**BME 3101 – Introduction to Biomedical Data Science and Engineering**
**Spring 2018**
**TTH 4:30-6:00, TBA**

**Instructor:**   Prof. Robert Lee
robert.lee@bme.gatech.edu
3103, 404-894-4484

**Web Page:**   https://t-square.gatech.edu/portal

**Office Hrs:**   Tuesdays 11:00

**TA**:   None

**Textbooks:**   Incredibly Strongly Suggested: *Advanced Engineering Mathematics,* E. Kreyszig, 10th Ed. John Wiley & Sons, New York, NY, 2012.

**Prereqs:**   BMED 2250 and Statistics
**Coreq:**
**Helpful:**   Basic Statistics

**Overview:**   This course is intended as a practical/hands-on introduction to the techniques behind the fields of Data Science and Engineering Computation as well as some exposure to common tool types/platforms used in engineering.  It is best thought of as an interactive/collaborative research lab/lab meeting where the "experiments" are specific tasks in Data Science/Engineering Analysis in a Biomedical context. That is, the format is more exploratory and participatory, and less follow-the-recipe.

The typical meeting will involve a few minutes of background/setup (i.e. lecture) then we will jump in and, collectively, figure out how to tackle a particular analysis challenge. Thus, we might manually manipulate data, write scripts, do stats, make beautiful graphs, etc. all in an attempt to best grapple with the challenge.  Near the end of each meeting, a take-home task will be added to what has been done in class.  The entire task (both the in-class part and the take home part) are due prior to the start of the next meeting.  Thus, the successful student will need to put in consistent effort throughout the semester.

**Goals:**   Exposure and skill development in a variety of tools and techniques.  Build a sense of confidence and even personal style in how to approach computational challenges.  Improve your task management and meeting skills.

**Tools**
Excel  - (Spreadsheet)
Mathmatica - (Free format/interactive math solvers)
MatLab with embedded C – (Traditional, Imperative programming)
Haskell – (declarative/functional programming)
Python – (all in one)


**Topics**
Converting problems into equations
Computer-based calculation/problem-solving
Data visualization
Iteration and numerical integration

Data aggregation/integration/fusion
Regression, optimization and searching for parameter values


**Honor Code:** Students are expected to abide by the Honor Code ([www.honor.gatech.edu)](www.honor.gatech.edu).  The objective of the honor code is "to prevent any students from gaining an unfair advantage over other students through academic misconduct". Any violations will be prosecuted through the Dean of Students.

**Grading:** Grading will be based entirely on the tasks started in class that are to be completed by the next class.   We will start one of these nearly every class.  We complete about half of each task in class.  Thus, submitting that alone would give you 50% on the assignment.  Beyond that, scoring is task specific but typically includes "did you follow the instructions?", "did you complete the task?", and "did you present your task solution in a clear and concise manner?" The point value of individual tasks will increase modestly as the semester progresses.

| Average of tasks | Final Grade |
|---|---|
| >= 80% | A |
| >= 70% | B |
| >= 60% | C |
| >= 50% | D |

**Attendance/Late assignments:** Attendance is not mandatory but there are no provisions for making up what was done in class.  Likewise, the course moves on and often builds upon the previous meetings.  Consequently, late assignments will receive a zero.  Students with an officially approved absence will have the affected tasks dropped from their grade.  Job interviews, Conferences, etc. are not approved absences.  Make sure you save up enough extra points to compensate for these.

**YOU NEED A LAPTOP EVERY MEETING:** Windows/Mac/Linux are all acceptable.  However, students with Mac have had somewhat more "issues" in the past.  I cannot guarantee plug availability but most rooms have some plugs.  You will also need internet access (typically GT wireless) and you will likely install many programs and so 20 Gig of free space is a good idea. (Alternatively, you can use the BME virtual lab, but most students did not prefer this option.) You will not need to buy any software.

**Accommodations for Learning Needs:** If you have learning needs that require some adaptations for you to succeed in this course, please contact the Office of Disability Services on campus (http://www.adapts.gatech.edu/). I am happy to arrange to accommodate your learning needs based on their recommendations.