NIMBioS

Evaluation Data Report
Stochastic Modeling in Biology Tutorial
March 16-18, 2011

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Stochastic Modeling in Biology Tutorial Evaluation Data Report

Evaluation Design

Evaluation Questions

The evaluation of the tutorial was both formative and summative in nature, in that the data collected from respondents was intended to both gain feedback from respondents about the quality of the current tutorial and also to inform future similar events. The evaluation framework was guided by Kirkpatrick's Four Levels of Evaluation model for training and learning programs (Kirkpatrick, 1994[1]). Several questions constituted the foundation for the evaluation:

1. Were participants satisfied with the tutorial overall?
2. Did the tutorial meet participant expectations?
3. Was the tutorial appropriate to the participants' levels of expertise?
4. Did participants feel they learned an appropriate amount of information?
5. Were participants satisfied with the amount of content and format of the tutorial?
6. Were participants satisfied with the accommodations offered by NIMBioS?
7. What changes in accommodations, group format, and/or content would participants like to see at future similar meetings?

Evaluation Procedures

An electronic survey aligned to the evaluation questions was designed by the NIMBioS Evaluation Coordinator with input from the NIMBioS Director and Deputy Director. The final instrument was hosted online via the University of Tennessee's online survey host mrInterview. Links to the survey were sent to 31 tutorial participants on March 18, 2011 (tutorial organizers and participants associated with NIMBioS were excluded from the evaluation). Reminder emails were sent to non-responding participants on March 25 and 30, 2010. By April 6, 2011, 27 participants had given their feedback, for a response rate of 87%.

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[1] From Kirkpatrick, D.L. (1994). *Evaluating Training Programs: The Four Levels.* San Francisco, CA: Berrett-Koehler.

Evaluation Findings

Respondent Satisfaction

Overall Satisfaction with Tutorial

Figure 1. Respondent satisfaction with various aspects of tutorial

Scale: -2 = Strongly disagree to 2 = Strongly agree
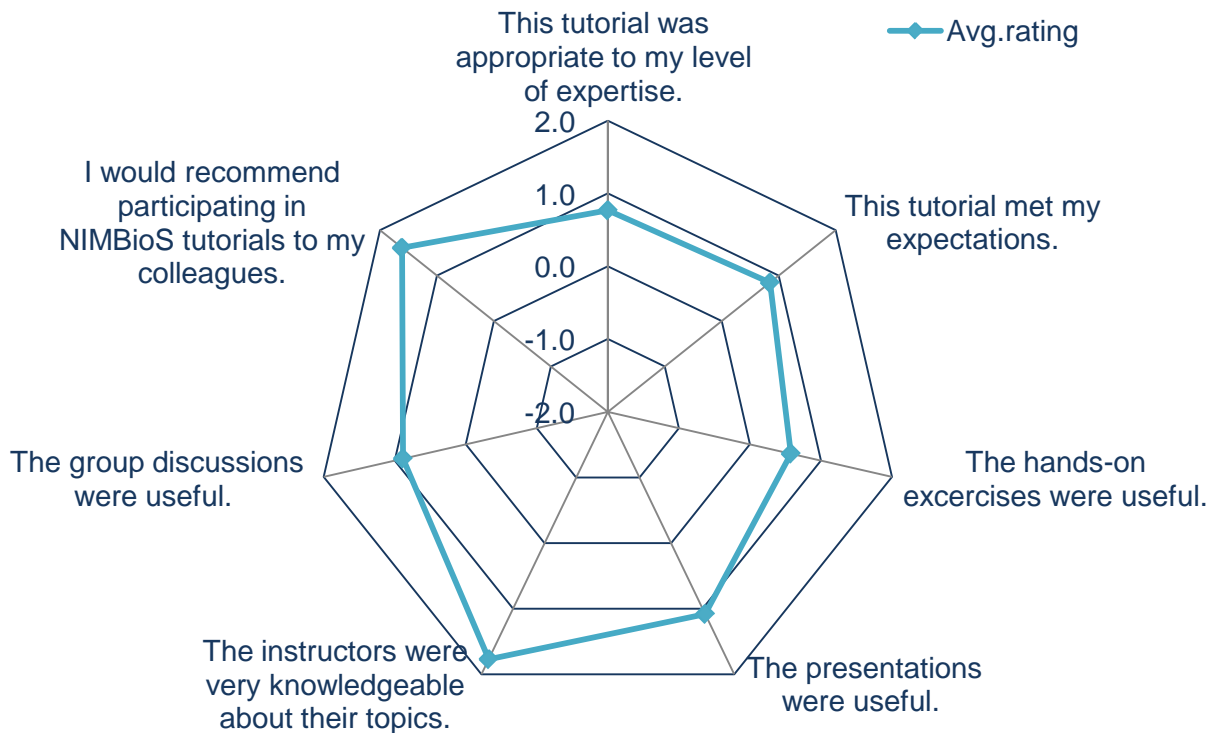
Satisfaction with Accommodations

