

# Welcome to Bioinformatics MS program at RIT!

- **Feng Cui, Ph.D.**  
Associate Professor & Director  
Graduate Bioinformatics Program
- **Patrick Rynkiewicz**  
Candidate, M.S. in Bioinformatics, RIT
- **Spencer Richman**  
Alumnus, M.S. in Bioinformatics, RIT

**Presented by RIT MS Program in Bioinformatics**

**[www.rit.edu/study/bioinformatics-ms](http://www.rit.edu/study/bioinformatics-ms)**

## Reminders:

- Participants will be muted during the presentation.
- You may use Q&A text box to send your questions
- Questions and discussion at the end.

- ❑ **Program overview**
- ❑ **Facilities**
- ❑ **Student outcomes**
- ❑ **Current faculty research**
- ❑ **Current student research and co-op experience**
- ❑ **Alumni stories**
- ❑ **Q & A**

- ❑ A 2-year program offering two tracks to students with **diverse backgrounds**
- ❑ A comprehensive **bridge program** to supplement students’ previous education
- ❑ A **customized curriculum** providing strong foundation in biotech and computer programming
- ❑ Research projects and co-op/internship exposing students to **real-world problems**
- ❑ Diversity of skills giving students access to a wide range of **career choices**

## Curriculum

### First Year

BIOL-625	Ethics in Bioinformatics	3
BIOL-630	Bioinformatics Algorithms	3
BIOL-635	Bioinformatics Seminar	3
BIOL-671	Database Management for the Sciences	3
BIOL-694	Molecular Modeling and Proteomics	3
MATH-655	Biostatistics	3
	Graduate Electives*	6

\*Any graduate-level course deemed related to the field of bioinformatics by the program director.

### Second Year

BIOL-790	Research and Thesis	6
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## Industries



Biotech and Life Sciences



Medical Devices



Pharmaceuticals



Health Care

## Typical Job Titles

Bioinformatics Engineer	Associate Systems Analyst
Computational Biologist	Research Technician
Software Engineer	Bioinformatics Analyst
Developer	Bioinformaticist

## Merit-based Scholarship



## Graduate Teaching Assistantship (GTA)



## Graduate Research Assistantship (GRA)



**Students have numerous job opportunities on and off campus.**

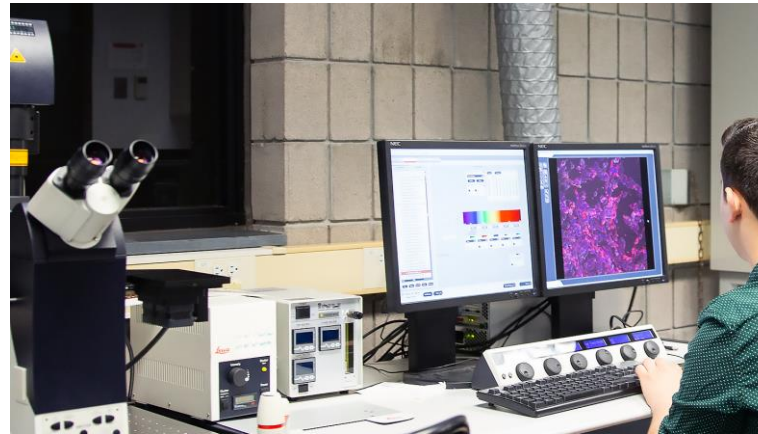
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## Genomics Lab



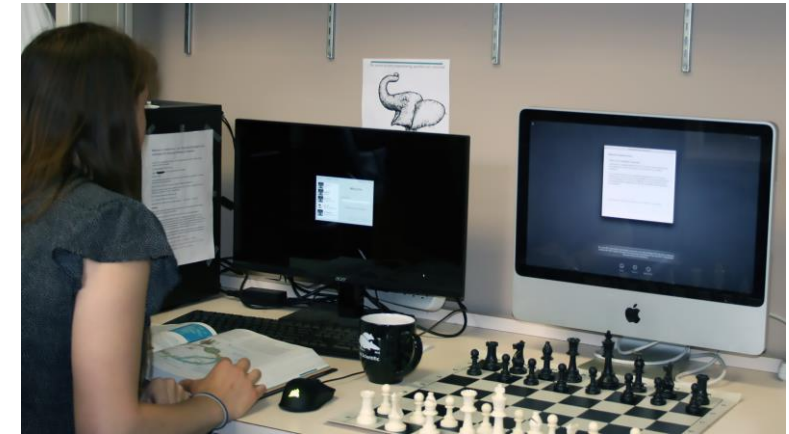
- \$1.5 million from NYS
- MiSeq
- NextSeq (forthcoming)

