

PSM in Bioinformatics at Northeastern University

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Why did NU establish PSM degrees?

We recognized:

- Many students want training beyond BA/BS, but not to Ph.D.**
- Many students do not want an MS based on research – duration uncertain.**
- Many students (or their employers) will pay for a professional MS that adds value and practical experience and requires 2 years (FT) to complete.**

Program Objectives

Our major educational objective for students in this program is the attainment of a common core of knowledge in bioinformatics, with particular emphasis on the ability to integrate knowledge from biological, computational, and mathematical disciplines.

Bioinformatics MS Curriculum

Path depends on prior preparation.

Fundamental Courses

- **Biochemistry**
- **Molecular Cell Biology**
- **Statistics for Bioinformatics**
- **Data Structures**
- **Database Management**

Bioinformatics MS Curriculum

Core Courses

- **Genome and Proteome Analysis**
- **Microarray Analysis and Protein Structure Modeling**
- **Concepts in Pharmacological Science**
- **Ethics in Biological Research**
- **Bioinformatics Seminar**
- **Internship Tutorial**

Bioinformatics MS Curriculum

Elective Courses

- **Many**

Bioinformatics Internship (6 months)

- **Biotech Industry**
- **Biomedical Academic Labs**
- **Government Labs**

The Bioinformatics MS Graduate

- **Integrated skill set encompassing biotechnology and information sciences.**
- **Able to tackle challenging bioinformatics problems semi-autonomously.**
- **Versed in the limitations of techniques, whether biological or computational.**
- **Socialized to work effectively in teams.**

NU Student Enrollments

<u><i>Year</i></u>	<u><i>Admitted</i></u>	<u><i>Enrolled</i></u>	<u><i>Yield</i></u>
2001	36 (42)	14	39%
2002	40 (60)	16	40%
2003	26 (46)	11	42%
2004	19 (35)	10	52%
2005	21 (28)	9	43%
2006	26 (33)	9	35%
2007	27 (33)	8*	30%

Enrolled Student Profiles

<u>Year</u>	<u>CS/IT</u>	<u>Biol.</u>	<u>Math/Eng.</u>
2004	~30%	~50%	~20%
2006	0%	~67%	~33%

GRE Scores

	<u>V</u>	<u>%</u>	<u>Q</u>	<u>%</u>	<u>AW</u>	<u>%</u>
2004	562	~74	729	~77	~4.4	~44
2006	441	~42	674	~63	~3.4	~15

Student Demographics

- **Multicultural**
- **Near equal gender split**
- **Students strong in the context of biomedical sciences admits**
- **Self-financing, some scholarship aid**

Graduated Students

- **46 to date**
- **Sample Placements**
 - **Biogen: 2**
 - **Affymetrix: 1, in legal services**
 - **Math Works: 1**
 - **Harvard Baur Bioinformatics Core Facility: 1**
 - **MIT Broad Institute: 1**
- **Promotions/Advancements**
 - **Amgen (1), Forsyth Dental (1), Partners Healthcare (1), Perkin Elmer (1)**

Student Internships (2004)

➤ **8**

➤ **Intern Placements**

– **Biogen: 1**

– **Boston Biomedical Research Institute: 1**

– **Deaconess/Harvard Institutes of Medicine: 2**

– **Massachusetts Crime Lab: 1**

– **MGH – Charlestown: 1**

– **MIT Broad Institute: 1**

– **Tufts University: 1**

➤ **Good news, bad news? Not enough interns to fill Novartis positions**

Student Likes/Dislikes

Bravo!

- **Multidisciplinary, integrative approach**
- **Custom tailoring of curriculum**
- **Real world experience**
- **Two-year fixed duration**

Not so bravo!

- **A professional education costs money.**

Biotechnology/Bioinformatics Industrial Advisory Board

- **Alkermes**
- **Alnylam**
- **AMGEN**
- **Astra Zeneca**
- **Biogen**
- **Children's Hospital**
- **EMD Lexigen**
- **Genzyme**
- **Merck**
- **Novartis Inst. BMR**
- **Pfizer**

The Bioinformatics MS Program at Northeastern University

- **Supported by ex-President Freeland with a Bioinformatics professorial position.**
- **NU proud to have received a prestigious award from the Sloan Foundation.**
- **NU subsequently pursued a Sloan-sponsored PSM Program in Biotechnology.**
- **The PSM model is being championed by Provost Abdelal.**