materials enabled for autonomous sensing, self-healing, and temperature control to enhance a broad range of national-security-related structures and vehicles.

Autonomous Systems

Modernization, design, and development of new platforms and control systems to advance human interactions with unmanned systems across a range of conditions.

OUTCOMES

- Diverse aerospace/defense research portfolio including GCoE Schools of AME, CS, ECE, and ISE.
- Increased capacity in faculty, staff engineers and scientists, and graduate students.
- Enhanced capacity and ability for project delivery through new business-oriented professional staff in the areas of business development, project management, and finance.
- Establishment of new partnerships with industry and government mission-agencies.

METRICS FOR INITIATIVE 1

Lead time
to key milestones
for applied

**PROJECT
INITIATION
and
EXECUTION**

Number of

NEW
industry/government
PARTNERS
and
PROJECTS

Research and
development expenditures
for

**NEW
PROJECTS**
of
\$3M
per year by 2024



INITIATIVE 2

Excellence in Research

Double research productivity, particularly in strategic growth areas of biomedical, computing, energy, and water.

STRATEGIC AREAS

- Biomedical
- Computing
- Energy
- Water

BIOMEDICAL

Become the leader in the central U.S. region for biomedical engineering research, known for the creation of technologies that advance human health.

GOALS

- Build an interdisciplinary biomedical research enterprise with cluster hires of world-class faculty across OU's three campuses.
- Design and invent translational healthcare technologies and commercialize through new start-up companies.

RESEARCH THEMES

Cancer Nanomedicine

Photothermal therapy, peptide-based drugs, targeted delivery, and theranostics.

Brain Research and Neural Engineering

Traumatic brain injury, post-traumatic stress disorder, cerebral palsy, brain tumors, pain, Alzheimer's disease, and depression.

Biomedical continued

Regenerative Medicine

Arthritis (bone and cartilage repair), spinal cord, temporomandibular joint, trachea, vision, diabetes.

Medical Imaging

Digital mammography, radiography, fluoroscopy, biophotonics, fluorescence lifetime imaging, cancer imaging, image processing.

Auditory Function

Biomechanical modeling and measurement of blast and other threats of auditory injury; hearing protection mechanisms; and restoration of hearing and balancing functions.

Immunoengineering

Diabetes, cancer, arthritis.

Biomaterials

Drug delivery, scaffolding for tissue engineering, cancer therapy.

Health and Medical Systems

OUTCOMES

- A self-sustaining funding stream from NIH, DoD, private foundations, and other agencies for cross-campus biomedical research.
- Enhanced funding from SBIR/STTR programs through industry partnerships.
- Status as the #1 public BME department in the 15+ contiguous states in the central US.
- Enroll 45 BME PhD students by 2024.

COMPUTING

Achieve national visibility in areas of computing research and development that are key to Oklahoma's future.

GOALS

- Establish and lead a center of excellence in artificial intelligence and machine learning for broad multidisciplinary research and application domains.
- Provide research leadership in secure embedded software engineering to support the Applied Research Institute's embedded systems research theme.
- Establish industry-sponsored computing research in sectors of importance to Oklahoma, including aerospace/defense, biomedical, and energy.

RESEARCH THEMES

Artificial Intelligence and Machine Learning

Development of advanced methods for enormous spatiotemporal data sets constrained by real-time analysis and prediction requirements.

Secure Embedded Software Engineering

Advancements in design, development, testing, and deployment of safety-critical real-time embedded software systems.

OUTCOMES

- New collaborations and synergies among programs in computer science, computer engineering, and data science and analytics.
- Development of applied research programs in cybersecurity and embedded software engineering.
- Computing-related research expenditures in excess of \$5M per year by 2024.
- 32 regular faculty in computing, including 10 new faculty on the OU-Norman campus and 7 new faculty on the OU-Tulsa campus.

ENERGY

Broaden OU's national reputation in energy research through strategic initiatives in energy efficiency and power engineering, and by strengthening research collaborations with the Mewbourne College of Earth and Energy.

GOALS

- Innovate unique technologies to support efficient, resilient, diversified, and distributed energy systems.
- Establish new facilities to provide direct experiential training and education with grid modernization technologies.
- Develop and nurture meaningful collaborative relationships among the GCoE, MCEE, and industry to support unconventional fossil fuel research.

