Solving a complex issue, the BS-X takes a cross-disciplinary approach

Example 1 : Oilfield Chemistry

Complex challenge	Proposed solution
How can we design, predict, improve the properties of oilfield chemicals in the complex upstream operations during the different development phases of oil & gas fields?	An unstructured program that provides a deep understanding of the underlying mechanisms associated with the application of oilfield chemicals in upstream E&P and the ability to devise new solutions for challenges in EOR, reservoir monitoring, productivity enhancement, and drilling optimization.

Major		Needed skills in the discipline	If taken alone
Petroleum Engineering	7 courses	Appropriate understanding, design, and execution of upstream operations	Insufficient background on chemistry
Chemistry	9 courses	In depth understanding of organic and inorganic chemistry	Lack of understanding the design aspects of upstream operations
Geology	2 courses	Knowledge of rock types, rock compositions, and textures	Limited understanding of fluid/rock interactions and engineering design

Summary of degree requirement of oilfield chemistry			
Areas	**Credit hours**	**Areas**	**Credit hours**
Math & Science	28 or 29	General Studies	22
Digital and Business foundation	12	Major depth	67
Total	129 or 130		

Solving a complex issue, the BS-X takes a cross-disciplinary approach

Example 2 : Climate resilience engineering

Complex challenge	Proposed solution
How can we harmonize ongoing technological innovation with the complexity of Earth's natural systems to mitigate the impacts of anthropogenic climate change ?	need for gaining a deep appreciation for the way our planet's natural systems operate, while also gaining the technical skill set necessary to successfully design innovative solutions in energy, infrastructure, or agricultural systems.

Major	Needed skills in the discipline	If taken alone
Mechanical Engineering	practical design and fabrication of products	limit the number of classes to address resilience challenges
Civil and Environmental Engineering	energy-efficient infrastructure, climate change and pollutants	Narrow scope within the built environment
Bioengineering	engineered organisms in agricultural, energy, or environmental pollutant management systems	Absence of energy or infrastructure components critical to any resilient system

https://ughb.stanford.edu/majors-minors/individually-designed-major-engineering

Solving a complex issue, the BS-X takes a cross-disciplinary approach

Example 2 : Biomimetic Design Engineering

Complex challenge	Proposed solution
How can we understand and learn from the nature's brilliance to address the intricate challenges across diverse domains, from developing advanced materials and energy-efficient technologies to addressing complex ecological and healthcare issues.	harnessing the wealth of knowledge derived from nature's designs to create sustainable and efficient designs and technologies. This interdisciplinary approach, integrating biology with design and materials, aims to pave the way for advancements that not only address intricate challenges but also contribute to a more harmonious and sustainable coexistence with our environment.

Major		Needed skills in the discipline	If taken alone
Mechanical engineering	6 courses	practical design and fabrication of products	Limited knowledge about biology and materials
Materials science engineering	5 courses	Understanding of materials properties	Limited exposure to design and biology
Bioengineering	7 courses	Animal and organic species adaptation to environment	limited exposure to materials and product design

Summary of degree requirement of oilfield chemistry			
Areas	**Credit hours**	**Areas**	**Credit hours**
Math & Science	29	General Studies	22
Digital and Business foundation	12	Major depth	67
Total	130		