Department of Biostatistics

Doctoral Student Handbook

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Chair's Welcome

We are delighted that you have chosen to pursue the highest academic level of education, Ph.D. in Public Health at Florida International University, majoring in Biostatistics and Data Analytics. All public health studies need biostatistical support and a major in Biostatistics and Data Analytics will rigorously train you in theoretical concepts and the application of biostatistical, data science, and computing methods in public health and biomedicine.

Biostatistics as a discipline and Departments of Biostatistics has been central to Public Health in general and specifically to Schools of Public Health for over 50 years. During this time, biostatisticians have contributed critically to the understanding of health and medical issues that impact our populations. They have done this both through the development and implementation of new theoretical and applied methods for public health and medical data and through the utilization of sound research methodologies that have helped develop improved approaches to health promotion, disease prevention, and clinical care.

The Department of Biostatistics at Stempel is continuously building its teaching and research programs. Our diverse group of core faculty members, in addition to their teaching responsibilities, have active research programs for developing contemporary biostatistical and computing methods. They also contribute to applied and collaborative projects that focus on improved health promotion, disease prevention, and approaches to clinical care. At this point, we offer an MPH degree with a concentration in Biostatistics and a new Ph.D. major in Biostatistics and Data Analytics.

Biostatistics provides a great career path, especially during a national shortage of biostatisticians. Our discipline has consistently ranked among the top ten best jobs as ranked by US News and World Reports. Biostatistics and Data Analytics major will prepare you for an exciting career in academia, industry, pharma, or government.

Again, welcome to the Department of Biostatistics, we are excited to have an opportunity to interact, teach and mentor you over the next several years, and prepare you for the exciting professional future in this field.

We welcome you to our program and encourage you to study and work hard!

Zoran Bursac, PhD, MPH
Professor and Chair

FIU

Robert Stempel College of Public Health & Social Work

Department of Biostatistics

Faculty Profiles

Zoran Bursac, PhD, MPH

Professor and Chair

Research: Statistical methods in public health and medicine: longitudinal data methods and repeated measures, missing data problems, mixed models, hyperbolastic and other non-linear growth models, statistical computing, and simulation, graphical data visualization, categorical data methods, logistic regression topics, and variable selection algorithms. Application areas: tobacco prevention, alcohol, and substance abuse, weight loss and obesity, cancer screening and prevention, maternal and child

Michelle Hospital, PhD

Research Associate Professor

Research: Structural Equation Modeling, program evaluation, weighted data, data analyses for intervention studies, as well as, health disparities, and youth risk behavior prevention research.

Nan Hu, PhD

Associate Professor

Research: Survival analysis, longitudinal data analysis, meta-analysis, analysis of missing data, statistical methods in medical diagnosis and prognosis, medical research on cardiovascular disease, kidney disease, neurological disorders, and radiology.

Boubakari Ibrahimou, PhD, PhD

Associate Professor

Research: Nonlinear analysis, exposure assessment, and the implications of clustering in addition to providing biostatistical support for public health and medical research with other investigators.

Tan Li, PhD

Associate Professor

Research: Ordinal data analysis, multilevel mixture models, psychometrics, longitudinal study

Emir Veledar, PhD

Courtesy Professor

Research: Biostatistical methods in Medicine.

Changwon Yoo, Ph.D., MS

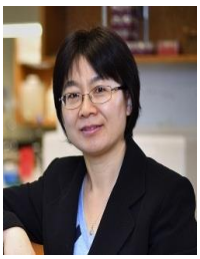
Associate Professor

Research: Dr. Yoo's areas of research include Bioinformatics, Medical Informatics, Causal Discovery, Causal Bayesian Networks, Intervention Modeling, Multivariate Analysis, Artificial Intelligence, and Machine Learning.

Gabriel Odom, Ph.D., ThD

Assistant Professor

Research: High-Dimensional Statistics, Statistical Genetics, R/Bioconductor Package Development, Data Science, Matrix Theory, Bayesian Statistics, Spatial/Time Series



Xuexia Wang, Ph.D.

