


## Adrienne R. Minerick, PhD Bioengineer



**BIOENGINEER**  
ADRIENNE R. MINERICK, PH.D.

Place of Employment:  
**Michigan Technological University**

Type of Research:  
**Biomedical Microdevices**

*For example, tiny devices to measure and manipulate living cells*

"If a person is determined to learn, there will always be opportunities or resources for that person to pursue an education in science and engineering... There is a *real* demand for scientists and engineers whose contributions advance knowledge, technology, and the economic foundation of our society. I chose my career because I wanted to be a part of advancing knowledge and facilitating others to gain knowledge."

**CAREERS IN THE SPOTLIGHT:**  
**BIOENGINEER**

**What do they do?**  
A bioengineer uses the principles and tools of engineering to address problems in biology and medicine, creating usable products. These include designing medical devices, diagnostic equipment, renewable bioenergy, and genetically modified organisms.

**What kind of training is involved?**  
A bachelor's degree in engineering is required for almost all entry-level engineering jobs. Sometimes a graduate degree is also required, such as a Master's degree or Ph.D.

**What is a typical salary for a Research Scientist?**  
The average salary is about \$55,000/year (\$26/hour), with a range from \$45,000/year (\$22/hour) to more than \$120,000/year (\$58/hour).

### 1. Where did you grow up?

Alamosa, CO – it is a small college town in the center of a high altitude mountain valley.

### 2. What do you do (i.e., what career or field are you in; what is the title of your position)?

I'm an associate professor of chemical engineering at Michigan Technological University in Houghton, MI. My job is a combination of research with graduate and undergraduate students, and teaching bio-focused chemical engineering courses. My research is on biomedical microdevices. We use electric fields to distinguish ABO blood types that will help change medical diagnostics.

### 3. How did you choose your career? When did you first know this was the career you wanted?

Education is a very valuable asset that transcends all socio-economic classes. If a person is determined to learn, there will always be opportunities or resources for that person to pursue an education in science and engineering. On the other side of the college experience, there is a *real* demand for scientists and engineers whose contributions advance knowledge, technology, and the economic foundation of our society. I chose my career because I wanted to be a part of advancing knowledge and facilitating others to gain knowledge.

### 4. Did your family support your decision to pursue your career?

Yes, mostly. Some did not understand what an advanced degree (MS/PhD) really was. They didn't understand that it wasn't just coursework. Now that I'm a professor, they think that all I do is teach and don't really understand what goes into writing research proposals, managing a lab of researchers/equipment, and publishing papers to disseminate knowledge to others.

### 5. What is the highest level of education you have?

PhD in Chemical Engineering.

**6. What is the highest level of education reached by other members of your family?**

Mother – PhD in Vertebrate Paleontology.

Father – PhD in Mathematics.

**7. What is the salary range for a person in your position?**

\$85,000 - \$95,000 over nine months (professors aren't paid for three months in the summer unless they secure research funding to pay those three months). [That's about \$41-\$46/hour.]

**8. What do you like most about your job?**

The freedom and the variation. When an exciting research problem presents itself, I have the ability to seek resources to pursue and explore that. No day is the same and I'm continuously learning and challenging myself.

**9. What do you like least about your job?**

Sometimes students are just after a grade and not truly interested in learning. I don't like having to discuss allocations of points with students like that.

**10. What's an abbreviated day in the life of your job?**

This varies so much. I'll describe my favorite day. I come in, catch up on email and note the important tasks I need to do for others that day. I meet with one of my graduate students, see the data they collected over the last week. We discuss what it means and make plans for experiments for the next week. I study material and prepare lecture notes. Search for nice visuals online or in books/other resources. Go to class and lecture/work problems with students. Meet with undergraduate senior unit operations team who is doing a lab experiment under my supervision (we use pilot scale equipment in our curriculum). Read/review research article and provide feedback to editors on whether it should be published. File away this information for later (knowledge of the literature is important to continue learning and advance knowledge). This type of information will later be used to develop creative ideas to solve real research problems.

**11. In one to two sentences, how would you say you use bioinformatics in your work? If you don't use bioinformatics directly in your work, how has bioinformatics impacted your career field?**

Biomedical engineering is a broad field. Basically any area of engineering that uses its knowledge to solve biological problems qualifies. Bioinformatics in the traditional sense is using mathematical tools to compile and understand large amounts of biological data (DNA sequences, protein folding, etc.). I don't do this traditional work. Instead, I explore how chemical expression in biological cells impacts behaviors within microchannels the width of a human hair.

## 12. Do you have any recommendations for students who are interested in entering your field?

Yes! There is no traditional educational path to this type of research. Follow your interests and look for the links between the different areas. This approach will give you a unique background and thus unique insights to be able to solve problems.

## 13. What are your favorite hobbies?

Gardening, my two kids, my husband, cooking, our two dogs, camping, equestrian riding, remodeling our house, woodworking, boating. I also want to get my pilot's license and learn to quilt.

### Resources:

In the **field of bioengineering**, there are many different types of jobs available, depending upon what type of education and experience you have. For more information about different types of jobs in this field, including what you can do with different degrees (two year Associate's degree, four year Bachelor's degree, graduate, or professional degrees), visit NWABR's Student Career Center at: <http://www.nwabr.org/students/student-resource-center/career-center>.

The site also includes descriptions of and links to different types of degree programs, various career paths, resources on writing a resume and cover letter and evaluating online resources, and tips for successful job interviews.

All of the links below can also be accessed from NWABR's Student Career Center.

To learn about **job prospects**, **salary information**, and **job skills ("qualifications")** required for engineering in general, and biomedical engineers in particular, visit the US Bureau of Labor Statistics: <http://www.bls.gov/oco/ocos027.htm>.

Find information on careers in biomedical engineering at the National Human Genome Research Institute, including information about **career outlook**, **working conditions**, and **salary**. Scroll through the career listings until you reach "Biomedical Engineer" one page 1: <http://www.genome.gov/GenomicCareers/careers.cfm>.

To learn more about careers in bioengineering, visit the Biomedical Engineering Society's Frequently Asked Questions page at: [http://www.bmes.org/aws/BMES/pt/sp/be\\_faqs](http://www.bmes.org/aws/BMES/pt/sp/be_faqs).

You can also visit the Sloan Career Cornerstone Center's webpage on Bioengineering at: <http://www.careercornerstone.org/bioeng/bioeng.htm>.

Dr. Minerick is the Director of the Medical Micro-Device Engineering Research Lab (MD-ERL) at Michigan Tech: [http://www.mderl.org/all\\_projects.php](http://www.mderl.org/all_projects.php).

*Some of the Resources above may also be used to research other careers that may be of interest to you in the future, including the Bureau of Labor and Statistics and the National Human Genome Research Institute.*

***See next page for Job Posting***

**Job Posting: Biomedical Engineering Summer Internship**

The laboratory of Dr. Maynard Smith is looking for motivated individuals interested in learning about the development of small biological microdevices that can be used to detect disease-causing mutations in small samples of patients' blood. Interns will work closely with lab members and help develop and evaluate microdevices. Prior lab experience is not necessary, but an understanding of molecular biology, including the role of DNA in encoding human traits, is required. Applicants familiar with genetic testing and bioinformatics tools used to detect mutations are encouraged to apply. Additional computer skills, including Microsoft Office (Word®, Excel®, PowerPoint®), are preferred. Applicants must be hard-working, responsible, and able to work in a team environment. Address all inquiries to Dr. Maynard Smith, Seattle Research University, Biomedical Devices Department, Suite 100, Seattle, WA.