Department of Biomedical Science

BMS353 : Bioinformatics for Biomedical Science

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Using Jupyter Notebook in Undergraduate teaching

BMS353 is a newly introduced module in the Biomedical Science curriculum that has the scope to introduce students to Bioinformatics and Computational Biology for Biomedical Science, proving them with a set of skills to implement advanced data analysis. The key feature of this module is the introduction of biology students to interdisciplinary studies, with analysis of real case studies, which will be implemented with state-of-the art programming tools.

> Challenging but a great sense of achievement.
>
> **BMS353 STUDENT 2016**

It is aimed at biology students with little or no knowledge of programming and statistics and has the goals of: a) making them aware of effects of experimental design in the subsequent data analysis; b) having a good understanding of technologies and methods for Bioinformatics; c) introducing them to basic coding and use of workflow and pipelines for their data analysis.

In BMS353 the students learn with integrating theoretical knowledge with practical skills and the exposure to problem solving exercises helps them to develop innovative thinking. Interfacing mathematics, statistics and biology the students will acquire a set of skills that are unique and will make them competitive and highly employable.

> The hardest thing ever, stressful, frustrating but very rewarding.
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> **BMS353 STUDENT 2016**

With this in mind, the key issues that we address in the module are: a) create an engaging and inclusive environment that enables effective learning of new skills; b) achieve learning using traditional lecturing techniques and classroom based activities with technology enhanced learning on a cloud based environment; c) design an effective way to assign, mark and feedback while enhancing constructive learning.

In delivery of this module, we focus on these key points:

- Easy working environment to enable students to naturally change their mind setting
- Interactive sessions in which monitoring learning with formative feedback
- Assignment that were able to assess learning
- Marking and feedback from teacher to students
- Peer feedback and problem solving using a dedicated discussion forum.

> Initially I found the learning curve rather steep, but in hindsight this was a good thing as it forced me to solve my own problems. This allowed me to learn how to use coding guides online, solve my own problems, and try out new ideas.
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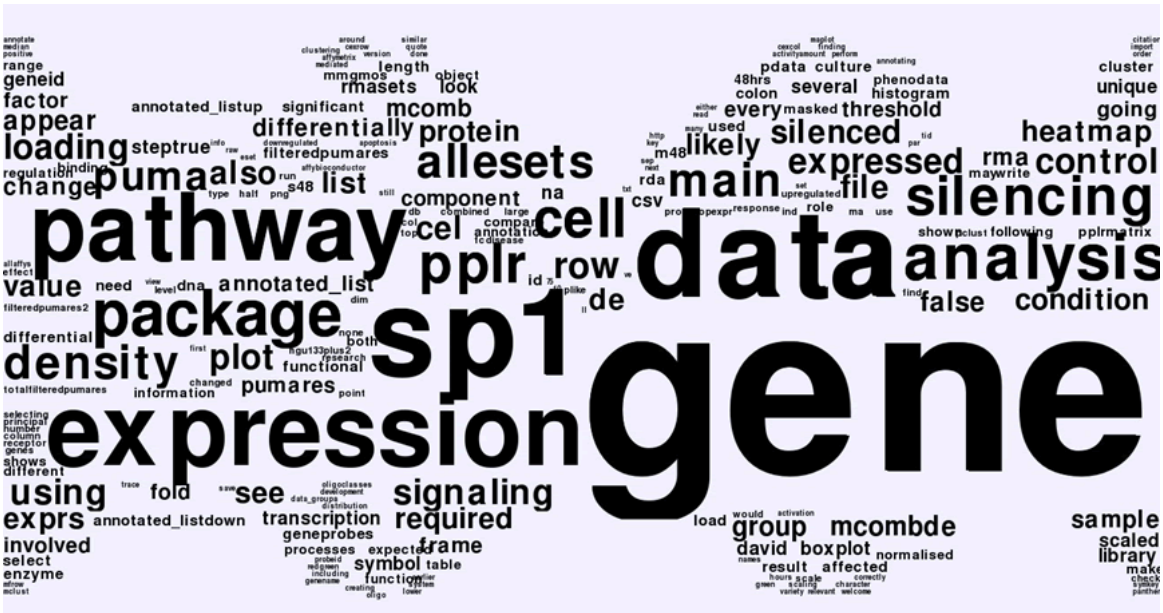
The tools that we use through out the module are based on cloud computing and have a user-friendly approach to programming, using the Jupyter notebooks. This is to make learning a fun and enjoyable experience and to give the student a sense of achievement at the end of the module. Assessment is also based on interactive assignments.

The full assign-mark-feedback process happens through the cloud-based environment SageMathCloud and the practical classes are to stimulate discussion and to promote working in in groups. Students particularly liked this aspect. The module has a dedicated website interface for all the activities and forums for discussion and feedback.



The text word cloud below was generated by Mr Duncan Cooper, BMS353 (2015/2106) student, using the R coding skills for the data analysis to process words from his final project notebook.