Professor

Research: Development of statistical methods and computational tools in genetic discovery and risk prediction; identification of genetic risk factors for cancer and its treatment-related adverse outcomes

FIU

Robert Stempel College
of Public Health
& Social Work

For More Information Please Visit

http://stempel.fiu.edu

Introduction and General Description

Biostatistics is the study of data and methods to measure uncertainty related to biological and biomedical science. The science of biostatistics is largely the intersection of two disciplines: applied mathematical sciences and statistics and biomedical sciences. Thus, the field of biostatistics requires a deep understanding of both mathematical theory and how interpretations of uncertainty can be influenced by biological phenomena.

The borders of biostatistics are always expanding. Modern biostatistics is diverse: involving machine learning, design of clinical trials, statistical computing, statistical genetics, design and testing of new statistical techniques, data visualization, research reporting, and many other subfields. Graduates in biostatistics have rewarding and fulfilling careers in academia, pharmaceutical research, various fields of industry, public health and government, and public and private research enterprises.

Typical Course Schedule

Fall Semester 1

PHC 6601	Emerging Issues in Public Health
PHC 6091	Biostatistics II
PHC 7050	Advanced Biostatistics I

Spring Semester 1

PHC 7705	Methods in Evidence Based Public Health
PHC 7051	Advanced Biostatistics II
PHC 60XX	Elective

Summer Semester 1

PHC 60XX	Elective
PHC 60XX	Elective
PHC 6099	Advanced R Computing, OR
PHC 6080	SAS Computing for Health Sciences

Fall Semester 2

PHC 7054	Advanced Biostatistics III
PHC 60XX	Elective
PHC 60XX	Elective

Spring Semester 2

PHC 7981	Research Concepts and Proposal Development
PHC 7982	Public Health Pre-Dissertation Research
PHC 60XX	Elective

Summer Semester 2

PHC 7982	Public Health Pre-Dissertation Research
PHC 60XX	Elective

Fall Semester 3

PHC 60XX	Elective
PHC 60XX	Elective
PHC 60XX	Elective

Subsequent Semesters

PHC 7933	Doctoral Seminar in Biostatistics
PHC 7980	Dissertation

FIU Course Catalog

https://catalog.fiu.edu/

FIU-University of Miami Exchange Program

FIU Doctoral students can complete up to six credit hours at the University of Miami (UM) as members of the exchange program between FIU and UM. The exchange program at UM and FIU allows students to take advantage of the broad educational and research opportunities at both institutions. All students who are fully admitted into a doctoral program and in good academic standing may participate in this program. Students can choose from any course at UM provided the course is not already offered at FIU, is not a limited access course, and/or does not have additional fees (i.e. many online courses).

A listing of some public health courses offered at the University of Miami can be found here: http://publichealth.med.miami.edu/graduate/academic-programs/course-descriptions

The application form for the FIU/UM Exchange Program can be found here: http://gradschool.fiu.edu/wp-content/uploads/2018/07/WritableFIU-UM-Exchange-Application-2018.pdf

Funding for Doctoral Students

Presidential Fellowship *(*Institutional)
A doctoral student is nominated by the department prior to beginning his/her doctoral studies here. Each program can nominate 2 candidates—mentor plays a key role in this process; newly admitted

- $30,000/year
- 2 years of stipend support from the University Graduate School (UGS)
- 1 additional year of funding support from the fellow's graduate program
- 3 years support via tuition waiver and health insurance from the UGS
- Additional information: http://gradschool.fiu.edu/fellowships.shtml

McKnight Doctoral Fellowship (Statewide)
Graduate student applies for and brings the funds with him/her (statewide FEF foundation); newly admitted

- $22,000/year
- $12,000 from the Florida Education Fund for the 1st 3 years
- $10,000 from the University Graduate School for the 1st 3 years
- 2 additional years of funding support from the fellow's graduate program (as a Graduate Assistant)
- 5 years of support via a tuition waiver and health insurance
- Additional information: http://gradschool.fiu.edu/fellowships.shtml

FIU McNair Graduate Fellowship *(*National/Institutional)
Must have been an undergrad McNair; applicable to all McNairs nationwide, both Master's and Doctoral; must be newly admitted and nominated by home department/unit.

- $23,000 /year
- 2 years of stipend support from the University Graduate School (UGS)
- 2 additional years of funding support from the fellow's graduate program (as a Teaching or Research Assistant).
- Additional information: http://gradschool.fiu.edu/fellowships.shtml

NIGMS RISE Fellowship Program *(*Institutional/Grant-based)
For all master's and doctoral students, during or prior to entering program.