## Confocal Microscopy Lab



- \$0.5 million from NSF
- Multidisciplinary imaging research

## Bioinformatics Epicenter



- Multiple Mac, Unix and Linux machines
- Bioinformatics servers

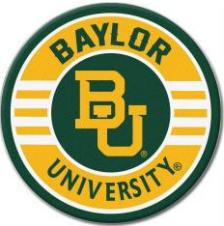
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# Not-for-profit

# For-profit

## Ph.D. students

## Staff





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**Gregory Babbitt**

- Molecular evolution
- Molecular dynamics
- Ecological modeling

**Feng Cui**

- Nucleosome positioning
- Cancer chromatin
- Machine learning

**Michael Osier**

- Genomics
- Database

**Gary Skuse**

- Bioinformatics
- Literature mining
- Forensic science

**Students are free to find mentors inside or outside RIT (e.g., URM, RGH).**



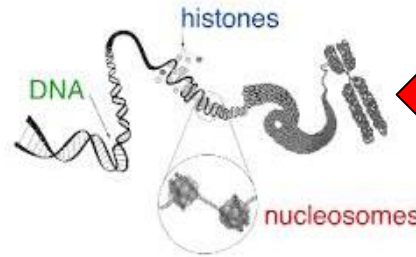
# Research projects in Dr. Cui's lab

## Nucleosomes:

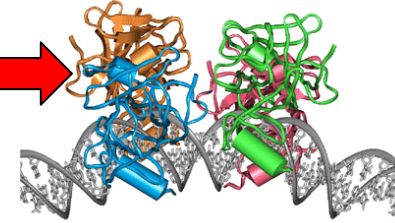
- (1) Positioning patterns
- (2) Sequence analysis
- (3) Predictions
- (4) Web server

(Gregory Wright)  
(Bader Alharbi)  
(Sheethal Nagalakshmi)  
(Sridevi Subramanya)

## Chromatin



## p53



## p53 binding sites:

- (1) Site predictions
- (2) Sequence analysis
- (3) Accessibility
- (4) Experimental mapping
- (5) Database

(Peter LoVerso)  
(Feifei Bao)  
(Julia Freewoman)  
(Chris Barilla)

## Cancer chromatin:

- (1) Nucleosome organization around p53 sites
- (2) Nucleosome positioning and epigenomics in cancer genome

(Feifei, Bao, Andrew Rosato)

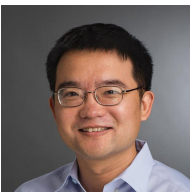
## Cancer chromatin



## Other projects:

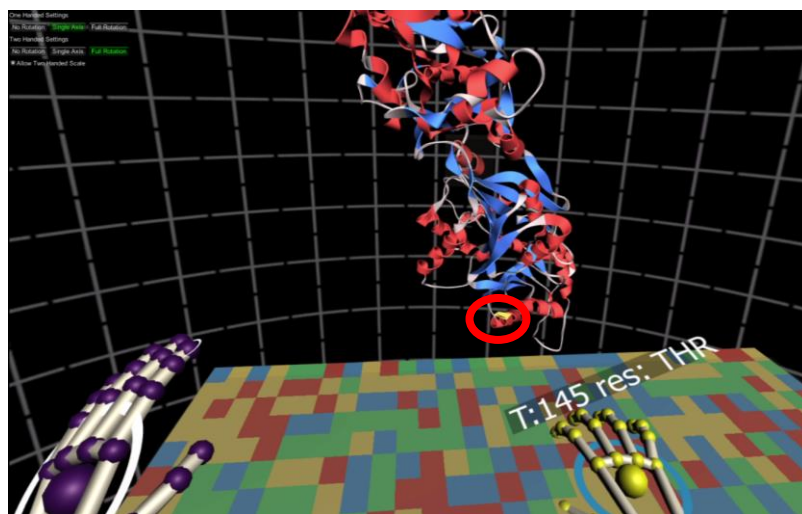
- (1) Classification of invasive and non-invasive cancer
- (2) Gene regulatory network
- (3) BioVR: a VR-based platform for biomolecular visualization

(Benny Yin, Kishan Kc, Jimmy Zhang)



