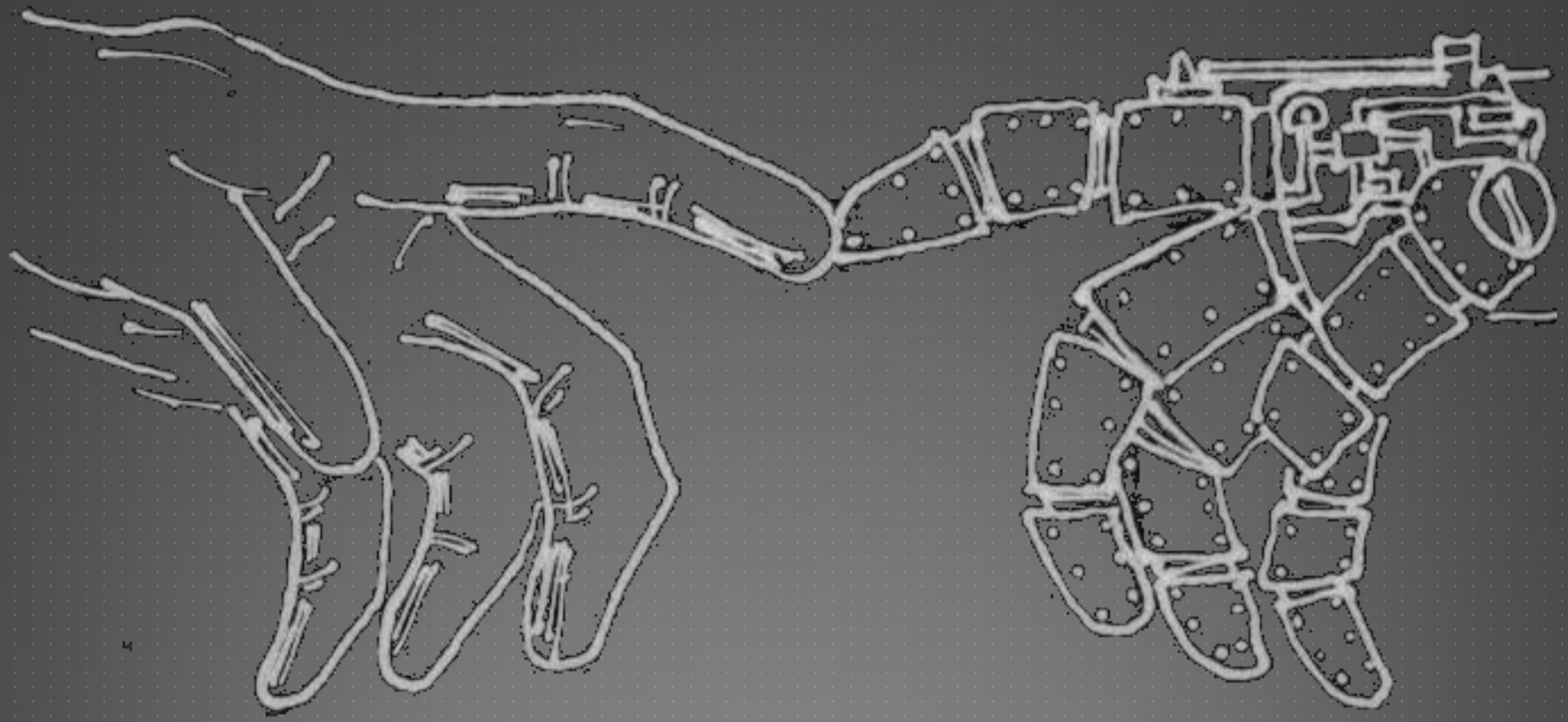
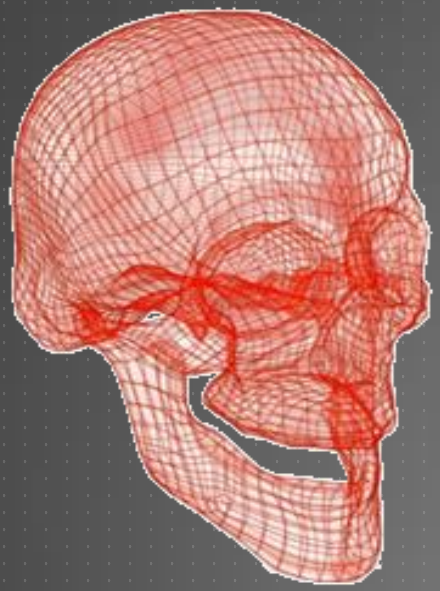