- $25,000/year stipend and tuition waiver, and travel funds for conferences
- Additional information: http://rise.fiu.edu/rise/application.shtml

C.V. Starr Scholarship
The C.V. Starr Scholarship assists students from Latin America and The Caribbean, who are interested in pursuing a doctoral degree in one of the three major disciplines at Stempel College.

- $24,000/year stipend and tuition waiver
- Additional information: https://stempel.fiu.edu/student-life/funding-your-education/

FIU Scholarships

- *Stempel College Scholarships:* https://stempel.fiu.edu/student-life/funding-your-education/
- http://gradschool.fiu.edu/current-students-graduate-funding.shtml
- https://fiu.academicworks.com
- https://fiu.academicworks.com/opportunities/external

Other Funding Sources

- *Public Health Online:* www.publichealthonline.org/scholarships-and-grants/
- *Society for Public Health Education*: http://my.sophe.org/Awards-Scholarships/Awards-Scholarships
- *ASPPH Scholarship Database*: www.aspph.org/study/financing-your-degree/

Suggested Timelines to Complete PhD

Suggested timeline for full-time student entering doctoral program		
Year 1		
Fall Semester	**Spring Semester**	**Summer Semester**
9 credit hours	9 credit hours **Submit D-1 Form**[1]	9 credit hours
Year 2		
Fall Semester	**Spring Semester**	**Summer Semester**
9 credit hours	9 credit hours **D-2 Examination and Form**	6 credit hours
Year 3		
Fall Semester	**Spring Semester**	**Summer Semester**
9 credit hours **Submit D-3 Form**	3 dissertation credit hours	3 dissertation credit hours
Year 4		
Fall Semester	**Spring Semester**	**Summer Semester**
3 dissertation credit hours	3 dissertation credit hours	3 dissertation credit hours **Submit D-5 Form**

**** 75 credit hours (CH) are required (60 CH pre-candidacy + 15 dissertation CH)***

(1) This is a suggested deadline; this form must be submitted by midway through Y2 Fall

Robert Stempel College of Public Health & Social Work

Doctor of Philosophy in Public Health with Biostatistics Concentration

http://stempel.fiu.edu

Name:	PID#:	Admitted:

I. Public Health Core Courses - 12 credits of required coursework.					
PREFIX	COURSE DESCRIPTION	HOUR	TERM	GRADE	PREREQUISITES
PHC 6091	Biostatistics 2	3			PHC 6052
PHC 6601	Emerging Issues in Public Health	3			
PHC 7705	Methods in Evidence Based Public Health	3			PHC 6065
PHC 7981	Research Concepts and Proposal Development	3			PHC 6091

II. Biostatistics and Data Analytics Core Courses - 12 credits of required coursework (choose one of 6099 or 6080).					
PREFIX	COURSE DESCRIPTION	HOUR	TERM	GRADE	PREREQUISITES
PHC 7050	Advanced Biostatistics 1	3			
PHC 7051	Advanced Biostatistics 2	3			PHC 7050
PHC 7054	Advanced Biostatistics 3	3			PHC 7051
PHC 6099	Advanced R Computing	3			
PHC 6080	SAS Computing for Health Sciences	3			

III. Biostatistics Electives - 12 credits of required coursework.					
PREFIX	COURSE DESCRIPTION	HOUR	TERM	GRADE	PREREQUISITES
PHC 6099	R Computing for Health Sciences	3			PHC 6052, PHC 6091
PHC 6056	Longitudinal Health Data Analysis	3			PHC 6052, PHC 6091
PHC 6059	Survival Data Analysis	3			PHC 6090, PHC 6091
PHC 6064	Applied Statistical Methods for Discrete Data	3			PHC 6052
PHC 6080	SAS Computing for Health Sciences	3			PHC 6052, PHC 6091
PHC 6067	Probabilistic Graphical Models	3			
PHC 6060	Principles and Approaches to Biostatistical	3			
PHC 6931	Special Topics in Biostatistics	3			
PHC 6084	Introduction to Bayesian Inference	3			PHC 6052, PHC 6091
PHC 6701	Advanced R Computing	3			PHC 6099 or instructor
PHC 7064	Applied Structural Equation Modeling	3			PHC 6052, PHC 6091
PHC 7083	Advanced Bayesian Inference	3			PHC 6084 or instructor
PHC 7719	Multivariate Methods in Health Science Research	3			PHC 6052, PHC 6091
PHC 7982	Public Health Pre-Dissertation Research	1-6			

