Survey on Programing Education in Biochemical Engineering

In this course (CHE 8663 Systems Biology), you were given a series of training and lectures on applying MATLAB programing to model and analyze biological systems. The eight MATLAB programing skills introduced in this course include:

1) Algebraic operation, script function development, flow and loop control, logical operation, basic algorithms for searching and sorting
2) Simulation of ODE models for biological reaction networks
3) Parameter estimation for signal transduction models
4) Sensitivity analysis for signal transduction models
5) Metabolic modeling techniques (e.g. flux balance analysis and essential gene analysis) for metabolic networks
6) Statistical analysis of omics data (such as genomics data)
7) Integration of gene expression data with metabolic modeling
8) Simulation of pharmacokinetic models

1. Survey of your experience with MATLAB programing

One of the major goals of CHE 8663 is enriching your expertise in MATLAB programing.

Not at all   Greatly

(1) Rate your experience of computer programing/modeling prior to taking CHE 8663   ① ② ③ ④ ⑤

(2) Rate your experience of computer programing/modeling after taking CHE 8663.   ① ② ③ ④ ⑤

(3) Rate your understanding of MATLAB programing to model and analyze a biological system (such as the target system in your term project) prior to taking CHE 8663.   ① ② ③ ④ ⑤

(4) Rate your understanding of MATLAB programing to model and analyze a biological system (such as the target system in your term project) after taking CHE 8663.   ① ② ③ ④ ⑤

(5) Rate the usefulness of MATLAB programing for understanding/modeling complicated biological systems such as signaling pathways and metabolic networks.   ① ② ③ ④ ⑤

(6) Rate the usefulness of MATLAB programing skills you learned from this course in your work or research.   ① ② ③ ④ ⑤

(7) Rank the eight trained MATLAB programing skills listed above from the most to the least useful in your work or research.

(8) List the MATLAB programing skills you think should have been covered in CHE 8663.

2. Survey of the instructor's teaching strategies on MATLAB programing

The instructor has applied the following teaching strategies on MATLAB programing. Please evaluate them.

Not at all   Greatly

(9) Rate the effectiveness of the training sequence of the aforementioned eight MATLAB programing skills.   ① ② ③ ④ ⑤

(10) The instructor trained MATLAB programing using examples with real biochemical engineering application (e.g., application of sensitivity analysis to IL-6 signaling to identify targets for drug development).
Rate the usefulness of this teaching strategy on motivating and facilitating you to learn MATLAB.   ① ② ③ ④ ⑤

(11) Reference MATLAB codes were provided for all examples in the lecture.
Rate the usefulness of these reference codes on facilitating you to learn MATLAB.   ① ② ③ ④ ⑤

(12) At the end of each lecture, the instructor offered 30 to 45 minutes for students to interact with the instructor and ask him questions related to MATLAB programing.
Rate the effectiveness of this teaching strategy on improving your MATLAB programs and thus facilitating you to learn MATLAB.   ① ② ③ ④ ⑤

(13) Homework problem sets were posted before each lecture and due on the day following the next lecture.
Rate the effectiveness of this teaching strategy on facilitating you to understand the MATLAB training and interact with the instructor (as you can ask him questions related to the homework during the 30-45 minute question section at the end of the lecture).   ① ② ③ ④ ⑤

(14) Solutions of homework problems, especially the MATLAB codes, were given, as well as feedback and suggestions on your MATLAB programs.
Rate the effectiveness of this teaching strategy on facilitating you to learn MATLAB programing and improve MATLAB programing skills.   ① ② ③ ④ ⑤

(15) Homework problems were designed to be similar to those examples shown in the lecture.
Rate the effectiveness of this teaching strategy on facilitating you to learn MATLAB programing and apply these programing skills.

① ② ③ ④ ⑤

(16) In-class assignments (such as deriving the stoichiometric matrix for a metabolic pathway) were assigned for students to complete in the lecture.
Rate the usefulness of this teaching strategy on facilitating you to learn MATLAB programing.

① ② ③ ④ ⑤

(17) Each student is required to complete a term project in which he should apply MATLAB programing skills to solve a real modeling problem/application that is related to his work or research.
Rate the effectiveness of this strategy on facilitating you to learn MATLAB programing and apply these programing skills.

① ② ③ ④ ⑤

3.   Survey of your background

(1) Are you a distance student (i.e. did you learn the programming skills by watching lectures online)?
Y or N

(2) Was your undergraduate degree in engineering?
Y or N

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4.   Suggestions for improving teaching strategies for facilitating your to learn MATLAB programing in biochemical engineering

The course can be broken down to the following sections:
(1) Lecture – MATLAB training in Systems Biology and reference MATLAB codes
(2) Homework problems
(3) In-class assignments
(4) Interaction time with instructor at the end of each lecture
(5) Term project

1.   Which components listed above did you find most helpful in learning MATLAB? Explain.

2.   Which components listed above need to be improved? Explain.

3.   Do you have any other suggestions for improving the MATLAB learning process, or the course in general?

4.   As for Distance Learners, please list suggestions making your experience as a Distance-Learning or Part-Time student in learning MATLAB programing more effectively.