BIOMEDICAL ENGINEERING

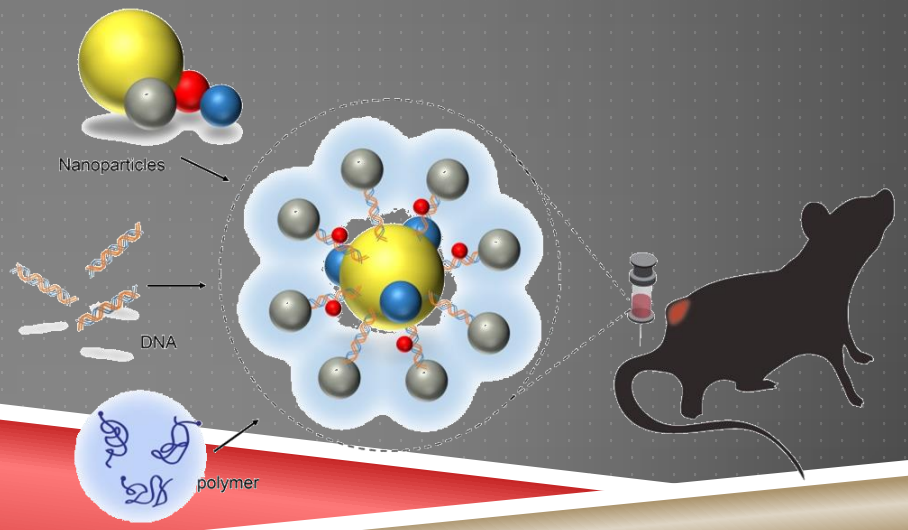
WHAT IS BIOMEDICAL ENGINEERING?



- Biomedical engineers apply the concepts of engineering – mathematical modeling, analysis, design – to living systems, improving lives by solving problems in biology and medicine. The field is rapidly expanding to include many exciting research areas:
  - Bioinstrumentation: developing tools for biological research
  - Biomaterials: creating synthetic materials intended to interact with living systems
  - Biomechanics: analyzing the mechanics of living organisms
  - Cell and tissue engineering: repairing or replacing living cells with synthetic cells
  - Drug delivery: improving the way medications are administered
  - Medical imaging: creating images of the body using light, sound, radiation, electrodes, etc.

WHAT DO BIOMEDICAL ENGINEERS DO?

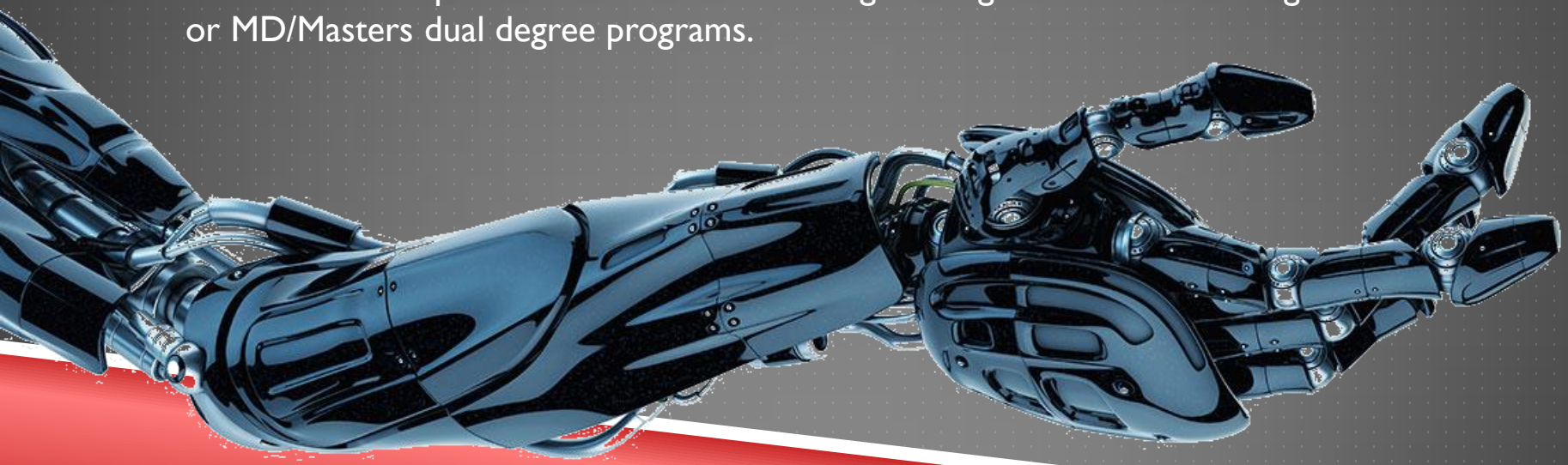
- Biomedical engineers design surgical robots and artificial organs, make synthetic lubricants for aging joints, improve techniques for DNA sequencing and make MRI machines smaller and more powerful. And new job opportunities for biomedical engineering are constantly emerging – U.S. News & World Report recently named biomedical engineering the country's fastest growing occupation.
- Many graduates work in the biotechnology industry, in pharmaceutical and medical device companies. Others work in hospitals, medical research facilities and government regulatory agencies. Many of our students go on to medical school and then use their knowledge of technology to improve patient care and conduct research.



