The dynamic and evolving field of molecular engineering offers compelling challenges to creative engineers interested in making a global impact. The Molecular Engineering (MolE) Ph.D. program at the University of Washington - an innovative, interdisciplinary training program - offers students the opportunity to engage in cutting-edge research and learn from world-class faculty all within reach of Seattle’s thriving science and technology scene.

The MolE Ph.D. program teaches a rational approach to engineering highly-complex, multifunctional molecular systems, drawing on fundamental principles from physics, biology, chemistry, engineering, and materials science. Students learn to design and characterize molecules and systems of molecules, model molecular system behaviors and exploit molecular constraints impacting system functionalities.

By removing conventional boundaries between science and engineering disciplines, this unique degree program aptly prepares the next-generation of interdisciplinary researchers and innovators.

Program Features:

- Students become experts in an emerging field with a wide range of career opportunities
- With over 130 participating faculty from 20+ departments across the university, students have the flexibility to pursue diverse research interests
- Students have the option to receive additional training in data science through the UW eScience Institute

Admissions Requirements

- BS/BA degree in an engineering or natural sciences field
- One undergraduate college course in Thermodynamics and/or Statistical Mechanics
- Score of at least 159 (75th percentile) on the quantitative portion of the GRE

Core Curriculum

- Fundamentals of molecular properties and material functionalities
- Material molecular hierarchies and assemblies
- Material and device functionality guided molecular synthesis
- Synthetic biosystem engineering on the molecular scale

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A pioneer in molecular engineering education, the Molecular Engineering & Sciences Institute at the University of Washington (UW) launched one of the first molecular engineering Ph.D programs in 2014. The MolE Ph.D. program draws on expertise from across UW to create a unique education and research opportunity for trainees.
**AREAS OF RESEARCH**

Through their deep understanding of molecular properties and interactions, MoE students design and assemble better materials, systems, and processes for a wide variety of applications. The following are some of the projects they have pursued.

**CleanTech**

- Material and device functionality guided molecular synthesis
- Molecular structure and solid condensed phase assembly
- Structure effects on electronic and photonic material properties
- Optoelectronic properties such as light absorption, fluorescence, and phosphorescence
- Charge transport mechanisms in organic materials
- Organic light emitting diodes, field-effect transistors, and organic photovoltaic devices
- Electro-optical properties of organic systems
- Electrochemical Cells
- Energy Storage

**BioTech**

- Synthetic biosystem engineering on the molecular scale
- Design of bio-molecular building blocks
- Artificial biochemical reaction networks and devices
- Biomolecular engineering involving DNA and proteins
- Gene regulation and signaling
- Chemical kinetics/stochastic processes
- Hierarchical systems
- Metabolic functionalities

**Join a Growing Community**

Students engage with other related high-impact, interdisciplinary UW institutes including the Clean Energy Institute, Institute for Protein Design and Institute for Nano-Engineered Systems.

Students also have the opportunity to meet nationally and internationally recognized molecular engineering experts through our weekly seminar series.

“*My research benefited from the training I received in that it gave me both a deep and holistic understanding of molecular science as well as the ability to approach my research with an engineering mindset.*”

-Hao Shen, MolE Alumni

**Utilize State-of-the-Art Research Facilities**

The Molecular Analysis Facility and Washington Nanofabrication Facility support cutting-edge molecular engineering research at UW.

Together these facilities provide state-of-the-art equipment and advanced expertise, allowing users to characterize surface morphologies, measure fundamental properties of materials, and fabricate devices at the nanoscale.

These publicly-accessible, shared user facilities serve the UW research community as well as scientists and engineers at other universities, government labs, non-profit research institutes and in industry.

**Thrive in an Environment of Opportunity**

The University of Washington is located in Seattle, the major city center of the greater Puget Sound region. The UW is among the nation’s top public universities for research funding.

With more than $1.4 billion in sponsored research funds, UW is a major contributor to the Puget Sound’s reputation as a hotbed for research and development.

Seattle is home to some of the most recognizable global companies as well as a booming biotech and clean tech scene. Seattle is a growing and vibrant urban city - with an active arts, cultural and sports scene - surrounded by unmatched natural beauty.

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**For more information about the MoE Ph.D. Program, contact:**

Paul Neubert, Graduate Program Advisor
206-221-6542 | moleng@uw.edu
www.MoEES.washington.edu/PhD