



GRADUATE GROUP IN
BIOSTATISTICS

Handbook for Graduate Students

2017-2018

UC DAVIS
UNIVERSITY OF CALIFORNIA

Welcome to the **BIostatISTICS GRADUATE GROUP** at UC Davis!

This Handbook helps you to navigate through your studies at Davis. It summarizes the most important guidelines and issues, as well as listing the degree requirements.

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INTRODUCTION

ABOUT US

We are an interdisciplinary graduate group drawing together faculty and research from two colleges and three schools. Founded in 2002, the Graduate Group in Biostatistics is housed in the Department of Statistics, and consists of 32 faculty members from the following departments across campus: Statistics, Public Health Sciences, Population Health and Reproduction, Psychology, Computer Science, Nutrition, Plant Sciences, Molecular and Cellular Biology, Pediatrics, the Genome Center and the Graduate School of Management. We have around 33 graduate students in our Ph.D. and M.S. programs, many of whom are funded as researchers or teaching assistants, with office space within the Statistics department.

WHAT IS BIOSTATISTICS?

Biostatistics is a field of science that uses quantitative methods to study life sciences related problems that arise in a broad array of fields. Biostatistics provides stochastic models and methods, algorithms and graphical tools for the analysis of data from genetics, bioinformatics, and the medical, biological, agricultural and environmental health sciences. This includes methodology and models for data at the subcellular level (Genetics, Genomics, Proteomics and Bioinformatics), cellular level (Cancer Models, Neuron Models, Cell Distribution, Cell Kinetics and Survival), tissue/organ level (Pharmacokinetic and Toxicological Modeling, Imaging Techniques), individual level (Clinical Studies, Life History, Growth, Aging and Survival), and the population level (Biomathematical Modeling in Ecology, Epidemiological, Demographic and Public Health Studies). Core problems and methodologies include Survival Analysis, Clinical Trials, Longitudinal Studies, Generalized Linear Models, Dose-Response and Estimating Equations, Mixed and Random Effects Modeling, and the Analysis of Molecular Sequence Data as well as the statistical methodology of Bioinformatics.

A special feature of our graduate program is that it emphasizes biostatistical modeling and inference in a wide variety of fields, including bioinformatics, the biological sciences and veterinary medicine, in addition to the more traditional emphasis on applications in medicine, epidemiology and public health. This feature takes advantage of unique UC Davis strengths, including the unparalleled diversity of the UCD campus in the life sciences. Biostatistics group faculty are researchers with widely varying backgrounds, espousing a wide variety of methodological approaches.

The program in Biostatistics provides students with:

- Solid training in the biostatistical core disciplines and theory;
- State-of-the art knowledge and skills for biostatistical data analysis;
- Substantial exposure to the biological and epidemiological sciences;
- A strong background in theoretical modeling, statistical techniques and quantitative as well as computational methods.

The program prepares students for interdisciplinary careers ranging from bioinformatics, environmental toxicology, stochastic modeling in biology and medicine to clinical trials, drug development, epidemiological and medical statistics.

A unique feature of this program is that it emphasizes biostatistical modeling and inference in a wide variety of fields, including bioinformatics, the biological sciences and veterinary medicine, in addition to the more traditional emphasis on applications in medicine, epidemiology and public health. This feature takes advantage of unique UC Davis strengths, including the unparalleled diversity of the UCD campus in the life sciences. Biostatistics faculty at UCD cover the major biostatistics subspecialties, such as Survival Analysis, Longitudinal Data Analysis, Dose-Response, Diagnostic and Screening Tests. In addition, a broad array of other sub-fields is included in the faculty research interests, such as Curve Data and Functional Data Analysis, Interlaboratory Testing, Bayesian Modeling in Biostatistics, Statistical Modeling in Ecology, Nutrition, Biodemography, Nephrology, Psychiatry and Neurosciences, Statistical Genetics and Statistical Methods for Sequencing and Molecular Biology, Statistics in Health Care Research, Spatial Methods for Environmental and Epidemiological Data, and Random and Mixed Effects Models. These areas are well represented among Biostatistics faculty and this unique combination of features presents students with an unusually diverse choice of applications and applied research problems. Biostatistics group faculty are researchers with widely varying backgrounds, espousing a wide variety of methodological approaches.