bu.edu/eng/academics/programs/biomedical/#degreesOffered

DEGREE OPTIONS

- Careers in BME are diverse and may be pursued with a variety of educational backgrounds.
- Students with bachelor's degrees in Biology, Engineering, or related fields may pursue BME after graduation and then decide on an advanced degree based on their career trajectory.
- To advance in the field, a few degrees are common, including a Master of Engineering (M Eng), a Master of Science (MS), or a doctoral degree (PhD).
- Some students opt to combine biomedical engineering and medical training in MD/PhD or MD/Masters dual degree programs.

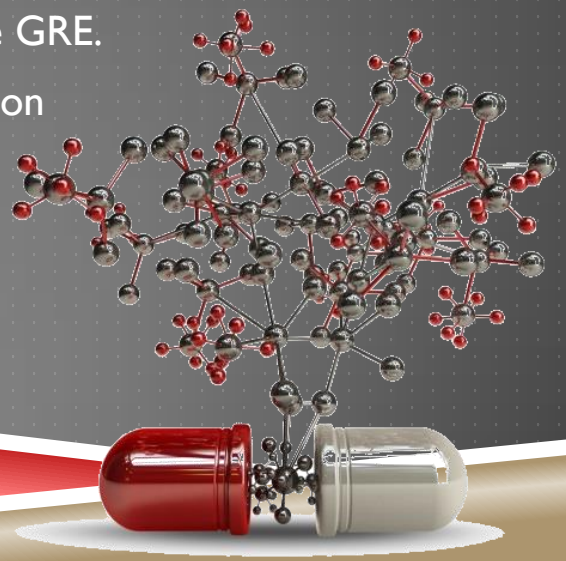


DEGREE OPTIONS: DUKE

	PhD	MS	M Eng
Curriculum:	Research degree with advanced technical course work and a dissertation	Research degree with advanced technical course work and a thesis	Non-thesis degree comprised of technical and business coursework with internship and applied research experience
Professional Interests	Research/technology development in academia, industry, or government	Research/technology development in academia, industry, or government	Product design, product development, and innovation in industry
Duration	6 years	1.5-2 years	1.5-2 years
Ideal for	Those interested in leading specialized research efforts, contributing new knowledge in an interdisciplinary, highly collaborative environment.	Those interested in participating in research efforts, or who are preparing for a doctoral program.	Those who seek practice-oriented training through both course work and real world training.
Learn More	BME.Duke.edu/Grad/PhD	BME.Duke.edu/Master-Science	BME.Duke.edu/Grad/MEng