Figure 2. Respondent satisfaction with accommodations

Scale: -2 = Very dissatisfied to 2 = Very satisfied

Tutorial Format and Content

Format
Figure 3. How satisfied were you with the opportunities provided during tutorial presentations and discussions to ask questions and/or make comments?

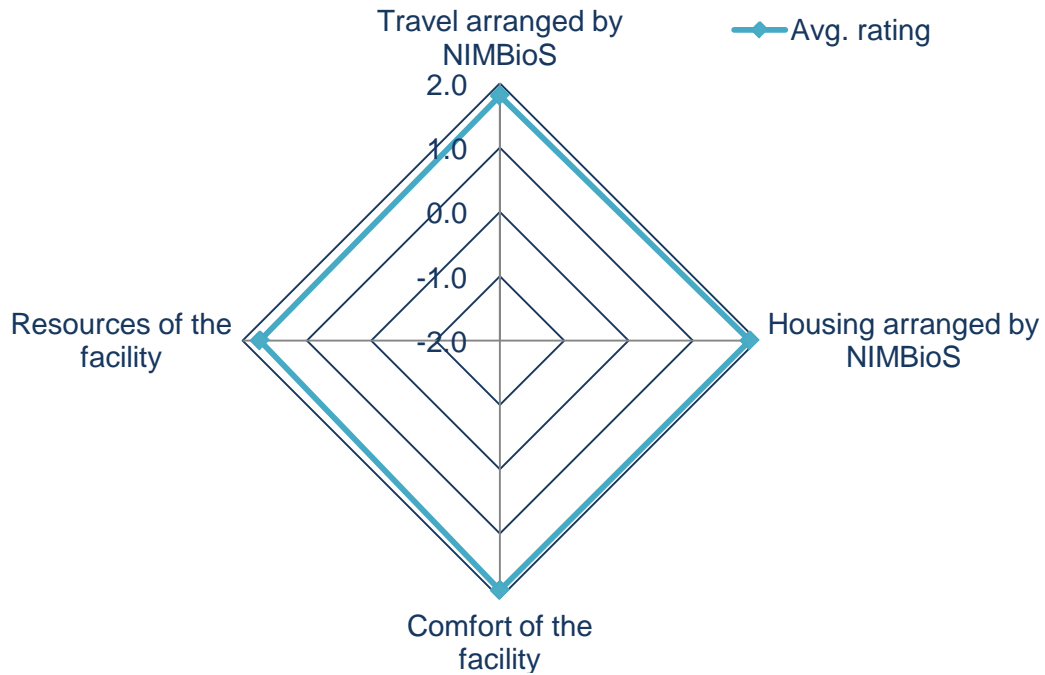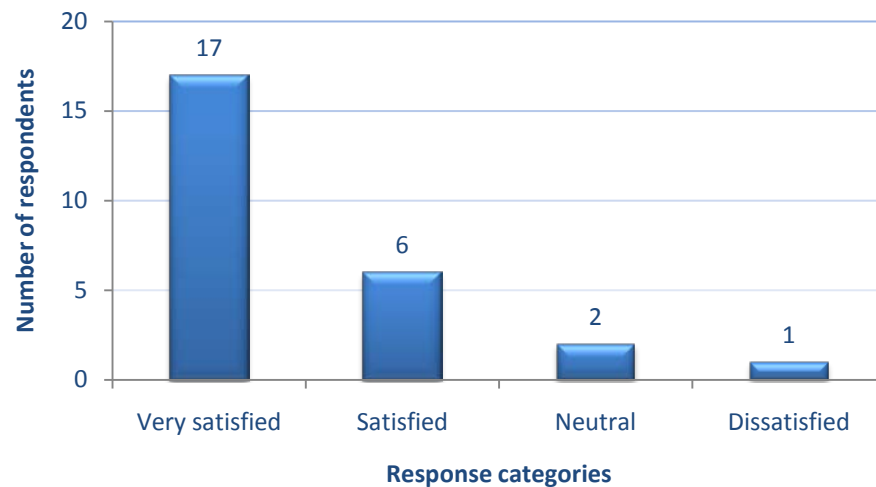**Please indicate any suggestions you have for facilitating communication among participants during the tutorial: (n=7)**