RESEARCH THEMES

Sustainability

Advancements in efficiency, resiliency, and diversification in the context of distributed smart power production and distribution systems.

Power systems

Protection of power grids with highly distributed and volatile energy resources.

Refining

Development of new hydrocarbon refining and utilization technologies through advancements in heterogeneous catalytic science.

Complex Fluids

Development of next generation oil field fluids for deep formation permeability modification through the design of new surfactant, polymer, and particle systems.

Produced Water

Development of novel treatment technologies to enable reuse of produced water, working together with the water priority.

OUTCOMES

- Expanded collaborative research portfolio that is significantly supported by industry partnerships.
- Expanded capacity for R&D and graduate program quality in areas of refining, power, and energy systems.
- New state-of-the-art facility for power systems simulation and experimental capabilities.
- Double the annual number of graduates that accept positions in the utilities and renewable energy industry.

WATER

Build an internationally renowned program that addresses complex water challenges – quantity, quality, and management – from local to global scale and requires application of innovative science and technology to provide solutions.

GOALS

- Establish the Oklahoma Water Survey as the leader in enabling science-based solutions for water challenges in Oklahoma.
- Grow the Water Technologies for Emerging Regions (WaTER) Center to address water quantity, quality, and equity issues in emerging regions around the world.
- Lead an NSF engineering or science center (or equivalent) in one of the three thematic areas.

RESEARCH THEMES

Smart Water

Application of sensors, information technology, and data analytics to optimize use of water resources.

Water Reuse

Application of engineered treatment technologies and operational strategies to utilize marginal waters (e.g., produced water, municipal and industrial wastewater, and storm water).

Engineering with Nature

Development of hybrid systems that combine engineered and natural systems to treat and manage polluted water, while also providing additional ecosystem services.

OUTCOMES

- A unified and collaborative university program addressing water resource issues.
- Double the number of Ph.D. students receiving degrees in this topical area.
- Double faculty research expenditures and publications stemming from this effort.

METRICS FOR INITIATIVE 2

Increase regular faculty strength by 60 to

**190 TOTAL
FACULTY**

Increase student enrollment to

**500 DOCTORAL
STUDENTS**

Appropriately

COMPENSATE
faculty and graduate students
to peer compa-ratios

Increase GCoE research
expenditures by 100% to

\$40M
per year by 2024



INITIATIVE 3

Diversity, Equity and Inclusion

Enhance and broaden GCoE commitment to Diversity, Equity and Inclusion to create a competitive advantage for the college and its stakeholders.

GOALS

- Implement assessment cycle for college-level climate survey to understand and guide improvements in college environment.
- Leverage education and understanding of DEI to build leaders and foster excellence.
- Facilitate opportunities to enable growth in cultural competence and strengthen the college.
- Increase visibility and recognition of DEI initiatives and improvements.

OUTCOMES

- Improved diversity-related metrics and track using an equity scorecard.
- DEI training for all members of the college community.
- Resources available for faculty to support DEI issues (e.g., recruiting diverse faculty, staff, and students; student retention; ensuring an inclusive classroom culture).
- Collaborative DEI culture of improvement facilitated through faculty, students, and staff led by Councils of Inclusive Excellence.

METRICS FOR INITIATIVE 3

Full participation
of faculty and staff in relevant

DEI TRAINING

Close the gap in

STUDENT RETENTION

among student cohorts

Improve

DIVERSITY
within college faculty,
staff and student body

Show continuous improvement in

COLLEGE CLIMATE

through survey



INITIATIVE 4

Education and Workforce

Improve and expand opportunities to prepare engineers to excel in professional and research careers.

GOALS

- Broaden state, national and global impact on workforce by producing 1,250 engineering graduates per year.
- Develop and improve support structures to enhance graduate student success.
- Continue to meaningfully improve the education and professionalism of our undergraduate students.

OUTCOMES

- Expand online MS programs for workforce advanced education.
 - » Generate revenue to provide resources that drive research productivity.
- Provide new education pathways that prepare students with knowledge and skills needed for the state workforce.
 - » Computing Information Technology (OU-Tulsa)
 - » Academic certificates to provide specialized knowledge
- Develop and strengthen external pathways for recruitment of high-quality graduate students.
 - » Leverage GCoE for cross-disciplinary recruiting opportunities
 - » Build competitive financial structures for graduate student support
- Enhance and develop opportunities for interdisciplinary educational experiences.
- Identify and implement strategic opportunities to improve retention.
- Support graduate student success through targeted professional development programs, workshops, and mentorship.