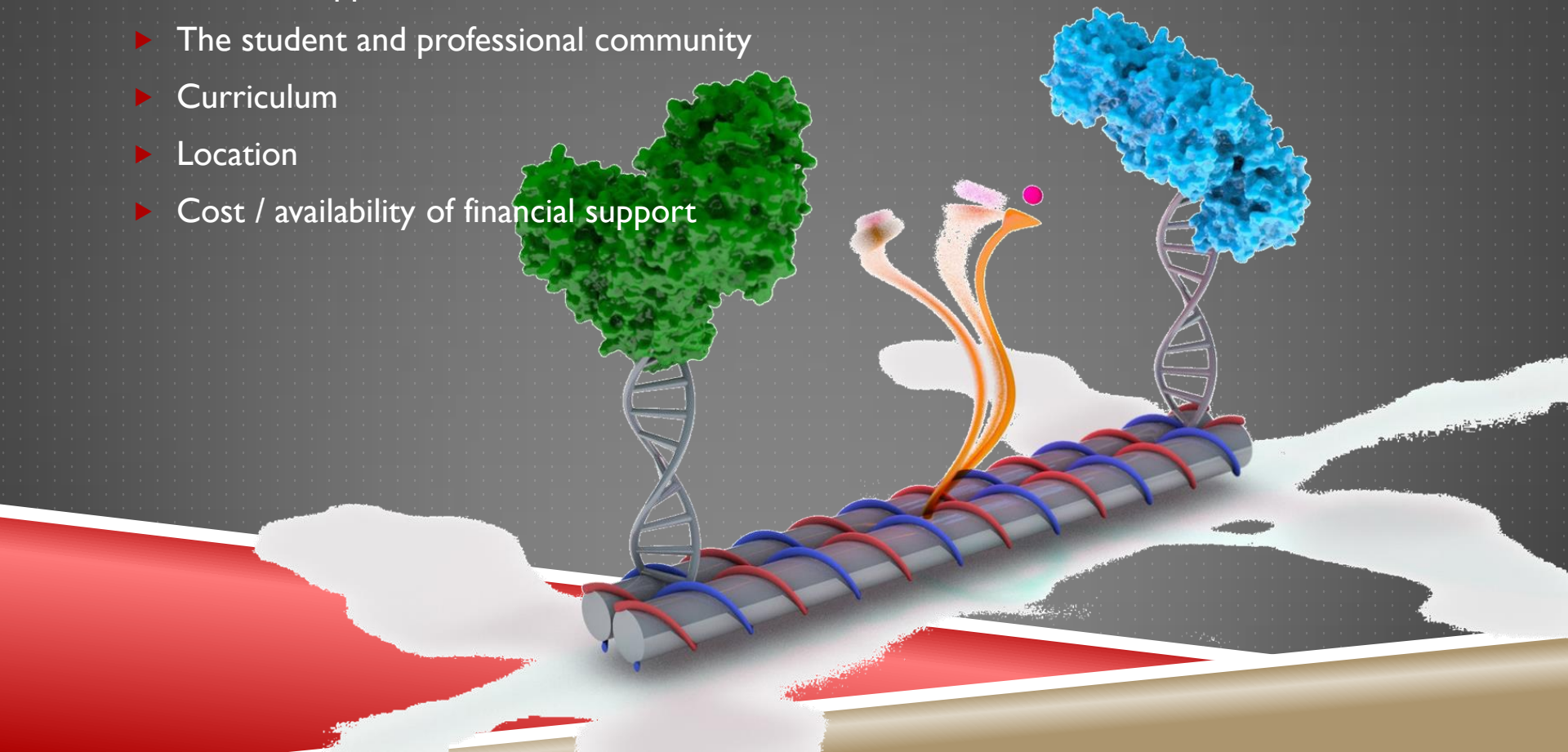
ADMISSIONS REQUIREMENTS

- Will vary depending on the program, but will likely include:
  - Degree in engineering or a science discipline, or course work in Physics, Chemistry, advanced Mathematics, and Biology
  - GRE
  - Personal statement
  - Letters of recommendation
  - Application deadlines generally in the academic year prior to matriculation
- Students applying for the MD/PhD will follow regular medical school admissions requirements and may have additional requirements set by the PhD program.
  - Most MD/PhD programs accept the MCAT in lieu of the GRE.
  - Students will apply about 15 months prior to matriculation