I had no problems communicating with the participants. I think perhaps making us aware ahead of time just exactly what the "talk about stochastic methods in your own research" part of the program was, and suggested putting together slides or something to pull up on our laptops for talking to each other. If I had any idea beforehand, I think it would have been useful to have had slapped together a few slides ahead of time instead of on the spot wading through papers on my computer and scribbling on napkins.

I think that if any participant could give a very brief talk (5-10 minutes) introducing his/her work to the other participants - that could probably be more helpful - people will see others' work and that could lead to more collaborations.

Though specific time for group discussion was allocated, this took place not very orderly and it could have been more organized/lead.

I would recommend more time for computer labs when the instructors are able to give more demonstrations to their programs.

Wiggios can be difficult to use. A short tutorial (i.e. 5 min. or less) on how to use it would have been useful.

Smaller groups.

The Wiggio approach and email seemed to work well.

The tutorial format would have been more effective if: (n=5)

Computer exercise follows right away with lecture, so that the code can be explained in more detail by the instructor. The codes provided (especially the R code) is hard to follow for people who are not R experts. They would look a lot better it more comments are provided.

Assuming that the participants are not exposed to the field, I would teach first principles and then give simple homeworks/exercises. I felt a gap between introduction of the concepts and their applications.

There had been less intense never-ending sessions with non-stop equations, and more time to run programs and ask specific questions.

The professors should consider that not everybody in the audience has a mathematical background (there are some biologists), so probably should try to adapt to this situation. Not only explaining the mathematical problems, but trying to link them with biological examples.

It was longer. Perhaps another day or two. Cutting the talks into smaller chunks and allowing for more time to work with the codes would have probably made the tutorial a bit more effective, for me personally, anyway.

Content
Figure 4. How do you feel about the amount of content offered during the tutorial?
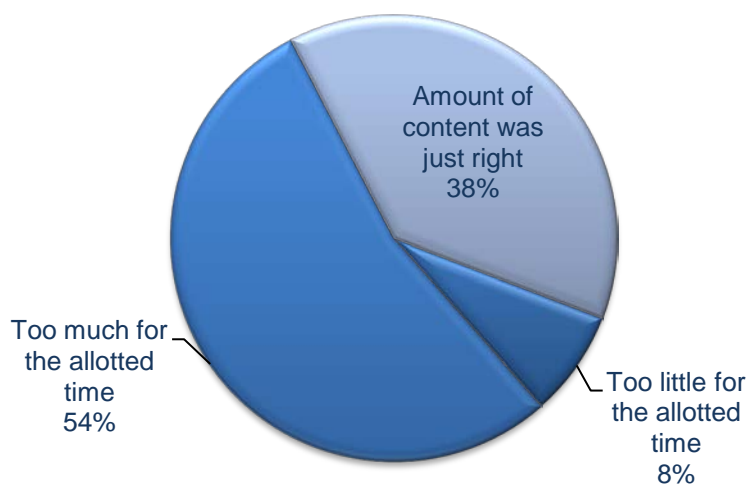
What do you feel was the most useful aspect of the tutorial? (n=20)