The Biostatistics program at UC Davis is based on solid methodological and theoretical foundations and emphasizes high quality at all levels of instruction and research. Students receive strong training in the core Biostatistics disciplines, in the biological sciences and also in theoretical statistics. The faculty of the Biostatistics Group consists of recognized researchers and teachers who are committed to a distinguished program in graduate education and research.

ABOUT DAVIS

The University of California has ten campuses, of which Davis is the third largest. The campus started as an agricultural school (first admitting students in 1908) and later established the School of Veterinary Medicine. It became a general campus in 1959. Since that time, the campus has expanded to 35,400 (Fall 2014) students, with undergraduate and graduate programs in many fields, and the professional schools of law, management, medicine and veterinary medicine. Despite the size of the campus, it has retained many of the attributes of a small college, with an informal atmosphere and excellent student-faculty interaction.

The city of Davis has been called the most “energy-conscious” city in the United States. It is an interesting, forward-looking city of about 65,600 located in California’s Central Valley. It lies 15 miles west of Sacramento, the State capital, and 75 miles northeast of San Francisco. Davis residents can take advantage of the recreational opportunities of Lake Tahoe, Northern Sierra Nevada, Napa Valley, and the beaches of northern California.



The UC Davis Arboretum

BIostatISTICS DEGREE PROGRAMS:

THE MASTER'S PROGRAM IN BIostatISTICS

<http://biostat.ucdavis.edu/graduate-program/ms>
Degree Requirements approved by Graduate Council May 2010

ADMISSIONS REQUIREMENTS

An undergraduate major in mathematics or statistics is typical for Biostatistics graduate students, but is not required. However, because of the mathematical nature of some of the graduate coursework, students should be able to demonstrate good mathematical ability. Students should also demonstrate some exposure to courses in the life sciences (biological, environmental, medical and agricultural sciences). The minimal background for entrance into the master's program is: a bachelor's degree with a 3.0 overall grade-point average; one year of calculus; a course in linear algebra; facility with a programming language; and upper-division work in mathematics and/or statistics.

Applicants without this minimal background will not be considered for admission in the Graduate Group. Applicants must complete the online Office of Graduate Studies application, and provide three letters of recommendation; applicants whose native language or language of instruction is not English must achieve the minimum TOEFL or IELTS scores listed on the Office of Graduate Studies website. The program does not accept part-time students.

MASTER'S PLAN

This is a M.S. Plan II program which requires a comprehensive exam (no thesis). A minimum of 50 units is required (graduate and upper division), of which at least 18 must be graduate courses in the major field (according to university regulations). Not more than 9 units of research (299 or equivalent) may be used to satisfy the 18-unit requirement.

COURSE REQUIREMENTS (50 units)

Required courses (35 units):

STA131 A, B, C (4 units each)*

STA135 (4 units)

STA141 (4 units)

STA232 A, B (4 units each)**

STA390 (2 units)

STA260 (3 units)

BST290 (twice) (1 unit)

The following courses can be used to substitute certain required courses:
STA 200ABC for STA 131ABC (*MS students are advised to take STA 200ABC);
STA231ABC for STA131ABC;
STA 206-207 for STA 232AB (** MS students are advised to take STA 206-207)
STA232C for STA135;
STA242 or 243 for STA 141; and a data analysis project conducted under BST299 (independent study) for STA260

If a required course for the M.S. program is substituted in this way, the substituting course cannot be used to simultaneously satisfy any other requirement.

Biostatistics core courses (8 units):

Two courses chosen from:

- BST222 (Survival Analysis) (4 units)
- BST223 (Generalized Linear Models) (4 units)
- BST224 (Longitudinal Data Analysis) (4 units)
- BST225 (Clinical Trials) (4 units)
- BST226 (Statistical Methods in Bioinformatics) (4 units).