IV. Secondary Courses - 12 credits of advised graduate secondary courses. *These courses must be approved by the Graduate Program Director or Major Professor.*					
PREFIX	COURSE DESCRIPTION	HOUR	TERM	GRADE	APPROVED BY

V. Dissertation - 15 credits of required coursework.					
PREFIX	COURSE DESCRIPTION	HOUR	TERM	GRADE	APPROVED BY
PHC 7980	Dissertation	24			

Graduation Requirements:

1. Satisfy all requirements for the Ph.D. of Public Health in Biostatistics and Data Analytics.
2. Must earn a grade of B or better in each Biostatistics and Data Analytics core course.
3. Complete a minimum of 75 credit hours of graduate-level coursework in an approved program.
4. 9 credit hours must be 7000-level courses.
5. Earn a minimum overall GPA of 3.0 in all coursework completed.
6. Complete Forms D-1, D-2, D-3, and D-5 (Dissertation Approval Forms) as per University Graduate School guidelines and deadlines. Forms can be accessed at http://gradschool.fiu.edu/
7. Meet with Faculty Advisor to receive Graduation Check prior to the final semester.
8. Apply for graduation at the Registrar's Office during registration of the final semester (See University Catalog for most current deadlines).

Competencies for Ph.D. in Public Health with Biostatistics Concentration

1. **Understand statistical and computing theory to develop new analytic methods in medicine and public health.**
    a. Demonstrate skills in mathematical rigor by proving known hypotheses about statistical knowledge in order to derive/evaluate new techniques
    b. Demonstrate knowledge of state-of-the-science algorithms and their strengths and limitations
2. **Integrate biostatistics and informatics methods in the design of original research for medical and public health fields.**
    a. Demonstrate knowledge of current biostatistical methods and their strengths and limitations
    b. Demonstrate familiarity with various bioinformatics tools/data repositories and their use
    c. Be able to comment on current gaps in biostatistics practice
3. **Apply contemporary data science skills in the analysis of complex medical and public health data.**
    a. Demonstrate broad familiarity with current data reporting and access strategies for clinical trials and electronic medical records, e.g. including basic knowledge of REDCap and SQL integration and familiarity with electronic data warehouses.
    b. Demonstrate ability to access and import surveillance data through APIs for major national databases.
    c. Exhibit strong programming ability in at least one major statistical computing language.
4. **Critically read and evaluate statistical literature.**
    a. Demonstrate evaluation of the utility of a theoretical manuscript and develop the ability to explain the main ideas of other papers in a clear and succinct manner.
    b. Demonstrate evaluation of how comprehensive an applied manuscript is, particularly with regard to a method's application to other areas of research. Further, offer opinions on how similar ideas could "cross-pollenate" with other areas of research.
5. **Learn to effectively collaborate with researchers and scientists and communicate biostatistics and data analytics with a lay audience, students, and health professionals.**
    a. Develop the interpersonal communication ability necessary to "speak the language" of a collaborating subject-matter expert.
    b. Explain the main ideas of a project to a lay audience as clearly and simply as possible, specifically within the framework of an "elevator pitch".
    c. Share research documents over online drives and version control systems in a secure, organized, and documented manner.

Candidacy Examination Guidelines

D-2 Candidacy Examination Overview

All doctoral candidates must pass a candidacy examination (a.k.a. comprehensive exam, or qualifying exam) before they can advance to Ph.D. candidacy, defend their research proposal, and begin working on their dissertations. The candidacy exam can be taken once the candidate has successfully completed all graduate core courses and is close to completing the elective courses required by the program. Once the student has successfully passed the candidacy exam, the student will have to defend their proposal (D-3) before the student can register for their dissertation credits. In general, students in the program take their candidacy exams in the Spring semester of their second year in the program. Under certain circumstances and upon the permission of their committees, students are allowed to take their candidacy examinations in the Summer semester of their 2nd year or the Fall semester of their 3rd year.

The Doctoral Candidacy Examination will have two components: written and oral. The written exam will be administered by the Department of Biostatistics faculty, and the oral exam will be given by the dissertation committee. Students are responsible for establishing the committee (D-1) early in their doctoral studies and before they apply for taking the candidacy examinations (D-2). It is recommended that the Doctoral Candidacy Examination Committee should consist of 5 members: three from the Department of Biostatistics (including the Chair or the major professor), one from another department in the Stempel College of Public Health and Social Work, and one from outside the Stempel College of Public Health.