Almost all aspects of the tutorial were useful.

Overall, it is very informative.

The computational part where we would be able to visualize and understand the theory better!

Construction of sde's from models utilizing Markov chains.

Having a formal introduction to Markov Chains, likelihood, stochastic differential equations and modeling using them. I've been doing a lot of this stuff at my desk (likelihood, MCMC), but have never had a class or anything in this.

The applications of stochastic models with accompanying Matlab and R scripts were immensely useful.

Modeling biological processes using stochastic differential equations

The talks couple with the exercises. And the interactions with all the other participants and speakers

The talks and the fact that some of the content overlapped from once presentation to the next. That helped with understanding the content better - if you didn't quite get it in the first talk, you got to see some of it again in another talk.

Lectures and practical that were very well connected., presenters were very accessible

It was an eye opener for a person just getting into modeling. It is much more involved with more variables and options than I had expected. It was good to see how the stochastic approach compared with Monte Carlo simulations.

Introduction part of stochastic differential equation and examples of formulation of SDE models with biology problems.

It gave a general introduction to stochastic processes and their application to some specific problems in population dynamics.

Meeting other participants, discussing their and my current work, networking for the purposes of pursuing future academia/jobs.

Interacting with other people.

A chance to network with colleagues from around the world, A chance to see the mathematical side of these methods, proofs and all