Electives (7 units):

Biostatistics and Methods electives (4 units):

One course with a substantial biostatistical data analysis component at the upper division or the graduate level. Possible courses include the following (although they may not simultaneously satisfy any other Biostatistics core courses requirement):

- | | |
|------------------|----------------------------|
| BST222 (4 units) | STA237 A, B (4 units each) |
| BST223 (4 units) | STA250 (4 units) |
| BST224 (4 units) | STA251 (4 units) |
| BST225 (4 units) | STA252 (4 units); |
| BST226 (4 units) | |

Life Sciences Elective (3 units):

One course selected from any upper division or graduate offering in biology, epidemiology, environmental, agricultural or medical sciences. Further elective units at the upper division or graduate level may be taken in the following areas if a student wishes to do so for furthering his or her career objectives: (a) Statistics, (b) Fields of Biostatistical application (e.g., epidemiology, genetics).

SUMMARY

A minimum of 50 units is required; 43 units of core and 7 of elective coursework. A minimum course load is 12 units per academic quarter.

COMMITTEES

ADMISSIONS COMMITTEE: once applications and relevant materials are submitted to the program, they are reviewed by the Admissions Committee, which consists of three to five faculty members appointed by the Chair of the Graduate Group. Once a decision has been made to admit or deny an applicant, the Admissions Committee chair forwards the committee's recommendation to the Dean of Graduate Studies for approval. The application deadline for entry in Fall of the next year is May 15.

ADVISING COMMITTEE: Five faculty members are appointed by the Chair of the Graduate Group to the Committee of Advisers, chaired by the Master Graduate Adviser. Mentors for each student are chosen from this group and assist the students in the transition through the graduate program. The Master Graduate Adviser meets quarterly with each graduate student and assists graduate students in developing a study plan. In particular, the Master Graduate Adviser must approve all courses to be used to fulfill the requirements. Other members of the Committee of Advisers support the Master Graduate Adviser when needed. All students are expected to enroll in a minimum of 12 units per quarter, which may include a combination of required courses, electives, and research units (BST299).

COMPREHENSIVE EXAMINATION COMMITTEE: The Graduate Group Chair will appoint two permanent members to the M.S. comprehensive exam committee. The third member is identified by the Master Graduate Adviser in consultation with the student. This committee will be in charge of administering the M.S. comprehensive exam and reporting the result to the chair of the GGB. The chair of the committee is responsible for guiding the student in preparation for the comprehensive exam.

ADVISING AND MENTORING

Five faculty members are appointed by the Chair of the Graduate Group to the Committee of Advisers, chaired by the Master Graduate Adviser. Mentors for each student are chosen from this group and assist the students in the transition through the graduate program. The Master Graduate Adviser assists graduate students in developing a study plan, and has signatory authority for all paperwork to be submitted to the Office of Graduate Studies. Other members of the Committee of Advisers support the Master Graduate Adviser when needed. The Mentoring Guidelines may be found online (<http://biostat.ucdavis.edu/pages/program/mentoring%20guidelines.pdf>).

ADVANCEMENT TO CANDIDACY

Plan II M.S. Candidates must file an advancement to candidacy form (<http://www.gradstudies.ucdavis.edu/forms>) prior to taking the M.S. comprehensive examination. Candidates must have taken at least half of the required coursework for their degree requirements (25 units). Students are expected to apply for advancement to candidacy by the end of the third quarter in the program, and then advance by the end of the 6th quarter. A completed form includes a list of courses the student will take to complete degree requirements. If changes must be made to the student's course plan after s/he has advanced to candidacy, the Master Graduate Adviser must recommend these changes to Graduate Studies. Students must have the Master Graduate Adviser sign the candidacy form before it can be submitted to Graduate Studies. If the candidacy is approved, the Office of Graduate Studies will send a copy to the program and the student. If the Office of Graduate Studies determines that a student is not eligible for advancement, the program and the student will be told the reasons for the application's deferral. Some reasons for deferring an application include: grade point average below 3.0, outstanding "I" grades in required courses, or insufficient units.

COMPREHENSIVE EXAM

Students in the M.S. program must attempt the exam at the end of all coursework, typically in the last quarter in the program. If a student does not attempt the exam at that time, it will be recorded as a failure. Every M.S. student needs to pass the exam in a maximum of two attempts. If a student fails the first attempt, the second attempt must be done before the end of the next quarter; if the first attempt is made in Spring, the second attempt must be made over the summer. Two failures to pass the exam will result in a recommendation to the Dean of Graduate Studies for disqualification of the student in the graduate program.

The Graduate Group Chair will appoint two permanent members to the M.S. comprehensive exam committee. The third member, who will be named the Chair of the committee for a given student, is identified by the Master Graduate Adviser in consultation with the student. This committee will be in charge of administering the M.S. comprehensive exam and reporting the result to the chair of the GGB. The chair of the committee is responsible for guiding the student in preparation for the exam. The M.S. Comprehensive Examination consists of a written report and an oral defense on a scientific project involving Biostatistical data analysis. This project should be well written and should have the potential to be publishable in a scientific journal. The chair of the committee will provide the student with a scientific project involving data analysis. The student will have at most three weeks to complete the project and write the written report.

After the report is submitted, the committee will schedule an oral examina-

tion with the candidate in which the candidate presents the project and answers questions about the work. After this oral examination, the committee will make a decision on whether to pass the candidate. Each student will receive a written evaluation on the performance on the examination, which will be discussed with the Biostatistics Master Graduate Adviser.

NORMATIVE TIME TO DEGREE

The Normative Time to Degree for the Biostatistics M.S. program is six quarters (two years).

TYPICAL TIME LINE AND SAMPLE STUDY PLANS

Course requirements are completed by the end of year two, and the M.S. Comprehensive

Examination may be attempted in the fifth or sixth quarter. Graduate Students must be enrolled in a minimum of 12 units every quarter. These 12 units can be made up of both required courses and 299 variable unit courses. In addition to the coursework outlined below, students will take STA 290 for any two quarters.

The following would be a typical program for a student seeking an M.S. degree

Year 1:

Fall	Winter	Spring
STA 200A	STA 200B	STA 200C
STA 106 or 108	Elective	STA 135
STA 141	STA 106 or 108	BST 290
STA 390	BST 290	STA 260 (or BST 299)

Year 2:

Fall	Winter	Spring
STA 232A (or STA 206)	STA 232B (or STA 207)	
BST 222	BST 223	
Elective	M.S. Comp. Exam	

PELP, IN ABSENTIA & FILING FEE STATUS

Information about PELP (Planned Educational Leave, In Absentia (reduced fees when researching out of state), and Filing Fee status can be found in the Graduate Student Guide: <http://www.gradstudies.ucdavis.edu/publications>

BIOSTATISTICS DEGREE PROGRAMS:

THE Ph.D. PROGRAM IN BIOSTATISTICS

<http://biostat.ucdavis.edu/graduate-program/phd>
Degree Requirements approved by Graduate Council May 2010

ADMISSION REQUIREMENTS

An undergraduate major in mathematics or statistics is typical for Biostatistics graduate students, but is not required. However, because of the mathematical nature of some of the graduate coursework, students should be able to demonstrate good mathematical ability. Students should also demonstrate some exposure to courses in the life sciences (biological, environmental, medical and agricultural sciences).

The minimal background for entrance into the Ph.D. program is: a bachelor's degree with a 3.0 overall grade-point average; one year of calculus; a course in linear algebra; facility with a programming language; and upper-division work in mathematics and/or statistics.

Applicants without this minimal background will not be considered for admission in the Graduate Group. Applicants must complete the online Office of Graduate Studies application, and provide three letters of recommendation; applicants whose native language or language of instruction is not English must achieve the minimum TOEFL or IELTS scores listed on the Office of Graduate Studies website. The program does not accept part-time students.

Prerequisites

In addition, applicants are expected to have the equivalent of the following UC Davis courses:
MAT25 and MAT125A and MAT167

Deficiencies

Course work deficiencies should be made up by the end of the first academic year following initial enrollment by earning a letter grade of "B" or better.

DISSERTATION PLAN

This is a Plan C program which specifies a three member (minimum) dissertation/final examination committee, a final oral examination, and no exit seminar.

COURSE REQUIREMENTS (58 units)

Required Statistics courses (39 units):

STA231 A, B, C (4 units each) STA401 (3 units) twice
STA232 A, B, C (4 units each) STA290 (1 unit) for three quarters
STA141 (4 units) STA390 (2 units)

Biostatistics Core Courses (12 units):

BST222 (4 units)
BST223 (4 units)
BST224 (4 units)

Electives (7 units)

Biostatistics or Methods Electives (4 units):

One course from BST225 (Clinical Trials), BST226 (Statistical Methods for Bioinformatics), BST252 (Advanced Topics in Biostatistics), STA250, STA251, STA237 AB, STA235 AB.

Life Sciences Courses (3 units):

One course at the upper division or the graduate level in Biology or Life sciences. This course should be approved by the graduate advisor. The intention is to provide a base of knowledge in molecular, cellular, organismal, and population biology, epidemiology or environmental sciences. The students are strongly encouraged to take more courses in Biology, Life Sciences or Environmental Sciences that are relevant to their research. Selection of such courses should be made in consultation with the thesis adviser.

Substitutions

The following courses may be used to substitute the STA141 course requirement: STA242 or 243. If STA141 is substituted in this way, the substituting course cannot be used to simultaneously satisfy any other requirement.

SUMMARY

A minimum of 58 units is required; 51 units of core and 7 of elective coursework.

A minimum course load is 12 units per academic quarter.

SPECIAL REQUIREMENTS

Biostatistics Practicum

Students will complete a practicum in the form of an interdisciplinary applied data analysis project. They will work in collaboration with any UC Davis faculty researcher (not required to be a member of the Graduate Group) who conducts studies or experiments which generate data in the medical, biological, veterinary medical, epidemiological, agricultural or environmental sciences, and who will serve as a mentor. The practicum will last a minimum of six weeks sometime before completion of the dissertation and will involve the analysis of original data. The student will prepare or substantially contribute to a project report. The practicum may be conducted as part of employment as a Graduate Student Researcher or as part of the dissertation research. A report based on an internship of a duration of at least six weeks at a facility, government health office, institute or company outside of UC Davis focusing on biological or medical research can also be used to satisfy this requirement. In this case the mentor will reside at the institution where the internship is carried out.

COMMITTEES

Admissions Committee: once applications and relevant materials are submitted to the program they are reviewed by the Admissions Committee, which consists of three to five faculty members appointed by the Chair of the Graduate Group. Once a decision has been made to admit or deny an applicant, the Admissions Committee chair forwards the committee's recommendation to the Dean of Graduate Studies for approval. The priority application and fellowships deadline is January 15 and the final application deadline is May 31 for admittance to the following fall quarter.

Advising Committee: Five faculty members are appointed by the Chair of the Graduate Group to the Committee of Advisers, chaired by the Primary Graduate Adviser. Mentors for each student are chosen from this group and assist the students in the transition through the graduate program. The Primary Graduate Adviser meets quarterly with each graduate student and assists graduate students in developing a study plan. In particular, the Primary Graduate Adviser must approve all courses to be used to fulfill the requirements. Other members of the Committee of Advisers support the Primary Graduate Adviser when needed. All students are expected to enroll in a minimum of 12 units per quarter, which may include a combination of required courses, electives, and research units (BST299).

Qualifying Examination Committee: the examining committee consists of five members, at least three but no more than four of which are members

of the GGB. Members will be appointed in accordance with the policies of the Graduate Council and Office of Graduate Studies at the recommendation of the Graduate Adviser who consults with the student prior to making the recommendation. The Major Professor may serve on the QE committee but is not eligible to serve as chair of the committee.

