

# NIMBioS

National Institute for Mathematical  
and Biological Synthesis

Tutorial

# Uncertainty Quantification for Biological Models

EVALUATION SUMMARY REPORT

26-28 June 2017

**Dr. Pamela Bishop**

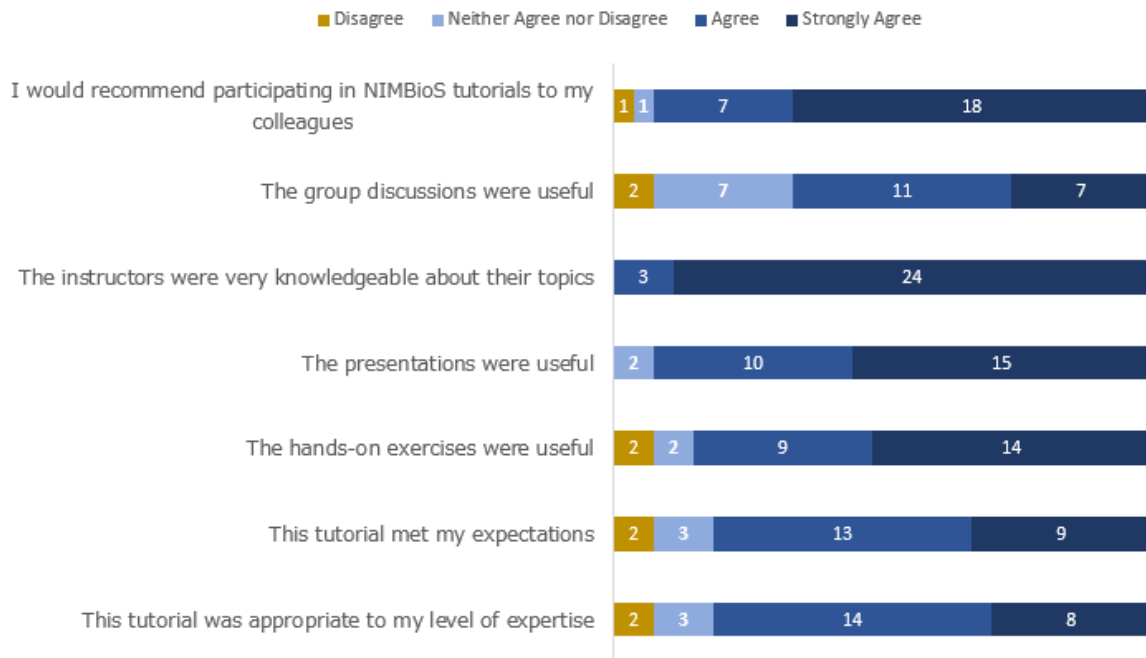
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**Ana Richters**

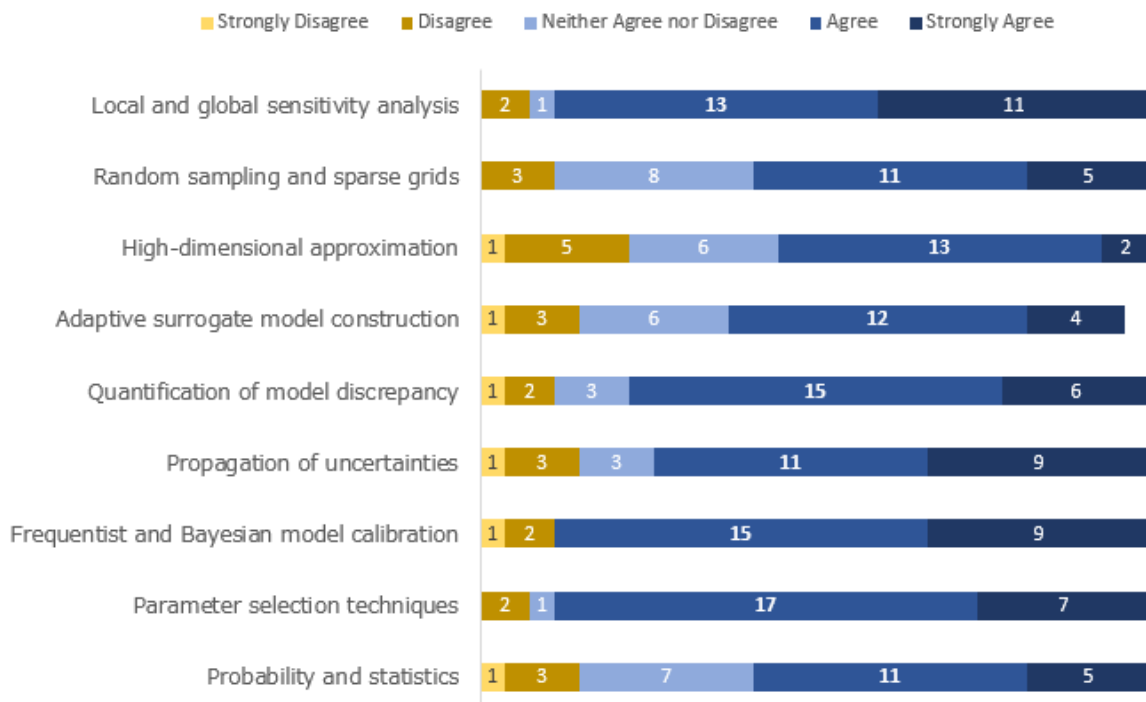
Database Administrator & Information Specialist