Meeting other people and seeing how they apply stochastic models was the most useful part for me.
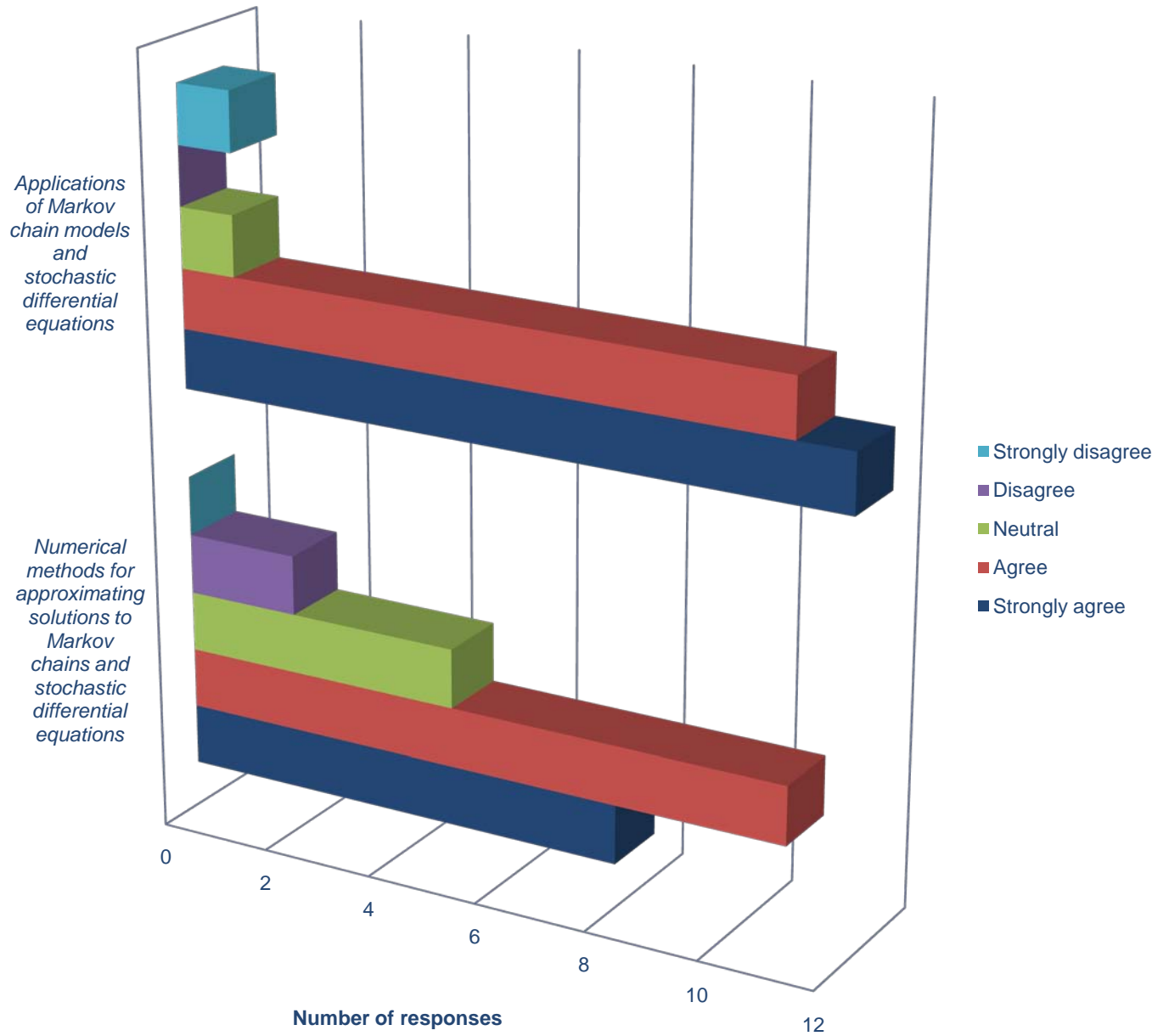
The presenters.

Linda Allen's talks,

The Introductory courses and Linda Allen Presentations.

Participant Knowledge

Figure 5. Participant knowledge gains

As a result of attending the tutorial, I have a better understanding of:

Suggestions for Future Tutorials

What would you change about the tutorial? (n=23)

Extend the tutorial from 3 days to around 5 days so that the content everyday can be better understood.

More time!

Time management, perhaps a couple of lectures more could have been scheduled or better group discussion management.

A little bit longer, with more topics covered.

I would have liked few practice problems on simple SDE to reinforce the concepts taught during the tutorial.

The problem session (computer exercises). I would divide the participants into small groups, and give each group a project(s) to work on.

I would make it a bit more accessible for non-mathematicians and give it in a bit longer time so that there is time to "digest" all the material.

I would say that it would be better if the lecturers focus, as much as possible, on the main ideas and give more examples driven from biology (or other areas) without many mathematical proofs or getting in so much depth in mathematical theory.

Perhaps the talks could have contained a little more application. As I understood, the tutorial was meant for individuals with not all that strong a math background in the biological, ecological, and biomedical fields (among others). The talks were quite mathematically rich and overall very general. More discussion of specific applications may have drawn back in individuals which may have switched off once the math got heavy.

Get people who truly work at the interface of math and bio. Nothing against the speakers, just a fact of how heavily biased towards math this was.

1. The 1st lecture (theory of stochastic models) switched to come after the second lecture (basic principles of stochastic models) because the second lecture provides an intuitive understanding of stochastic models, which prepares the audience for the much more theoretical 1st lecture. 2. Reduced emphasis on mathematical proofs of the derivation of stochastic models. Proofs can be provided as a complementary/optional presentation or handout. 3. Add a model fitting component, as noted previously. 4. If funding allows, provide a textbook to all participants, such as Linda Allen's revised book on stochastic models.