D-2 Candidacy Written Examination

Students should pass the written exams before the formal candidacy oral examination. The written part of the exam is a closed-book in-class exam (up to 8 hours) and tests students' knowledge of statistical theories and applications which are covered in PHC 6091, PHC 7050, PHC 7051, and PHC 7054. In addition to an in-class component, this exam will also have a take-home component in which students will be given data and asked to demonstrate their analytical and reporting skills. The written part of the exam will be held each Spring semester, and all faculty members in the Department of Biostatistics will submit questions each year. Students who fail the written exam will have a second chance to make it up or remediate via another exam, specific report, paper, or instructing a course. Students who pass the prerequisite written exams are eligible to take the oral candidacy examination (D-2).

D-2 Candidacy Written Examination Departmental Committee

Department of Biostatistics will form a committee to oversee the D-2 candidacy written examination. The committee will be chaired by the Ph.D. graduate program director and include at least two faculty members from the department. Major professors of students who are planning to take the D-2 candidacy written examination should be included in the written examination committee. The committee will solicit examination questions from the department faculty.

D-2 Candidacy Oral Examination

The oral part of the candidacy exam will be the formal D-2 component and will be held by the students' dissertation committee. The committee is responsible for creating questions for this oral exam to assess students' program competencies. In the candidacy examination, students will be assessed based on the five competencies in Biostatistics. To assess each concentration competency, members of the dissertation committee will submit questions to the chair of the dissertation committee prior to the date of the candidacy exam. The exam will have at least one question for each competency and have a minimum of 10 questions in total. The candidacy exam will occur before the students can defend the dissertation proposal (D-

3). The dissertation committee will meet with the student in private, which will be closed door to conduct the oral candidacy exam and evaluate the student on the concentration competencies for Biostatistics that they will need to advance to doctoral candidacy.

D-2 Assessment and Rubrics

The student will undergo an oral candidacy exam to assess competencies for the Ph.D. in Biostatistics (review the five competencies in the previous section). Members of the dissertation committee must submit exam questions to the Chair of the dissertation committee before beginning the candidacy exam. Using the scoring rubric below, each dissertation committee member must evaluate the student on each of the following 5 competencies. The student must score an average of 2.0 or higher on each competency to pass the candidacy exam. After completion of the candidacy exam, the Chair of the dissertation committee must submit the candidacy exam questions and the completed evaluation rubric to the Ph.D. program director.

Scoring Rubric:
(0) Does Not Meet Expectations
(1) Partially Meets Expectations
(2) Meets Expectations
(3) Exceeds Expectations

Dissertation Committee Member	**Competency 1:** Theory	**Competency 2:** Methods	**Competency 3:** Computing	**Competency 4:** Literature	**Competency 5:** Communication and Collaboration
1.					
2.					
3.					
4.					
5.					
	Average Score:	**Average Score:**	**Average Score:**	**Average Score:**	**Average Score:**

Candidacy Examination Procedures

Ph.D. in Public Health with Biostatistics Concentration

Instructions: To assess the five concentration competencies, members of the dissertation committee will submit questions to the Chair of the dissertation committee prior to the candidacy exam. The collection of questions must thoroughly assess each competency. The Chair of the dissertation committee will document the exam questions using the table and format below. After completion of the candidacy exam, the Chair of the dissertation committee must submit the candidacy exam questions and the completed evaluation rubric to the graduate program director.

Exam Question	Target Competency	Question Provided By
1. EXAMPLE QUESTION 1	Competency #2	Dr. John Doe
2. EXAMPLE QUESTION 2	Competency #5	Dr. John Doe

Candidacy Examination Rubric

Ph.D. in Public Health with Biostatistics Concentration

Student Name:_____ **Date:** _____

Instructions: Before the student can present the dissertation proposal, the student will undergo an oral candidacy exam to assess competencies for the Ph.D. in public health in Biostatistics and Data Analytics. Members of the dissertation committee must submit exam questions to the Chair of the dissertation committee before beginning the candidacy exam. Exam questions must be relevant to the major competencies. The collection of questions must thoroughly assess each competency. Using the scoring rubric below, each dissertation committee member must evaluate the student on each of the following five competencies. The student must score an average of 2.0 or higher on each competency to pass the candidacy exam. After completion of the candidacy exam, the Chair of the dissertation committee must submit the candidacy exam questions and the completed evaluation rubric to the graduate program director.

Scoring Rubric:
(0) Does Not Meet Expectations
(1) Partially Meets Expectations
(2) Meets Expectations
(3) Exceeds Expectations

Dissertation Committee Member Name	**Competency 1:** Understand statistical and computing theory to develop new analytic methods in medicine and public health.	**Competency 2:** Integrate biostatistics and informatics methods in the design of original research for medical and public health fields.	**Competency 3:** Apply contemporary data science skills in the analysis of complex medical and public health data.	**Competency 4:** Critically read and evaluate statistical literature.	**Competency 5:** Learn to effectively collaborate with researchers and scientists and communicate biostatistics and data analytics with a lay audience, students, and health professionals.
1.					
2.					
3.					
4.					
5.					
	Average Score:	**Average Score:**	**Average Score:**	**Average Score:**	**Average Score:**

Dissertation Proposal Defense Guidelines

D-3 Examination Procedures
The format of the dissertation proposal will approximately follow that of an NIH or NSF funding proposal. Furthermore, this written proposal will become the first chapter of the student's dissertation. The oral component of the defense will be a presentation of the main components of the funding proposal, including, but not limited to: introduction, background, gaps in the literature, motivation, and three specific aims corresponding to the three chapters of the dissertation. Because different students may have different requirements for included material and formatting, this section offers a generic guideline rather than detailed deliverables.

D-3 Examination Committee
The doctoral dissertation proposal defense committee will be comprised of the student's dissertation committee members.

D-3 Examination Assessment
Response for the dissertation defense proposal will be evaluated using the following scoring rubric: (0) Does Not Meet Expectations; (1) Partially Meets Expectations; (2) Meets Expectations; and (3) Exceeds Expectations. The proposal will be evaluated based on the Dissertation Proposal rubric included in this document.

To pass the dissertation proposal, the student must score an average of 2.0 or higher on each competency to pass the candidacy exam. Although the dissertation committee may make recommendations for additional coursework, readings, or research training that they believe will help the student as he/she completes his/her dissertation research, advancement to the next stage is not contingent upon the student following the recommendations.

Students that do not pass the dissertation defense may be allowed to repeat it at the discretion of the committee. If so, the committee will delineate specific recommendations for further coursework, readings, etc., to complete before the defense. The defense must be scheduled within 12 months of the date of the first one. Students may be allowed to defend one more time only. If they fail a second time, the student's status as a Ph.D. student will be terminated.

Formatting Notes: ALL FORMATTING NOTES ARE SUBJECT TO CHANGE AS NECESSARY TO FIT THE FUNDING MECHANISM GUIDELINES. THESE ARE SUGGESTIONS ONLY. Use Arial 11-point font, minimum 0.5-inch margins; Maximum 10 single-spaced pages for Sections II–VI; Maximum 1/2 single-spaced page for Section VII; Maximum 1/2 single-spaced page for Sections VIII & X; Maximum 1/2 page for essential figures or tables. Maximum 3 pages for Section IX.

1. **Title Page**: Project title, student's name, chair of the committee, committee members, and date. If your committee is not yet formally constituted, indicate potential committee members you are considering, including a Chair, who must have been selected.
2. **Specific Aims & Rationale**: List the research's immediate aims in terms of hypotheses to be tested or research questions to be answered. The purpose of the research should be specified, in order to indicate the long-term importance of the specific information being sought through this study. This section must not exceed 1/2 to 1 page in length and often can be shorter. *This is the most important section of the proposal.*
3. **Background and Significance**: Describe the scientific context for the study, briefly summarizing previous related research. This should NOT be an extensive literature review. Keep references to a minimum by citing only the most relevant. This section should focus on the gaps in knowledge the proposed research will help to fill. This section should not exceed

4 pages in length.