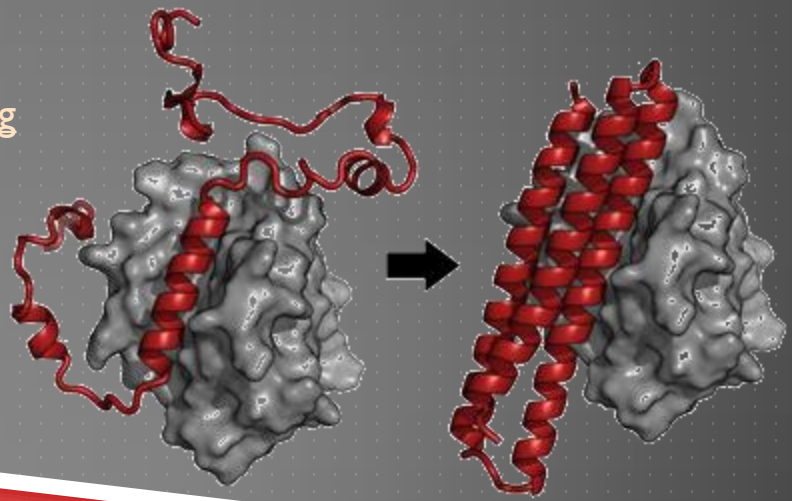
FACTORS IN SELECTING SCHOOLS

- Availability of specialty area(s) of interest. BME encompasses diverse areas of study, from Computational Biology to Systems Neuroscience to Tissue Engineering, to name a few. Different programs specialize in different areas.
- Research opportunities
- The student and professional community
- Curriculum
- Location
- Cost / availability of financial support



SAMPLE SCHOOLS FOR BME

- The Whiting School of Engineering at Johns Hopkins University
- The College of Engineering at Georgia Institute of Technology
- The School of Engineering at Massachusetts Institute of Technology
- University of California – San Diego Jacobs School of Engineering
- The School of Engineering at Stanford University
- The Pratt School of Engineering at Duke University
- The College of Engineering at University of California-Berkeley
- Rice University Brown School of Engineering
- University of Washington College of Engineering



grad-schools.usnews.rankingsandreviews.com/best-graduate-schools/top-engineering-schools/biomedical-rankings

SCHOOLS WITH MD/PhD IN BME

This is not an exhaustive list. See AAMC.ORG MD/PhD Policies for more

- Perelman School of Medicine at the University of Pennsylvania
- Stanford University School of Medicine
- Boston University School of Medicine
- Yale School of Medicine
- Case Western Reserve University School of Medicine
- Northwestern University Feinberg School of Medicine
- Vanderbilt University School of Medicine
- University of Pittsburgh School of Medicine / Carnegie Mellon University
- Mayo Clinic

grad-schools.usnews.rankingsandreviews.com/best-graduate-schools/top-engineering-schools/biomedical-rankings

SAMPLE CURRICULUM

MS IN BIOENGINEERING AT STANFORD

Bioengineering courses

- Molecular and Cellular Bioengineering & Lab
- Physiology & Tissue Engineering
- Clinical Needs and Technology

Approved Technical Electives

- Courses in mathematics, statistics, engineering, physical science, life science and medicine
- At least one course in an area of device or instrumentation
- Chosen within a given focus area, e.g., Biomedical Computation, Biomedical Imaging, Biomedical Devices