The target group: the description said it is targeted to Biologist mainly but the content was too advanced for non-mathematicians, also, the Matlab/R sessions: they were a bit chaotic, there was noise, and I was not sure what we were doing. Unfortunately we didn't get to do the SDE Matlab practical at all which was organized

It was too heavy on the math and light on the biology for my interests as someone just getting started in the field. I had hoped to see how different models can be used for different biological problems and a comparison of models for each of those problems.

It is intense mathematically. I would follow the lectures better it more examples are presented in more detail.

I would include more hands on exercises and less theory.

More written hands-on activities.

I would have more formal lab sessions - i.e. the codes come with a project description and questions to answer to understand the material. I also would have broken up the long talks with 5 minute breaks in the middle. Particularly Friday morning, there was only one loooong talk, we were all tired, having a break before launching into stochastic PDE's would have been awesome. I would have gained so much more from that.

More time with the exercises. More biological examples (not only the mathematical part).

I think it would have been reasonable to ask the participants to read specific selections or attempt to perform exercises in Linda Allen's book prior to arrival to get us fully engaged in the material and recognize our strengths and weaknesses in this area. This would have encouraged attendees to apply these techniques to their questions of interest while learning independently prior to the seminar and we could have come with issues generated during this preparation (leading to more discussion and more in-depth application to our own research questions.)

I would spend more time on simple examples instead of showing mathematical proofs.

It would be good that the hands-on part of the tutorial was a bit more guided, or the very least, to have a little guide of what things to specifically try with the programs, as some of the instructors did.

I'd reduce the time for discussing problems or try to make it more effective than this.

the lectures on maximum likelihood were too specific and detailed without adequate connection to fundamentals.

What topics would you have liked to have covered in this tutorial if given more time? (n=17)

I am very interested in biological applications, therefore, if we could have the chance to cover more applications of stochastic models in biology that would be really interesting for me!

More biological applications... or biological applications period. I got very frustrated when all four speakers consistently neglected the biological relevance of the tools that they were teaching. NIMBioS stands for National Institute for Mathematical and Biological Synthesis, I believe, but as far as I know, no biology was offered in this tutorial. I am still very frustrated about this because I think I wasted my time during those 2.5 days and because the message that was sent out to ecolog explicitly targeted people with my level of quantitative analyses and mathematical understanding. In talking to other biologist during the coffee breaks, it became clear to me that I wasn't the only one with this feeling... even people with strong math background were lost!

Include more biological examples in the presentations (not only the mathematical part).

More applications and fewer derivations.

Stochastic processes applied to other areas of biology (i.e., not necessary population dynamics).

More biological applications and more group discussion.

comparison between results of deterministic models and results of stochastic models in real research problems.

I think the topics covered were fine. I liked how the sde Matlab tutorial had a pdf that went with it - I think more organized lab sessions like that should have been covered.   It would have been neat if the R code projects went with similar projects. I left lost at understanding half of the material, even though I figured out how to run all the R files and what they were doing, I didn't understand the theory behind what they were generating even after reading those slides over and over.

Model fitting of time series to assess whether or not they result from a stochastic process.

I would have liked to have more computer time to play around with the codes in the presence of the authors and other participants.

Topics were just right. I would have liked more time to practice the concepts presented during the tutorial in the form of problems under the supervision of instructor give more time was available.

The topics are enough, I need more time to digest.

I would have liked to have more hands on exercises and less theory.

The lectures and practicals were very good and well organized. The group discussions did not go very well, it may be an idea to ask a few participants to present some of their work or their questions relevant to the topic. Great job!

If given more time I would like the same topics to be explained with more examples and in greater detail.

More development of the fundamentals, motivated by concrete examples.

Stochastic Differential Equation Applied to SIER model.