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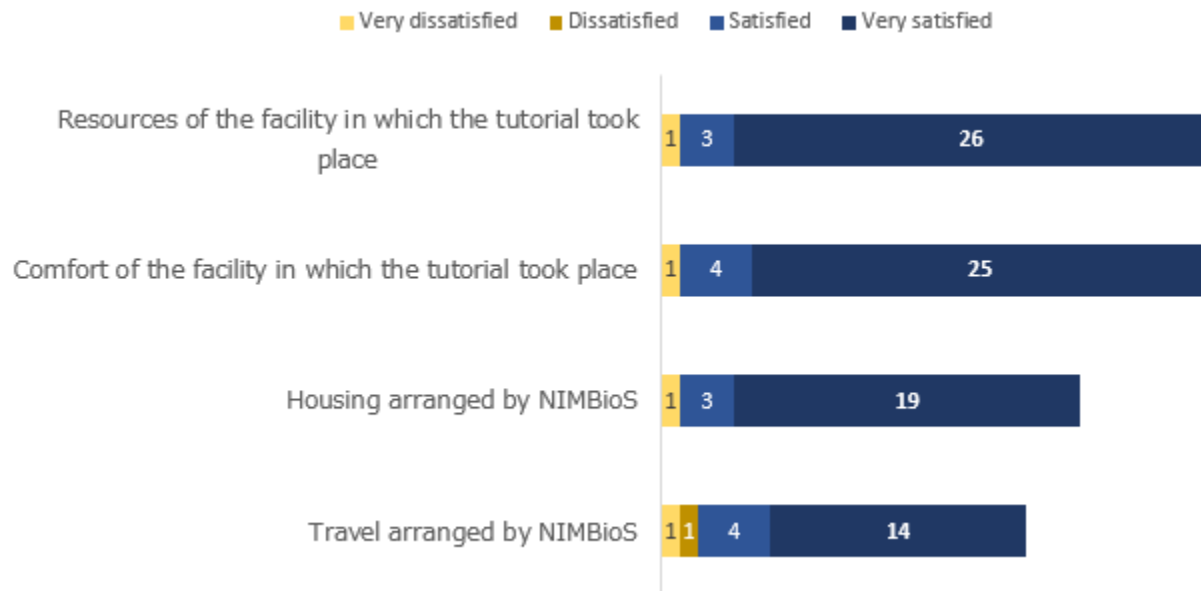
**Figure 1.** Please check the appropriate box to indicate your level of agreement with the following statements about this tutorial:



**Figure 2.** As a result of participating in this tutorial, I have a better understanding of:



**Figure 3.** Please indicate your level of satisfaction with the tutorial accommodations:



### Comments:

A wonderful visit to NIMBioS and to Knoxville

Excellent!

I thought the location was perfect – short walk to NIMBioS and easy walk to Market Square.

It was just wonderful.

