

Department of Chemical and Biomedical Engineering

E-mail: Statler-CHE@mail.wvu.edu

Degrees Offered

- Bachelor of Science in Biomedical Engineering (B.S.Bm.E.)
- Bachelor of Science in Chemical Engineering (B.S.Ch.E.)

Nature of Programs

The Department of Chemical Engineering offers undergraduate degrees in chemical engineering (ChE) and biomedical engineering (BMEG). Chemical engineers focus on processes that convert raw materials such as crude oil, biomass, coal and natural gas into value-added finished products such as plastics, paints, detergents and pharmaceuticals. Biomedical engineers are trained to work at the interface of engineering and biomedical sciences, and they focus on developing engineering skills and applying them to materials, processes and procedures used in medicine and biology. Both degree programs require a strong background in chemistry, mathematics, and physics.

The chemical engineering curriculum is relatively structured with courses that must be taken in a specific sequence. A unique aspect of the ChE curriculum is its heavy emphasis on design, beginning in the sophomore year. Graduates with a BSChE degree are prepared for positions in production, product and process development, sales and marketing, management and also research. There is a large concentration of chemical industry in the area, and the ChE program benefits from interactions with industrial practitioners.

The biomedical engineering program offers significant flexibility of study through a variety of electives. With the participation of faculty from several engineering departments, students learn about cells and tissues but also topics such as imaging and mechanics. Students are encouraged to do research and work side-by-side with faculty in both engineering and the WVU Health Sciences Center in areas such as tissue engineering and cancer diagnosis. Graduates with a BSBmE degree are prepared for solving the health-related problems and improving the quality of life of the aging population within the state and the nation.

Students in both programs are also prepared for graduate school in engineering and for professional schools in business, law and medicine.

FACULTY

CHAIR

- Rakesh Gupta - Ph.D. (University of Delaware)
Berry Professor and Chair, Professor. Polymer processing, Rheology, Non-Newtonian fluid mechanics, Composite materials

PROFESSORS

- Brian J. Anderson - Ph.D. (Massachusetts Institute of Technology)
Director, Energy Institute; GE Materials Professor. Natural gas hydrates, Sustainable energy development, Molecular dynamics, Quantum chemical calculations
- Eugene V. Cilento - Ph.D. (University of Cincinnati)
Glen H Hiner Dean. Physiological transport phenomena, Biomedical engineering, Image analysis, Mathematical modeling
- Pradeep Fulay - Ph.D. (University of Arizona)
Associate Dean for Research. Advanced electronics, Magnetic materials and devices, Flexible electronics, Synthesis and processing of nanomaterials
- John (Jianli) Hu - Ph.D. (Tsinghua University)
Shale gas utilization, Catalysis in refining processes, Coal and biomass conversion
- Richard Turton - Ph.D. (Oregon State University)
Bolton Professor. P.E. Fluidization, Heat transfer, Particle and powder technology, Chemical process design
- John W. Zondlo - Ph.D. (Carnegie Mellon University)
Coal enhancement and utilization, Carbon science, Environmental remediation

ASSOCIATE PROFESSORS

- Debangsu Bhattacharyya - Ph.D. (Clarkson University)
Integrated gasification combined cycle (IGCC), Chemical looping, Fuel cells (SOFC & PEM), Optimization, Dynamic modeling of process systems, Process control
- Zoica Cerasela Dinu - Ph.D. (Max Planck Inst of Molecular Cell Biology & Genetics & Dresden University of Technology)
Associate Chair, BMEG. Nanomaterials, Bionanotechnology, Biomimetics

- David J. Klinke - Ph.D. (Northwestern University)
Systems biology, Kinetics, Cellular signal transduction pathways, Immunology, Mathematical modeling, Bioengineering
- Charter D. Stinespring - Ph.D. (West Virginia University)
Wide bandgap semiconductor growth and etching, Surface kinetics, Thin films, Electronic materials

ASSISTANT PROFESSORS

- Ahmed E. Ismail - Ph.D. (Massachusetts Institute of Technology)
Biomass and biopolymers, Interfacial phenomena, Multi-scale modeling, Algorithm development
- Fernando V. Lima - Ph.D. (Tufts University)
Process design and operability, Model-based control and optimization, State estimation and process identification, Emerging energy systems, and Sustainable processes
- Jeevan Maddala - Ph.D. (Texas Tech University)
Microfluidics, Cell screening, Nanomaterial synthesis
- Hanjing Tian - Ph.D. (Lehigh University)
Chemical looping combustion, CO₂ capture, Shale gas utilization, Biomass gasification and refinery
- Yong Yang - Ph.D. (The Ohio State University)
Stem cell technology, Polymer micro/nanotechnology, Biomaterials

RESEARCH ASSOCIATE

- Sushant Agarwal - Ph.D. (West Virginia University)
Polymer processing and characterization, Rheology, Nanocomposites, Emulsions, Nanofluids, Suspensions

TEACHING ASSISTANT PROFESSOR

- Robin S Hissam - Ph.D. (University of Delaware)
Biomaterials, Polypeptides, Drug delivery, Bioengineering and materials science