Additional Comments

Please use this space for any additional comments: (n=12)

The tutorial was an enlightening experience. I am committed to applying stochastic modeling immediately in my research and teaching. Also, some of the new contacts at the meeting were very useful, as were the interactions with the faculty conducting the tutorial. Great experience! I plan to form a working group at NIMBioS this fall, and will try to participate in future tutorials/workshops when relevant. This was an excellent use of NSF funding. Thank you to all!

I know that NIMBioS did the best it could, and the organization was truly amazing, but the content was way out of the range that was advertised and I feel bad that I wasted my time and NIMBioS resources

Good job. I enjoyed the workshop.

Great job, well organized, great presenters, well prepared materials. Very helpful.

I really think it was a really great opportunity for all of us involved and that most of us took a lot out of this workshop. I wish these kinds of events were a lot more common and I really look forward to participate in something like this in the future.

This workshop has been a great opportunity for me to meet great people (Professors), and to discover a way to introduce some stochastic into my

model.

Include more biological examples and not only the mathematical part.

I think: 1) pdf files and simulations for presentations should be provided in advance;2) it's quite important to make the discussion time effective otherwise just reduce it; 3) some group activities should be activated so that participants can get to know one another more; 4) more applications in biology should be included in the presentations (nice examples can initiate, the ideas of how to work/deal with stochastic models).

The last day of the tutorial, I spent some extra time discussing a possible academic opportunity with a fellow participant. When we finally got around to grabbing some lunch, there was no more food left! Luckily, this didn't happen for any other tutorial provided meal, but I was very put off by this as traveling back home was imminent. I would have liked to have eaten before getting to the airport.

The general organization of the tutorial from the NIMBioS staff was really good and all the people were very eager to answer to all the questions from the participants!

Books offers (topics from the tutorial) could be arranged for attendees of the tutorial

I want to thank the organizers. The tutorial is very successful an informative!

Appendix

Stochastic Modeling in Biology Tutorial Evaluation Survey

Stochastic Modeling in Biology Tutorial Evaluation Survey

Thank you for taking a moment to complete this survey. Your responses will be used to improve the tutorials hosted by the National Institute for Mathematical and Biological Synthesis. Information supplied on the survey will be confidential, and results will be reported only in the aggregate.

Please check the appropriate box to indicate your level of agreement with the following statements about this tutorial: (Very satisfied, Satisfied, Neutral, Dissatisfied, Very dissatisfied)

       The tutorial was appropriate to my level of expertise.
       The tutorial met my expectations.
       The hands-on exercises were useful.
       The presentations were useful.
       The instructors were very knowledgeable about their topics.
       I would recommend participating in NIMBioS tutorials to my colleagues.

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

       Too little for the allotted time
       Too much for the allotted time
       Amount of content was just right

Please check the appropriate box to indicate your level of agreement with the following statements. As a result of participating in this tutorial, I have a better understanding of: (Strongly agree, Agree, Neutral, Disagree, Strongly disagree)

       Numerical methods for approximating solutions to Markov chains and stochastic differential equations
       Applications of Markov chain models and stochastic differential equations

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

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

What would you change about the tutorial?

How do you feel about the format of the tutorial?
       This was a very effective format
       This was not a very effective format
         The tutorial format would have been more effective if:

Please indicate your level of satisfaction with the tutorial accommodations:
(Very satisfied, Satisfied, Neutral, Dissatisfied, Very dissatisfied, Not applicable)

       Travel arranged by NIMBioS
       Housing arranged by NIMBioS
       Comfort of the facility in which the tutorial took place
       Resources of the facility in which the tutorial took place

How satisfied were you with the opportunities provided during tutorial presentations and discussions to ask questions and/or make comments?

     Very satisfied
     Satisfied
     Neutral
     Dissatisfied
     Very Dissatisfied

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

Please provide any additional comments about your overall experience with the tutorial: