

## **COM 1001: Pathways to Research Careers – Prof. Faulkner**

As an approved **Grand Challenges Scholars Program** by National Academy of Engineering (NAE) the Pathways to Research Careers course is part of the required core for all College of Arts & Sciences first-year students. Students meet in small work-group sessions, online discussion groups, offsite corporate learning experience teams, as well as, experience practicing professionals & academia learned professors who lead lecture seminars, corporate case studies sessions, research exercises, or workshop demonstrations each week. The Pathways research course emphasizes active collaborative learning (ACL), interdisciplinary innovation, entrepreneurial mind-set learning (EML), problem-based learning (PBL) and Inclusiveness Equity - CRE-Pillars. As a result, students are prepared for work life, managing constant change, patent law, business leadership, entrepreneur start-up challenges, organizational planning, teamwork, diversity, multicultural insights, communication relevance, cultural sensitivity and ethical research design necessary to become successful in the real world. Additionally, throughout the Pathways curriculum students will identify several available campus resources, labs, local research projects, and services designed to support students for a successful experience at LTU and beyond.



**[www.engineeringchallenges.org/challenges.aspx](http://www.engineeringchallenges.org/challenges.aspx)**

Students must submit three major course assignments in order to pass the class and achieve CRE (CURE) programming goals. The major course assignments consist of the creation of a research poster, research web site, and research proposal based on a selection of a global humanity and/or technology problem identified by the National Academy of Engineering (NAE) Grand Challenge Scholars Program (GCSP) of 14 tasks for the Grand Challenges of the 21st Century (see link above). Other global sustainable challenges and research goals are also addressed in the class including the United Nations (UN) Sustainable Planet Goals, World

Bank Forum -Top 10 Problems Facing the World 2020, industry/major fields of study research and more. Additionally, by successfully completing the course students may be eligible to participate in the LTU NAE Grand Challenge Scholars Program “Scholars Honors” transcript certification program to be completed before the student graduates.

## Meeting the 14 Grand Challenge Goals Delivers the Vision

The infographic displays 14 Grand Challenge Goals, organized into four thematic categories, each represented by a colored box:

- sustainability** (green box):
  - Make Solar Energy Economical
  - Provide Energy from Fusion
  - Develop Carbon Sequestration Methods
  - Manage the Nitrogen Cycle
  - Provide Access to Clean Water
- health** (blue box):
  - Engineer Better Medicines
  - Advance Health Informatics
  - Reverse Engineer the Brain
- security** (red box):
  - Secure Cyberspace
  - Prevent Nuclear Terror
  - Restore and Improve Urban Infrastructure
- enriching life** (pink box):
  - Enhance Virtual Reality
  - Advance Personalized Learning
  - Engineer the Tools of Scientific Discovery

The background features a stylized globe with a hand placing a puzzle piece into it, symbolizing the integration of these goals. The National Academy of Engineering logo is visible at the bottom.

**Research Methods** - The course includes historical, experimentation, evaluation, comparative, descriptive, ethnological, or cultural scientific method research styles to address major problems of interest for each student. Using weekly exercises, in-class discussions, learning check points, and final oral research proposals, research web site reviews, & poster presentations students are self-directed to drive the core research method deliverable assignments toward completion. Also during the term, students practice statistical writing, business & financial development, entrepreneur leadership, teamwork, orator skills, graphic design, and critical thinking. With practical learning demonstrations, online and home study activities, and team discussions students enjoy sharing their knowledge in what's called “Pathways Journals.” The Journal club method gives students a chance to be introduced to the

LTU 3 - CRE Pillars of Discovery through Scholarly Practices, Inclusive Collaboration, and Communication Relevance. For example, students will be required to canonize the Pathway's classes overall experience by sharing a video journal of reflections on inclusiveness, cultural sensitivity, and collaboration as assigned periodically for the students online research journals. Pathways Journals are designed for feedback and assessment with the instructor, classmates and quests is a key documentary skill on communications relevance that every researcher has to learn to do well. Also, the Pathways journal answers the explicitly focused question of "so, what?" Why does the student's research question and projects deliverables matter to the world and how are students helping to save the planet of > 8 Billion people.

**Entrepreneurship** – Finally, the Pathways course focuses on entrepreneurship and branding which brings their research projects to life, surrounding the crucial issues they've addressed to give clear understanding of the dynamic field of moving forward the necessary entrepreneurship process of new ideas in start-up or existing company. Pathways equips students with the necessary business knowledge for the "real world" to apply a range of skills applicable to many majors and industries - from sustainable industries, information technology, computer science, engineering, healthcare, nursing, architecture, biotechnology, as well as the musical and creative fine arts fields of study. Key entrepreneurship concepts taught in the course include: the theories & tools of building trust, create a mission, secure a team, drive results, creative thinking, market research, intellectual property protection, and market economics.