ADJUNCT PROFESSORS

- Deepak Doraiswamy - Ph.D. (University of Delaware)
- Joseph D. Henry - Ph.D. (University of Michigan)
- Charles M. Jaffee - Ph.D. (University of Colorado)
Theoretical Chemistry, Molecular and Atomic Physics, Nonlinear Dynamics, Astrodynamics
- George E. Keller, II - Ph.D. (Pennsylvania State University)
- Mahesh Padmanabhan - Ph.D. (University of Minnesota)
- David L. Walker - Ph.D. (West Virginia University)
- Robert Wildi - B.S. (Fenn College/Cleveland State University)
- Stephen Zitney - Ph.D. (University of Illinois at Urbana-Champaign)
Dynamics, Control and optimization of energy systems; Computational fluid dynamics (CFD) and process co-simulation; Pulverized coal combustion; Oxy-coal Combustion; Integrated gasification combined cycle (IGCC); Chemical looping; Supercritical CO₂ power cycles; CO₂ capture

ADJUNCT ASSOCIATE PROFESSOR

- Bingyun Li - Ph.D. (Chinese Academy of Sciences)
Assoc. Prof. of Orthopedics. Bioengineering and advanced biomedical devices, Nanotechnology sorbents, Coatings and capsules

PROFESSORS EMERITUS

- Eung H. Cho - Ph.D. (University of Utah)
Mineral processing, Leaching, Solvent extraction, Environmental science
- Dady B. Dadyburjor - Ph.D. (Delaware)
Catalysis, Reaction Engineering
- Edwin L. Kugler - Ph.D. (Johns Hopkins)
Catalysis, Adsorption, Coal Liquefaction
- Joseph A. Shaeiwitz - Ph.D. (Carnegie-Mellon)
Design, Design Education, Outcomes Assessment
- Alfred H. Stiller - Ph.D. (University of Cincinnati)
Physical/inorganic/solution chemistry, Coal liquefaction, Carbon science
- Ray Y. K. Yang - Ph.D. (Princeton)
Biochemical and Chemical Engineering, Nonlinear Dynamics

RESEARCH ASSISTANT PROFESSOR

- Nagasaree Garapati - Ph.D. (West Virginia University)

Carbon dioxide capture and storage (CCS) in various geologic media, utilizing carbon dioxide in gas hydrate reservoirs, petroleum reservoirs and geothermal reservoirs for enhanced gas, oil and heat recovery

- Huali Wang - Ph.D. (Wayne State University)
Shale gas, renewable energy, clean energy, energy catalysis, and reaction engineering

BIOMEDICAL ENGINEERING MINOR

MINOR CODE - U142

The minor is open to all students with the prerequisite coursework, which includes:

Biology: BIOL 115 OR (BIOL 101, BIOL 102, BIOL 103, AND BIOL 104)

Mathematics: MATH 155 and MATH 156. Students must also complete MATH 251 and MATH 261 for completion of minor.

Chemistry: CHEM 115 and CHEM 116

The minor consists of 5-6 courses, totaling 16 hours.

Required Courses:

7

BMEG 201	Introduction to Biomedical Engineering
or EE 425	Bioengineering

Choose one of the following:

BIOL 235 & BIOL 236	Human Physiology and Human Physiology: Quantitative Laboratory
BIOL 117	Introductory Physiology

Electives:

9

Choose three of the following:

BMEG 310	Biomedical Imaging
BMEG 311	Biomaterials
BMEG 340 or MAE 473	Biomechanics Bioengineering
BMEG 480	Cellular Machinery
BMEG 481	Applied Bio-Molecular Modeling
BMEG 482	Introduction to Tissue Engineering

Total Hours

16

CHEMICAL ENGINEERING MINOR

MINOR CODE - U101

Any student may take a minor in chemical engineering by passing the following courses and maintaining a 2.0 GPA or better in these courses.

Courses must be taken in the following order:

CHE 201	Material and Energy Balances 1	3
CHE 202	Material and Energy Balances 2	3
CHE 320	Chemical Engineering Thermodynamics	3
CHE 312	Separation Processes	3
CHE 325	Chemical Reaction Engineering	3

Total Hours

15

Biomedical Engineering Certificate offered in Chemical Engineering

CERTIFICATE CODE - CU02

The Department of Chemical Engineering administers a certificate program in biomedical engineering that is open to all students with appropriate prerequisites, which are: basic biology (BIOL 115), mathematics through MATH 261 (differential equations), CHEM 115, and CHEM 116 and a working knowledge of organic chemistry, specifically the naming conventions for, and knowledge of charge distribution in, organic molecules. Currently, the certificate program consists of six required courses listed below. As other courses are added in the biomedical engineering area, more choices of elective courses will be made available.

Required Courses

4 Department of Chemical and Biomedical Engineering

BIOL 235	Human Physiology	3
BIOL 236	Human Physiology: Quantitative Laboratory	1
BMEG 201	Introduction to Biomedical Engineering	3
BMEG 311	Biomaterials	3
Electives		
BMEG 481	Applied Bio-Molecular Modeling	3
BMEG 482	Introduction to Tissue Engineering	3
Total Hours		16

For chemical engineering undergraduates, the certificate program can be completed with the addition of one additional credit hour (134 hours total). Students wishing to attend medical school will have to take CHEM 234/CHEM 236 (four hours) for a total of 138 credit hours.