4. **Methods**: The format of this section may be tailored to meet the needs of the specific study being proposed. However, the following sub-headings usually apply. This should be the longest section of the proposal and can be up to 5 pages in length.
   a) Method development focus
      - **Method development**: Using a real data set, motivate the need for a new statistical test, procedure, or algorithm by showing how it addresses a current gap in common statistical / data science practice. Using rigorous mathematics, derive the properties of the method.
      - **Simulation study**: Using *in silico* data, show that this new method is non-inferior to a comprehensive set of competing methods for appropriate metrics while showing clear superiority in some aspects (accuracy, convergence, computing resources, ease of interpretation, etc).
      - **Applied project**: Apply this new method to the real data set mentioned above (or other similar data sets), and compare results across the comprehensive set of competing methods.
      - **Software dissemination/packaging**: Write, document, test, and distribute an open-source implementation of the method, including scripts necessary to replicate the *in silico* and real data analyses.
   b) Method application focus
      - **Data collection**: Describe the sources of key data items. When applicable, the sequence of data collection activities for a typical subject should be given. A diagram can be helpful when data will come from several sources or when multiple observations are to be obtained over time. If there are plans to monitor and assure data quality (such as duplicate data for some or all subjects, cross-checks of one data source against another), briefly describe them. If data are simulated, students need to specify the value of parameters, sample size, conditions, and outline of the computer code used to simulate the data.
      - **Data management**: Describe the computer applications and code necessary to store, process, clean, and document the data pre-processing steps.
      - **Data analysis**: Describe how the data will be organized to address each of the specific aims and/or hypotheses mentioned in Section A. Specify the statistical techniques to be used. Dummy tables or figures are recommended.
      - **Study Power**: Summarize the results of statistical power or sample-size calculations.
5. **Limitations**: Briefly describe the most important factors limiting conclusions to be drawn from the study and, the ability to adequately test the primary hypotheses.
6. **Timeline**: Provide an approximate timeline for completing the project. Indicate the current status of the project.
7. **References**: Provide citations to literature references used in the proposal.
8. **Student's Project Role** (if applicable): Describe your role in the project (e.g., idea, funding, design, data collection, data management, analysis). If the student is using data already collected by another professor or faculty, he/she must state their role in coming up with the dissertation research project.

Students are also required to prepare an abbreviated proposal for the University Graduate School. Guidelines for the University Graduate School are available at:
http://gradschool.fiu.edu/documents/Proposal_Guidelines.pdf.

Sample dissertation proposals can be found here:
http://gradschool.fiu.edu/thesis-dissertation/

Dissertation Proposal Defense Rubric

Ph.D. in Public Health with Biostatistics Concentration

Student Name:_____ **Date:** _____

Instructions: Using the scoring rubric below, each dissertation committee member must evaluate the student's dissertation proposal on each of the following five content areas. The student must score an average of 2.0 or higher on each content area to pass the dissertation proposal defense. The completed evaluation form must be submitted to the graduate program director.

Scoring Rubric:
(0) Does Not Meet Expectations
(1) Partially Meets Expectations
(2) Meets Expectations
(3) Exceeds Expectations

Dissertation Committee Member Name	**Content Areas**		
	Project Summary: (1) Clearly state the purpose and objectives; (2) The intellectual merit of the project is clearly stated; and (3) the Broader public health impact of the research is clearly stated.	**Introduction to Problem:** (1) Describe the scientific question; (2) Provide the context to the problem; (3) Explain the relevance of the problem being addressed; and (4) Describe previous research relevant to the problem.	**Methodology:** (1) Describe and use concise definitions and descriptions of methods; (2) Describe the potential sources of errors; and (3) Provide a clear timeline to carry out the project.
1.			
2.			
3.			
4.			
5.			
	Average Score:	**Average Score:**	**Average Score:**

Dissertation Requirements

Dissertations can be completed using one of two formats; however, the major professor determines which of the following formats the student will use.

Manuscript Format (recommended format)
Ph.D. students in public health with a specialization in Biostatistics and Data Analytics are expected to write three cohesive manuscripts related to the dissertation project.

1. Three manuscripts should be publishable and submitted for peer review.
2. Two of the three manuscripts must be published, in the press, accepted for publication, or have received a positive peer review by the time the candidate submits the dissertation to the Chair of the committee for final signature.
3. The choice of journals to which the manuscripts are submitted will be made in consultation with the candidate's dissertation committee.

This format of the dissertation will consist of five chapters. Chapter 1 will be the dissertation proposal, chapters 2-4 will be the three manuscripts, and chapter 5 will be the discussion and conclusions summarizing and joining all the work together.

