Bioinformatics Written Qualifying Examination (WQE)

Abstract of the WQE

The topic for each student's WQE requires advanced approval by an ad hoc committee of the IDP. To receive approval, students need to submit a ~1-page abstract to propose the WQE topic. *This section explains faculty's expectations for this abstract.* For detailed instructions on the WQE and the types of projects that are acceptable, please refer to other sections of this document.

The abstract is due: Monday, May 2nd, 2016.

The abstract should contain a title and the following content:

Background and Significance: Include a brief background to motivate the project, describe its significance, include a summary of existing literature and a clear description of what has been done and what has not. Highlight the gaps in knowledge that you will attempt to address in your work.

Proposed Method: Clearly and concisely explain your proposed method, state what is new in your method and how it differs from existing literature.

Proposed Data Analysis: The method should be applied to simulated data and actual data (if relevant). If applicable, performance of your method should be compared to that of one or more existing methods. Describe clearly the data sets you propose to use, justify your choice of data sets and methods to compare to, as applicable.

Expected Timeline: Implementation and data analysis may take longer than you expect. Try to give an estimate of time needed to finish each part, such that the scale of your project should be appropriate for a 1-month period. Do not forget to leave enough time for writing.

You should include a bibliography for the abstract, which does not count toward the page limit. Based on this abstract, the faculty will provide feedback on your project. It is in your best interest to submit an abstract that has been carefully crafted. This will allow you to obtain the most useful feedback on your project.

Bioinformatics Written Qualifying Examination

Recommended template for the final paper
(Up to 10 pages, single-spaced, exclusive of figures and references)

Title
Student name, UID

Background and Significance
[1-2 pages]

Summarize the problem and its significance
Summarize existing work in the literature
Highlight gaps in existing knowledge in the field that your method will address. Describe why we need a new method.
Articulate exactly how your idea differs from existing work

Methods
[1-2 pages**]**

Clearly describe your method
Provide sufficient detail that an expert reader could, in principle, reproduce your methods

Results
[3-5 pages]

Present results of your method applied to simulated and/or actual data sets
Describe the results clearly and compare to existing work
This Results section is most important and should constitute the bulk of your paper.

Discussion
[2-3 pages]

Discuss strength and weakness of your methods
Discuss results obtained
If your methodology did not out-perform existing methods, discuss why and what aspects could have been improved for your method
Discuss future work for improvements

*In **rare** case, if your final paper deviates from the proposed abstract, describe and justify any deviation.*
This description does not count toward the 10-page limit.

Bioinformatics Written Qualifying Examination

The University requires that Ph.D. students complete a Written Qualifying Examination (WQE). The Bioinformatics WQE takes place during the summer after the student's first year in the program. Each student independently selects the topic, and develops an original research proposal and pilot study for a data analysis project. The topic for each student's study requires advance approval by an ad hoc committee of the IDP.

Written Qualifying Examination Guidelines

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Purpose:

For the WQE, you must demonstrate your ability to formulate a testable research question and answer it, by carrying out a small, well-defined and focused project over a fixed one-month period. It must include the development of novel bioinformatics methodology. This tests four skills:

- Your ability to get "up to speed" on a research area of your choosing, so that you are able to understand what has already been done;
- Your ability to identify a solvable research problem within this area. That means spotting an opportunity to ask a different question or to propose a better answer to an existing question;
- Your ability to implement and test your idea
- Your ability to convincingly present each of these aspects in writing.

The WQE differs from publication-quality research primarily in scale:

You must choose a small enough problem that you can complete it in one month -- which is much less than the length of a typical published research project. Therefore you must choose a more focused, less ambitious scope for your WQE. Be realistic.

The WQE must be your own ideas and work exclusively.

For this reason, the topic of the WQE research proposal may not be a project from a previous course, a rotation project, a project related to the student's prior research experience, an anticipated dissertation research topic, or an active or anticipated research project in the laboratory of your mentor.

Your thesis advisor may neither be consulted, nor otherwise involved in the preparation or write-up of the WQE project.

Procedure:

Following advance approval of the topic, the actual period you will be given for completion of the WQE is one month: **Monday, June 13th, 2016 through Wednesday, July 13th, 2016.**

Publication-level quality (except for originality) is expected of the resulting WQE paper.

The maximum page length for the resulting project write-up is 10 pages or less, single-spaced. The 10-page limit is exclusive of figures and/or references.

The examination will be graded Pass, Conditional Pass, or Fail by the IDP Steering Committee. Students who receive a grade of Conditional Pass will be required to rewrite part, or all of their examination, and will have one opportunity for revision. Students who fail the Written Qualifying Examination will be given one additional opportunity to take and pass the WQE within three months of the original exam administration.

Criteria:

Your WQE paper should cover the following topics:

- Summarize the problem and its significance
- Summarize existing work in the literature
- Articulate exactly how your idea differs from existing work
- Provide sufficient detail that an expert reader could, in principle, reproduce your methods
- Present detailed results of your method applied to various data sets, and a performance comparison relative to exiting method/work. This Results section is most important and should constitute the bulk of your paper.
- Discuss strength and weakness of your method, future work, etc

It should be obvious that this is a lot of material to fit into 10 pages, so please be succinct!

Suggestions for Writing the WQE:

We suggest you seek to avoid the following possible mistakes:

- Writing mostly about background, and very little about your own results
- Failing to articulate what is different about your work, versus existing literature
- Attempting a project that is too ambitious for the tight, one month time frame
- Just "repackaging" existing work. If the readers cannot identify clear evidence of thinking (to propose a new question / answer), the paper does not fulfill the WQE's purpose (demonstrate your ability to spot a solvable research problem). Examples of "repackaging" include implementing a web server for an existing method, or "combining" multiple existing methods (unless this itself involves a conceptual advance).
- Focusing entirely on a biological problem, without really developing novel bioinformatics methodology, e.g. using standard bioinformatics tools to answer an exclusively biological question.

Administrative Directions:

Proposals should be submitted as an attachment in Word or rtf.

Your name, UID, and e-mail address should appear in the upper right-hand corner of the topic proposal.

Please send your proposed topic(s) to me at ataka@lifesci.ucla.edu as well as cc: Faculty Graduate Advisor Grace Xiao at gxxiao@ucla.edu so that we can coordinate communication between you and the IDP Steering Committee members. That will save unnecessary stress on your part, should it happen

that one or more of the Steering Committee members is out of town, or otherwise does not get back to you.

Please respond as soon as you read this message, to let me know you have received it. If you have questions about the content of this message, please do ask as soon as possible.