

## Biomedical Data Science

BME 4760 Section 1422

**Class Periods:** T | Period 7 (1:55 PM - 2:45 PM) -- R | Period 7 - 8 (1:55 PM - 3:50 PM)

**Location:** FLG 0270 (Tuesday), LIT 0237 (Thursday)

**Academic Term:** Fall 2019

### **Instructor:**

Parisa Rashidi

Email Address: [parisa.rashidi@ufl.edu](mailto:parisa.rashidi@ufl.edu)

Office Phone Number: 352-392-9469

Office Hours: by appointment, NEB 459

### **Supervised Teaching Student:**

Please contact through the Canvas website

Subhash Nerella, [subhashnerella@ufl.edu](mailto:subhashnerella@ufl.edu),

office location: TBA, office hours: TBA

### **Course Description**

This course covers the biomedical applications of data science techniques, biomedical data science libraries, and challenges in using data science techniques in the biomedical domain.

### **Course Pre-Requisites / Co-Requisites**

Prereq: BME 3053L, COP2271

Coreq: - N/A

### **Course Objectives**

1. Understand data science techniques in the biomedical domain,
2. Understand the limitations of each technique with respect to biomedical data,
3. Learn to use biomedical data science programming libraries.

### **Materials and Supply Fees**

N/A

### **Professional Component (ABET):**

N/A

### **Relation to Program Outcomes (ABET):**

Outcome	Coverage*
1. An ability to identify, formulate, and solve engineering problems by applying principles of engineering, science, and mathematics.	Medium
2. An ability to apply both analysis and synthesis in the engineering design process, resulting in designs that meet desired needs.	High
3. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.	High
4. An ability to communicate effectively with a range of audiences	Medium
5. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must	Medium

consider the impact of engineering solutions in global, economic, environmental, and societal contexts.	
6. An ability to recognize the ongoing need for additional knowledge and locate, evaluate, integrate, and apply this knowledge appropriately.	
7. An ability to function effectively on teams that establish goals, plan tasks, meet deadlines, and analyze risk and uncertainty	

### **Required Textbooks and Software**

-Course slides are developed and provided by the instructor. The students are responsible for taking additional notes.

### **Recommended Materials**

- Course Number: BME 4760 - Biomedical Data Sci
- Title: Deep Learning for the Life Sciences
- Author(s): Vijay Pande, Patrick Walters, Peter Eastman, Bharath Ramsundar
- Copyright Date: April 2019
- Publisher: O'Reilly Media, Inc.
- Edition (if applicable): first
- ISBN: 9781492039822
- Optional

### **Course Schedule**

**Note.** The course schedule might be subject to change.

Week	Subject	Biomedical Application
1	Introduction	
2	Basic Python Programming	Electronic Health Record (EHR)
3	Advanced Python Programming	Clinical Data Processing
4	Conventional Machine Learning I	Biophysical Modeling
5	Conventional Machine Learning II	Clinical Prediction
6	Neural Networks	
7	Review/ Exam 1	
8	Convolutional Neural Networks I	Biomedical Imaging
9	Convolutional Neural Networks II	Biomedical Imaging
10	Recurrent Neural Networks I	Physiological Signals
11	Recurrent Neural Networks II	Clinical Notes
12	Generative Models	Generating Drug Molecules
13	Advanced Methods	Omics
14	Review/Exam	
15	Ethical AI	Adversarial Medical Attacks, Guidelines, Fair decision making, Bias

### **Attendance Policy, Class Expectations, and Make-Up Policy**

Attendance is required. Exams or homework can only be made up for extraordinary circumstances with prior approval of the instructor. Excused absences are consistent with university policies in the undergraduate catalog

(<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>) and require appropriate documentation.

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### ***Evaluation of Grades***

<b>Assignment</b>	<b>Total Points</b>	<b>Percentage of Final Grade</b>
Homework	20 each	35%
Exams	100	45%
Paper Discussions	10	10%
Quiz	20 each	10%
		100%

### ***Grading Policy***

<b>Percent</b>	<b>Grade</b>	<b>Grade Points</b>
94.0 - 100	A	4.00
< 94.0	A-	3.67
< 90.0	B+	3.33
< 87.0	B	3.00
< 84.0	B-	2.67
< 80.0	C+	2.33
< 77.0	C	2.00
< 74.0	C-	1.67
< 70.0	D+	1.33
< 67.0	D	1.00
< 64.0	D-	0.67
< 61.0	E	0.00

More information on UF grading policy may be found at:

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

### ***Students Requiring Accommodations***

Students with disabilities requesting accommodations should first register with the Disability Resource Center (352-392-8565, <https://www.dso.ufl.edu/drc>) by providing appropriate documentation. Once registered, students will receive an accommodation letter which must be presented to the instructor when requesting accommodation. Students with disabilities should follow this procedure as early as possible in the semester.

### ***Course Evaluation***

Students are expected to provide feedback on the quality of instruction in this course by completing online evaluations at <https://evaluations.ufl.edu/evals>. Evaluations are typically open during the last two or three weeks of the semester, but students will be given specific times when they are open. Summary results of these assessments are available to students at <https://evaluations.ufl.edu/results/>.

### ***University Honesty Policy***

UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code (<https://www.dso.ufl.edu/sccr/process/student-conduct-honor-code/>) specifies a number of behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that

facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor or TAs in this class.

### ***Commitment to a Safe and Inclusive Learning Environment***

The Herbert Wertheim College of Engineering values broad diversity within our community and is committed to individual and group empowerment, inclusion, and the elimination of discrimination. It is expected that every person in this class will treat one another with dignity and respect regardless of gender, sexuality, disability, age, socioeconomic status, ethnicity, race, and culture.

If you feel like your performance in class is being impacted by discrimination or harassment of any kind, please contact your instructor or any of the following:

- Your academic advisor or Graduate Program Coordinator
- Robin Bielling, Director of Human Resources, 352-392-0903, [rbielling@eng.ufl.edu](mailto:rbielling@eng.ufl.edu)
- Curtis Taylor, Associate Dean of Student Affairs, 352-392-2177, [taylor@eng.ufl.edu](mailto:taylor@eng.ufl.edu)
- Toshikazu Nishida, Associate Dean of Academic Affairs, 352-392-0943, [nishida@eng.ufl.edu](mailto:nishida@eng.ufl.edu)

### ***Software Use***

All faculty, staff, and students of the University are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against University policies and rules, disciplinary action will be taken as appropriate. We, the members of the University of Florida community, pledge to uphold ourselves and our peers to the highest standards of honesty and integrity.

### ***Student Privacy***

There are federal laws protecting your privacy with regards to grades earned in courses and on individual assignments. For more information, please see: <https://registrar.ufl.edu/ferpa.html>

### ***Campus Resources:***

#### ***Health and Wellness***

##### **U Matter, We Care:**

Your well-being is important to the University of Florida. The U Matter, We Care initiative is committed to creating a culture of care on our campus by encouraging members of our community to look out for one another and to reach out for help if a member of our community is in need. If you or a friend is in distress, please contact [umatter@ufl.edu](mailto:umatter@ufl.edu) so that the U Matter, We Care Team can reach out to the student in distress. A nighttime and weekend crisis counselor is available by phone at 352-392-1575. The U Matter, We Care Team can help connect students to the many other helping resources available including, but not limited to, Victim Advocates, Housing staff, and the Counseling and Wellness Center. Please remember that asking for help is a sign of strength. In case of emergency, call 9-1-1.

**Counseling and Wellness Center:** <http://www.counseling.ufl.edu/cwc>, and 392-1575; and the University Police Department: 392-1111 or 9-1-1 for emergencies.

##### **Sexual Discrimination, Harassment, Assault, or Violence**

If you or a friend has been subjected to sexual discrimination, sexual harassment, sexual assault, or violence contact the **Office of Title IX Compliance**, located at Yon Hall Room 427, 1908 Stadium Road, (352) 273-1094, [title-ix@ufl.edu](mailto:title-ix@ufl.edu)

##### **Sexual Assault Recovery Services (SARS)**

Student Health Care Center, 392-1161.

**University Police Department** at 392-1111 (or 9-1-1 for emergencies), or <http://www.police.ufl.edu/>.

## Academic Resources

**E-learning technical support**, 352-392-4357 (select option 2) or e-mail to Learning-support@ufl.edu.  
<https://lss.at.ufl.edu/help.shtml>.

**Career Resource Center**, Reitz Union, 392-1601. Career assistance and counseling. <https://www.crc.ufl.edu/>.

**Library Support**, <http://cms.uflib.ufl.edu/ask>. Various ways to receive assistance with respect to using the libraries or finding resources.

**Teaching Center**, Broward Hall, 392-2010 or 392-6420. General study skills and tutoring.  
<https://teachingcenter.ufl.edu/>.

**Writing Studio, 302 Tigert Hall**, 846-1138. Help brainstorming, formatting, and writing papers.  
<https://writing.ufl.edu/writing-studio/>.

**Student Complaints Campus**: [https://www.dso.ufl.edu/documents/UF\\_Complaints\\_policy.pdf](https://www.dso.ufl.edu/documents/UF_Complaints_policy.pdf).

**On-Line Students Complaints**: <http://www.distance.ufl.edu/student-complaint-process>.