

Case Study 4: Free Fall

Transport in Biological Systems

Fall 2015

In this Case Study, you will further develop your ability to manipulate and understand key concepts in transport. This time you get to choose the topic. However, I will be offering you some guidance as you narrow down the focus. The final deliverable should demonstrate your comprehension of the material we have been covering as well as your understanding of the steps of abstraction taken to create a model from a physical system. It can take the form of a mini-review of some of the literature, reproducing and exploring an existing model, developing your own model, or in rare circumstances an experiment. You should choose something that is interesting to you, but I encourage you to consider including fluid flow.

Some topics that might be interesting are:

- Development of devices meant to replace lost kidney function
- Transport considerations in tissue engineering
- Atherosclerosis and recirculating flow
- Really anything in the transport realm by Melody Swartz's group.

I highly recommend that you perform this work in groups of 2-3. As always, this is not in order to take a divide and conquer strategy - all members of your team should be engaged in the work, feel as though they have contributed, and be able to explain it in detail. As usual, prepare your written deliverable in the style of IEEE. Your document should be 3-4 pages and should include as usual, a title, list of authors, a brief abstract, an introduction (includes background and significance), methods (if relevant), results and discussion, including relevant figures (no more than 4), a conclusion, and references cited. We will work on this case study in class and out of class. Key dates are:

- By Monday, November 30th, you should have formed your team and have some general ideas about the direction you want to go in. Come back from Thanksgiving break with some key literature in hand and bring a brief written proposal to class describing what you will do in your case study. We will work on refining this proposal in class.
- By Thursday, December 3rd, you should have made significant progress on your case study and be prepared to give the class a 5-10 minute overview of the topic at hand and your approach. Be prepared to go into more detail with me.
- We will continue to have group work time on December 7th and 10th.
- Your group will give a final, polished, technical presentation of your work during finals week, date TBA. I highly recommend that you review your work and slides with me before you present.

I leave you with some additional words of sage advice. Choose your topic and any source papers you use carefully. Many teams in the past have gotten bogged down by tying themselves to papers that were, frankly, bad. Or by choosing something they were not particularly interested in. Don't fall into this trap! Find something you are all excited about. It's hard work to find really good, high-impact papers to work with - you will be happy if you put that work in up front.