Dissertation Committee: the student, in consultation with their Major Professor, nominates three faculty to serve on the Dissertation Committee, one of which is the Major Professor who serves as Chair of the committee. These nominations are submitted to the Office of Graduate Studies for formal appointment in accordance with Graduate Council Policy (DDB 80. Graduate Council B.1.).

ADVISING AND MENTORING

Five faculty members are appointed by the Chair of the Graduate Group to the Committee of Advisers, chaired by the Primary Graduate Adviser. Mentors for each student are chosen from this group and assist the students in the transition through the graduate program until advancement to candidacy. The Master Graduate Adviser assists graduate students in developing a study plan, and has signatory authority for all paperwork to be submitted to the Office of Graduate Studies. Other members of the Committee of Advisers support the Master Graduate Adviser when needed. A Ph.D. student will select an area of specialization and will choose a dissertation adviser (Major Professor) from the Graduate Group in Biostatistics faculty working in that area, usually in the second or third year of study. The Mentoring Guidelines may be found online (<http://biostat.ucdavis.edu/pages/program/mentoring%20guidelines.pdf>).

ADVANCEMENT TO CANDIDACY

The student is eligible for advancement to Candidacy for the Ph.D. degree upon completion of all course requirements and after passing the Ph.D. Qualifying Examination, usually within two quarters of passing the Ph.D. Preliminary Written Examination. For well-prepared students, with sufficient statistical/biostatistical background prior to enrollment in the Graduate Group, they are expected to advance to candidacy by the end of the fourth quarter in the program. Otherwise, students are expected to advance to candidacy by the end of the eighth quarter in the program. Students must file the appropriate paperwork with the Office of Graduate Studies and pay the candidacy fee in order to be officially promoted to Ph.D. Candidacy.

QUALIFYING EXAMINATION & DISSERTATION REQUIREMENTS

Preliminary Written Examination

The Ph.D. Preliminary Written Examination will be given at the beginning of each Spring Quarter and also at the beginning of each Fall Quarter. Students in the Ph.D. program must attempt the exam in the Spring Quarter immediately after they complete both the STA 231AB, BST222 and BST223 core course series. A well-prepared student will take this exam during the first year of the program. Otherwise, they are expected to take the exam during the second year of the program. If a student does not attempt the examination at the first time they are eligible to take the exam, it will be recorded as a failure. Every Ph.D. student needs to pass the examination in a maximum of two attempts. In case of failure at the first attempt, the second attempt must take place at the next time the examination is offered, and if a student does not attempt the exam at that time, it will be counted as a second failure. Two failures to pass the examination will result in a recommendation to the Dean of Graduate Studies for disqualification of the student in the Ph.D. program.

The Ph.D. Preliminary Written Examination is a written exam with two parts: a statistical theory part and a biostatistics part. The duration of each part is about 3-4 hours. The exam committees in charge may be different for each part of the exam. Pass or fail is determined separately by the exam committees for the statistical theory part and the biostatistics part of the exam. The chair of the GGB will appoint an exam committee that will be responsible for preparing, administering and grading the examination for the Biostatistics part of the exam. This committee will forward its recommendation to the chair of the GGB.

Ph.D. Qualifying Exam

The Ph.D. Qualifying Examination is an oral exam. The exam will be attempted as soon as the Ph.D. Preliminary Written Examination has been passed and all required coursework for the Ph.D. degree in Biostatistics has been completed. In accordance with university rules, students are requested to take their qualifying examination, within three quarters of passing the Ph.D. Preliminary Written Examination, but no later than the end of the third year (9th quarter) to remain eligible for academic appointments such as GSI. Advisers must submit the Application for the Qualifying Exam four weeks prior to the exam date; exams taken before receiving Office of Graduate Studies approval, may be deemed null and void. Students must be registered during the quarters in which they take any portion of their Qualifying Examination.