Manuscript Format Outline

- Title Page
- Dedication (optional)
- Acknowledgments (optional)
- Abstract
- Table of Contents
- Chapter 1
  - Dissertation Proposal
- Chapter 2
  - Manuscript #1
- Chapter 3
  - Manuscript #2
- Chapter 4
  - Manuscript #3
- Chapter 5
  - Discussion and Conclusions
- References
- Appendices

Traditional Format
Alternatively, Ph.D. students in public health with a specialization in Biostatistics and Data Analytics can use the traditional dissertation format. Below is an outline of the traditional format. More details on the traditional format can be found here: http://gradschool.fiu.edu/thesis-dissertation/

Traditional Format Outline

- Title Page
- Dedication (optional)
- Acknowledgments (optional)
- Abstract
- Table of Contents

- Chapter 1
  - Introduction
- Chapter 2
  - Literature Review
  - Specific Aims and Hypotheses
- Chapter 3
  - Methods
- Chapter 4
  - Results
- Chapter 5
  - Discussion
- References
- Vitae
- Appendices

Dissertation Defense Rubric

Ph.D. in Public Health with Biostatistics Concentration

Student Name:_____ **Date:** _____

Instructions: Using the scoring rubric below, each dissertation committee member must evaluate the student's dissertation defense on each of the following three content areas. The student must score an average of 2.0 or higher on each content area to pass the dissertation defense. The completed evaluation form must be submitted to the graduate program director.

Scoring Rubric:
(0) Does Not Meet Expectations
(1) Partially Meets Expectations
(2) Meets Expectations
(3) Exceeds Expectations

	Content Areas		
Dissertation Committee Member Name	**Dissertation Implementation:** (1) Describe clearly the background and public health motivation of the research; (2) State the data collection, cleaning, and storing process including documented pipeline code; (3) Provide justification for the methods chosen AND/OR rationale for developing new method(s); (4) Compare chosen/developed methods used against other established methods; and (5) share all source code openly.	**Written Dissertation:** (1) Describe the scientific context; (2) Describe the scientific content in detail; and (3) Explain the technical aspects of the dissertation and publications.	**Oral Defense:** (1) Technical aspects of presentation [e.g., opening, delivery, word choice, timing, summary, conclusions]; (2) Quality of visual aids [e.g., number/sequence of slides, effectiveness, simplicity, and legibility]; and (3) Scientific content and organization [e.g., logic, significance and relevance, originality, responses to audience and defense committee].
1.			
2.			
3.			
4.			
5.			
	Average Score:	**Average Score:**	**Average Score:**

Student Agreement | Ph.D. in Public Health with Biostatistics Concentration

By signing this student agreement, I acknowledge that I was provided a copy of the "Ph.D. in Public Health with a Concentration in Biostatistics." I also acknowledge that understand the Florida International University policy number 380.044 which states the following:

Academic Dismissal: Failure to maintain good academic standing will result in placement on academic warning, probation, or dismissal.

- *Warning*: A graduate student whose cumulative graduate GPA falls below 3.0 will be placed on warning, indicating academic difficulty.
- *Probation*: A graduate student on warning whose cumulative graduate GPA remains below 3.0 in the following semester will be placed on probation, indicating serious academic difficulty. The College or School of the student on probation may indicate the conditions which must be met in order to continue enrollment.
- *Dismissal*:
  - A graduate student on probation whose cumulative and semester GPAs fall below 3.0 will be automatically dismissed from his or her program and the University. A graduate student will not be dismissed prior to attempting a minimum of 12 hours of coursework as a graduate student. The student has ten working days to appeal the dismissal decision.
  - A student may be dismissed for failure to make satisfactory progress toward degree completion or failure to complete all the requirements for a graduate degree within the time limits for degree completion. (Examples of unsatisfactory progress toward degree completion include: not completing a Fall or Spring student evaluation, and not achieving the SMART goals on two consecutive semesters.)
  - A student may be dismissed for non-compliance with the continuous enrollment policy for doctoral students who have advanced to candidacy or master's students with an approved research proposal.

_____	_____	_____
Student Signature	Student Name	Date

_____ _____

Zoran Bursac, PhD, MPH
Professor and Department Chair
Department of Biostatistics

Date

_____ _____

Changwon Yoo, Ph.D., MS
Associate Professor
Graduate Director, Biostatistics and Data Analytics Doctoral Program
Department of Biostatistics

Date