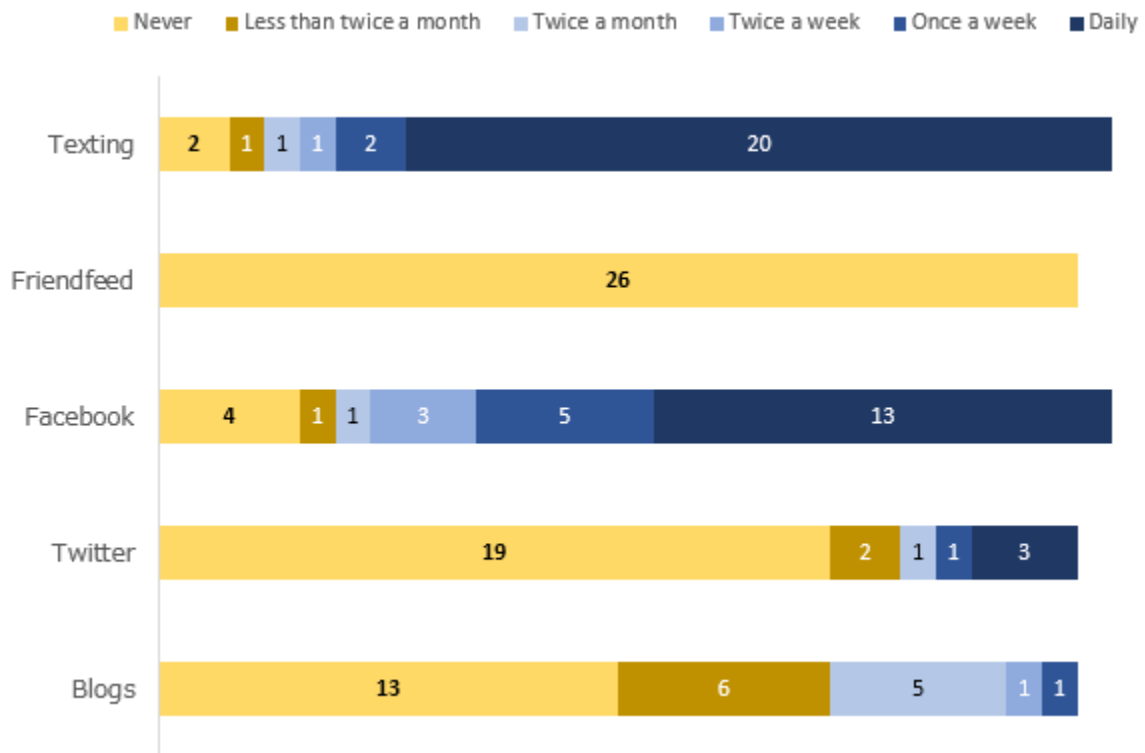
NIMBioS has some of the best workshop/tutorial organization I've encountered :)

Staff was excellent, as usual.

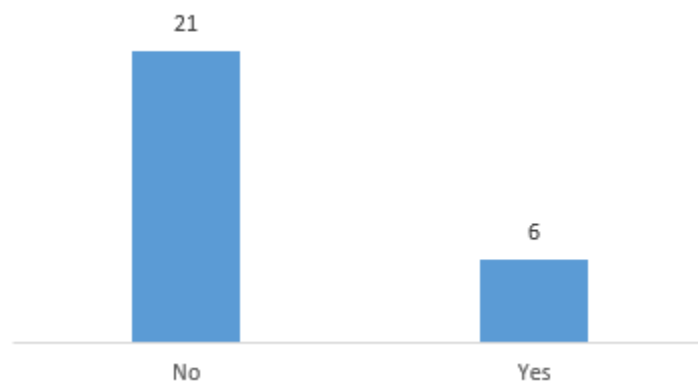
The conference rooms were a bit cold.

The travel arrangement (flight booking) was somewhat messy...wish the communication process could be more smooth and timely..

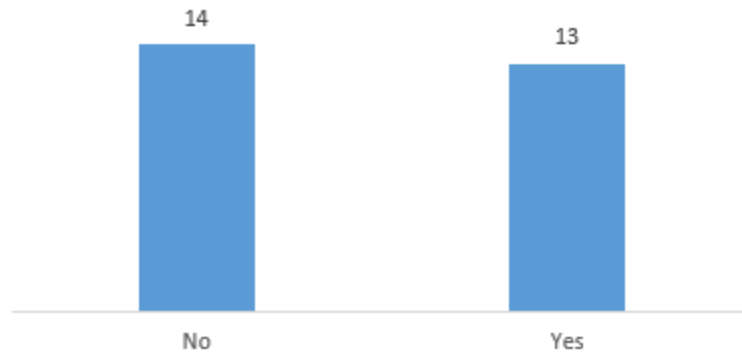
**Figure 4.** Approximately how often have you used the following social networking tools in the last six months?



Did you use any of the above tools during the tutorial presentations and/or discussions to communicate with other tutorial participants?



Would you be interested in using Twitter or other social networking tools for communications during NIMBioS tutorials?



Which social networking tools did you use?

Facebook and texting.

I prefer email. I check that multiple times a day.

NIMBioS wordpress

None

Texting

texting

Texting

The blog website

Twitter

Other social networking tools used:

Instagram

LinkedIn, occasionally

LinkedIn, Research Gate

None

29 out of 31

attendees felt this was a very effective format for achieving their goals.

26 out of 31

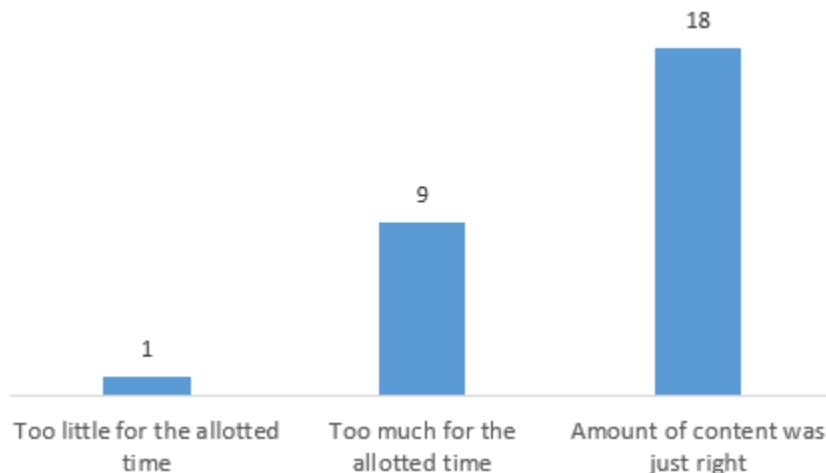
attendees were satisfied or very satisfied with the opportunities provided during the tutorial presentations and discussions to ask questions and/or make comments.

### The tutorial format would have been more effective if:

There was more coherence from one topic to the other. I felt like context was missing for some of the presentations. I enjoyed the tutorial, I just think it would have helped me learn even more.

We concentrate in a particular mathematical model and applied most of the revisited techniques (Like Dr. Heman did)

### How do you feel about the amount of content offered during the tutorial?



## What topics would you have liked to have covered in this tutorial if given more time?

A greater emphasis on tools and techniques for more sophisticated models such as agent based.

Can not think of any.

Explore more the codes that expositors gave us. Have more time to assimilate the knowledge and more time to work on the assignments

general type of biological models

Given the broad range of attendees, I think the topics covered were just right. Given more time, I personally would like to have more discussion on surrogate models and adaptive subspace methods applied to a non-trivial system.

I think the topics were okay but they could have done the same amount of topics and given it more time. Also some of the information needed more context. I have done mathematical modeling and stats but since I am not a mathematics academic some of the concepts were over my head. A bit more background information or pointing to a resource to fill in those gaps would have been very helpful.

I would have liked more time to digest topics presented to Clayton Webster. There was so much information that it was difficult to absorb it within the short time frame.

If there was more time, perhaps going over Sobol indices and collocation methods.

More specific examples.

More theoretical topics.

more time for exercises - there was so much amazing material, I would have loved more time to help solidify it

Most of the models are deterministic, and I suggest including some stochastic model (such as DTMC, CTMC or SDE) would be useful, too.

No new topics - more complete coverage of existing topics would help

Parameter estimation and surrogate models

Partial ranking correlation coefficients (PRCCs) and related topics.

Profile Likelihoods

The topics presented were good- but the majority of the presentations covered way too much material too fast. If instructors insist on covering as much as they do, they should give us materials to prepare in advance.

## What do you feel was the most useful aspect of the tutorial?

code and worked out examples

Exposure to not only new aspects and techniques of modeling, but also people who may be of help in the future

Get the chance to see how people approach UQ from different perspectives.

Hands on exercises.

Hands on with the code

Hands-on sessions and the synchrony between the organisers

I enjoyed the hands-on exercises and felt that they were useful in putting everything in to practice. However, generally these periods were short and most of it was already completed. I am glad we got the programming scripts at the end but a little more time to work on them would have been nice during the tutorial.

I learned that I have to more reading about sparse matrices and monte carlo sampling

It was all good and nothing stood out as most useful. But, when I first saw the schedule I thought the computer experiments might not be very useful for me and was pleasantly surprised to find that I found looking over the code and running the examples very helpful.

Marisa Eisenberg's presentation on Model Calibration and Selection was the most useful aspect of the the tutorial. She is an excellent instructor and the examples were very helpful.

Participant engagement.

Speaker's talks

statistical analysis of models and experimental data

The excellent overviews, especially by Marisa Eisenberg.

The hands on matlab tutorials.

The hands-on Matlab sessions were the most useful: we got to test the concepts just introduced in a practical way, and some of us were even able to apply the codes provided to our own research problems.

The lectures and time to play round with stuff.

The Matlab tutorials with accompanied pdf documents outlining the lab assignment. All instructors provided Matlab code but it was especially helpful to have a written summary of instructions for future implementations of the program.

The presentations

We learned a lot from different points of views.



## What, if anything, would you change about the tutorial?

1) I would slow it down! Less is more. 2) give students some reading material in advance. 3) tell students they need to have matlab installed. I didn't get to do the tutorials the first day because I did not have matlab.

1-2 talks had material at too high a level for a lot of people in the audience, so I would change that to more practical concepts. But the organizers did a great job introducing many useful topics.

Advise the students beforehand that a laptop and matlab would be necessary for the tutorial.

Again, more time for covering the concepts and more time on the hands-on aspect of the tutorial.

I hesitate to say, since I enjoyed all the speakers immensely. But if pressed I would say to take a little of the hard-core math edge out of Clayton's presentation and focus a bit more on the intuition behind things. And Ben's presentation generated many ideas, but I didn't get a clear idea of the main takeaways for how to proceed with UQ. Of course, maybe this is impossible given the wide range of models being considered by the attendees.

I would announce the schedule of topics a good 2 to 4 weeks before the tutorial so participants can be a little more prepared. I do not have a degree in mathematics and I feel I would have gotten even more out of the tutorial if I had time to prepare.

I would consider less topics in the same time, because it seemed to be too much for me.

I would like to include more time for team working and discussion

Increased focus placed on participant implantation of basic techniques - Less focus placed on advanced techniques.

It would have been helpful to ask participants to install the software before attending the courses. Also, it would have helpful to have had a list of topics and suggesting reading materials before attending.

Just a heads up on that we were going to to be using Matlab to run programs.

less "heavy" material, such as presented by Clayton Webster - that seemed a little out of the specific applicability scope

longer

N/A

Nothing, very well planned and presented.

Nothing.

Nothing.

## Please indicate any suggestions you have for facilitating communication among participants during the tutorial:

I think forcing people to work in groups would have opened up communication on other topics

No suggestions.

None

Perhaps allowing for even more interactions would be beneficial.

## Additional comments:

Excellent tutorial in every aspect, congratulations! and thank you

Great tutorial. The hands-on made things very clear. Thank you for putting this together and NIMBioS for the support to attend.

Great workshop!

I found the tutorial useful for my current research, but it was more informative rather than a tutorial

I thought the tutorial was fantastic. I hope NSF gives you another 10 years.

It was great to learn of the ways in which uncertainty quantification could be used to for validation of models used by NASA. I will be discussing the content of the course with colleagues to see where these tools may be best used.

It would have been beneficial for instructors to survey class about desired programming language. The required use of Matlab was unexpected and not my desired programming language.

Overall, I was very happy about the experience. I hope in the future NIMBioS offers more of these opportunities.

This was one of the best things that I have been to in math. It was a great learning experience. It is great way to become acquainted with a new topic.