Seminars

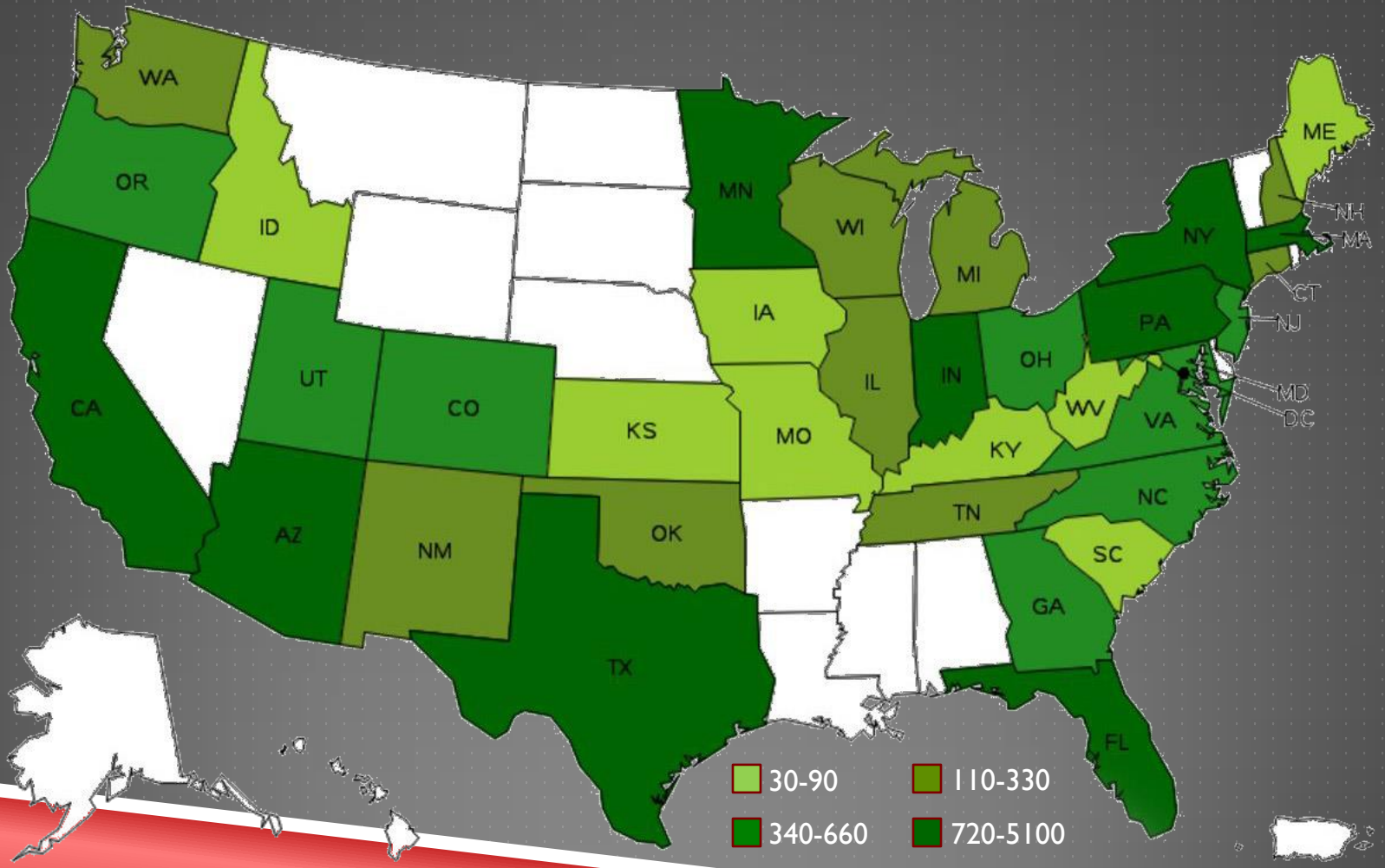
- Bioengineering Departmental Research Colloquium
- The Responsible Conduct of Research

Unrestricted Electives

- Chosen in consultation with faculty advisor depending on area of focus

Bioengineering.Stanford.edu/Academics/Graduate-Programs/Masters-Program/How-Apply

EMPLOYMENT OF BME BY STATE, MAY 2015



BLS.Gov/OES/Current/OES172031.htm

VIDEOS AND ARTICLES OF INTEREST

- A Day in the Life of a Biomedical Engineer YouTube video (Youtube.com/watch?v=vC5V8ItAIIk)
- Biomedical Engineering at Georgia Tech YouTube video (Youtube.com/watch?v=ufaup0iZLy8)
- The IEEE Engineering in Medicine & Biology Society (EMBS) boasts over 9000 members. They have a career guide for students considering careers in Biomedical Engineering (EMBS.org/About-Biomedical-Engineering/Designing-a-Career-in-Biomedical-Engineering/)
- Designing a Career in Biomedical Engineering: an IEEE YouTube playlist for those considering a career in BME. (bit.ly/1RQ9awR)
- Articles of Interest
  - Top 5 Advances in Medical Technology (bit.ly/1pQrfOq)
  - Johns Hopkins Applied Physics Lab builds a bionic man (bit.ly/25AvYEM)
  - Using Machine Learning to understand drug interactions (tedmed.com/talks/show?id=529433)
  - Sangita Bhatia, MD, PhD trailblazer (tek.io/1Dy4sdm)

FOR MORE INFORMATION

- Bioengineering at Princeton: Princeton.edu/CBE/Research/Bio/
- Career Services Resources: CareerServices.Princeton.edu/Undergraduate-Students/Major-Career-Choices/Major-Exploration/What-Can-I-Do-My-Major/Chemical-and-Biological-Engineering
- BMES.org Biomedical Engineering Society, Advancing Human Health and Well Being
- IEEE.org The Institute of Electrical and Electronics Engineers is the world's largest professional association for the advancement of technology.
- EMBS.org The Engineering in Medicine and Biology Society is your global connection to the biomedical engineering community.
- Search for graduate programs online: Gradschools.com/Programs/Biological-Biomedical-Engineering

- Publications of Interest
  IEEE PULSE
  Transactions on Biomedical Engineering
  Reviews on Biomedical Engineering
  Designing a Career in Biomedical Engineering