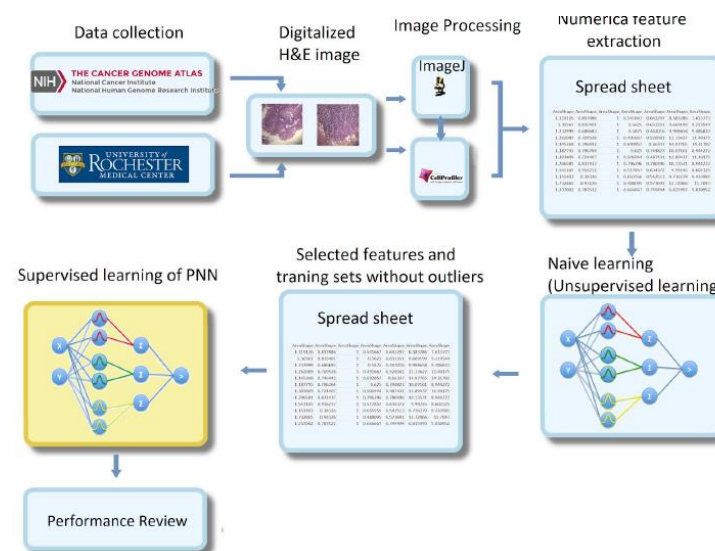
## Recent publications in Dr. Cui's lab

### Biomolecular visualization in VR



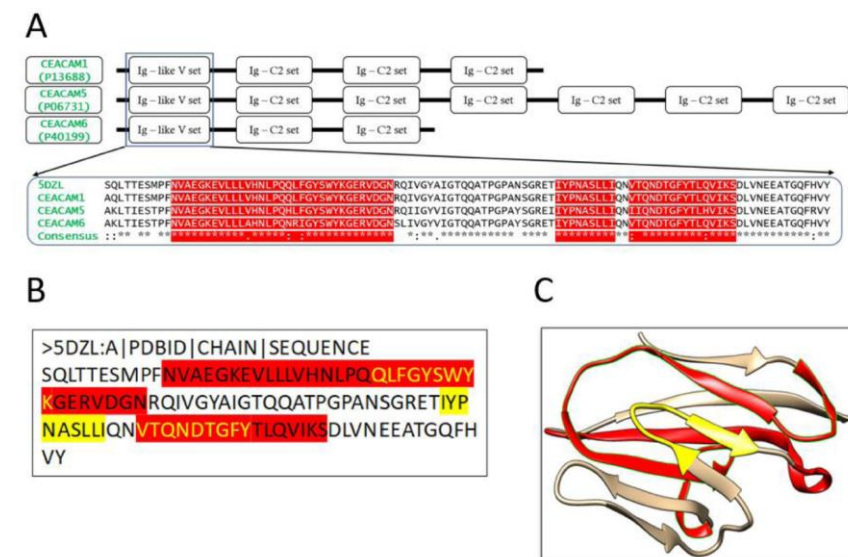
BMC Bioinformatics (2019)

### Cancer distinction by machine learning



BMC Med. Inform. Decis. Mak. (2020)

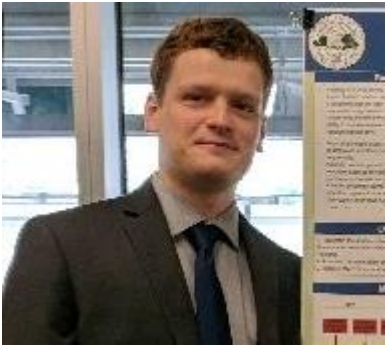
### Cancer vaccine design



J. Biomol. Struct. Dyn. (2020)

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# Student Panelist Research



- **Masters Thesis:**  
*Computational Prediction and Validation of Novel Pathogenesis-Related Protein Functions in Vitis vinifera*
  - Developing a tool for prediction of plant proteins capable of entering fungal infection structures
  - Optimizing validation protocols in the lab
- **Additional Research Topics and Interests:**  
*Molecular Dynamics of SARS-CoV-2 Spike Protein Binding*
  - Manuscript in review on dynamics of conserved binding regions across human and bat coronaviruses

# Student Panelist Co-Op Experiences



- **USDA Agricultural Research Service, Geneva NY:**  
Supported post-doctoral researchers and conducted grape proteomics research
- **Regeneron Pharmaceuticals:**  
Worked in a development group developing novel quality control metrics

- **Benefits of a Co-Op**

- Improve presentation of research
- Networking
- Wide range of programs available to bioinformatics students
- Understanding what it is like to be an employee in the academic, industry, and/or government sectors



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# Alumni Stories – Spencer Richman



## **Masters Thesis:**

*Applying Systems Pharmacology to the Treatment of Chronic Illness Using Novel Scoring and Translational Methods*

Adv. Dr. Gary Skuse, Dr. Gordon Broderick, Dr. Matthew Morris

## **Current Work:**

Bioinformatician - Center for Clinical Systems Biology, Rochester General Hospital

- Algorithm development for pharmacological data integration
- Modelling of chronic illnesses
- Computational support for various projects

**ROCHESTER**  
**REGIONAL HEALTH**

Rochester General Hospital



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RIT MS Program in Bioinformatics  
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