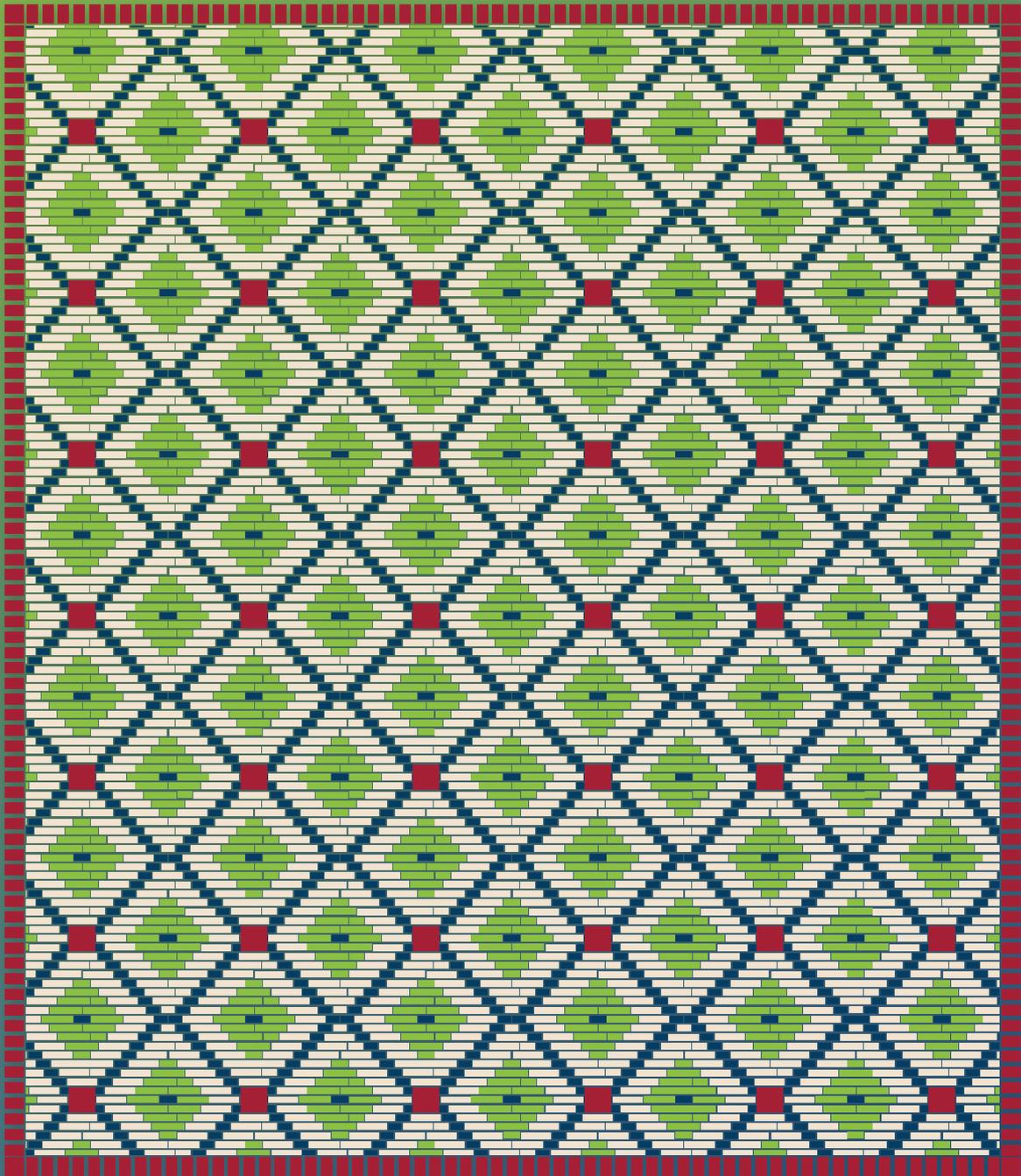
METRICS FOR INITIATIVE 4

DOUBLE REVENUE
from online programs for investment in research

Produce
1,250 GRADUATES
per year

Raise
DOCTORAL STIPENDS
to at least **\$25K** per year
across the college

Improve
GRADUATION
rate by 10% across college



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