To be eligible for the Qualifying Examination, the student must have:

- A "B" average in all work done in graduate standing;

- Satisfied all departmental or group requirements; and
- Removed all academic deficiencies

The preparation for the exam will be done by working closely with a faculty mentor (independent study) who is a regular member of the GGB. The exam committee consists of five faculty members, at least three but no more than four of which are members of the GGB. The Major Professor can be one of the members of the committee, but not its Chair. The Ph.D. Qualifying Examination examines a student on the breadth and depth of knowledge expected from the coursework taken, and a special research topic assigned by the committee. The primary purpose of the QE is to validate that the student is academically qualified to conceptualize a research topic, undertake scholarly research and successfully produce the dissertation required for a doctoral degree. A forty-five minute presentation given by the student is followed by a question period which covers the special research topic as well as coursework in general. The examining committee will be appointed by Graduate Council at the recommendation of the Master Graduate Adviser who consults with the student prior to making the recommendation.

Graduate Studies guidelines for Ph.D. Qualifying Examinations apply. A student who passes the Ph.D. Qualifying Examination is eligible for Advancement to Candidacy for the Ph.D. degree. Title and abstract of the Ph.D. Qualifying Examination presentation will be distributed to all faculty and students of the Graduate Group in Biostatistics, who are invited to attend the presentation portion of the examination. The subsequent question period is a closed session between the student and the committee. The student must file the appropriate paperwork with the Office of Graduate Studies and pay the candidacy fee to be promoted to Candidacy for the Ph.D. degree.

Qualifying Exam: Outcomes

A committee, having reached a unanimous decision, shall inform the student of its decision as "Pass" (no conditions may be appended to this decision), "Not Pass" (the Chair's report should specify whether the student is required to retake all or part of the exam, list any additional requirements, and state the exact timeline for completion of requirements to achieve a "Pass") or "Fail". If a unanimous decision takes the form of "Not Pass" or "Fail", the Chair of the QE committee must include in its report a specific statement, agreed to by all members of the committee, explaining its decision and must inform the student of its decision. Having received a "Not Pass" or "Fail", the student may attempt the QE one additional time. After a second exam, a vote of "Not Pass" is unacceptable; only "Pass" or "Fail" is recognized. Only one retake of the QE is allowed. A student who fails the QE on the second attempt will be recommended to the Dean of

Graduate Studies for disqualification from the program.

The Dissertation

The doctoral dissertation is an essential part of the Ph.D. program. A topic will be selected by the student, under the advice and guidance of a Major Professor (thesis adviser) and a Dissertation Committee chaired by the Major Professor. Students are encouraged to begin some research activity as early as possible during the second year of their graduate studies. The dissertation must contain an original contribution of publishable quality to the knowledge of Biostatistics that may expand the theory or methodology of Biostatistics, or expand or modify Biostatistical methods to solve a critical problem in applied disciplines.

Acceptance of the dissertation by three designated members of the dissertation committee follows Graduate Studies guidelines (Plan C). The dissertation must be completed and submitted to the dissertation committee prior to taking the final examination described in Section 8 (e).

Final Examination

The entire dissertation committee will conduct a final oral examination, which will deal primarily with questions arising out of the relationship of the dissertation to the field of Biostatistics. The final examination will be conducted in two parts. The first part consists of a one hour presentation by the candidate followed by a brief period of questions pertaining to the presentation; this part of the examination is open to the public. The second part of the examination will immediately follow the first part; this is a closed session between the student and the committee and will consist of a period of questioning by the committee members. Title and abstract of the oral presentation will be distributed to all faculty and students of GGB, who are invited to attend the presentation portion of the examination.

NORMATIVE TIME TO DEGREE

The normative time to degree is five years.

TYPICAL TIME LINE AND SAMPLE STUDY PLANS

Every full-time student at UC Davis is required to take 12 units of coursework per quarter.

In addition to the coursework outlined below, students will take BST 290 (Seminar) and generally will take additional electives later on, in consultation with their Major Professor.

The following track will be a typical program for a well-prepared student seeking a Ph.D. degree.

Year 1

Fall	Winter	Spring
STA 231A	STA 231B	STA 231C
BST 222	BST 223	BST 224
BST 290	Elective, BST 290	BST 290
STA 390	Ph.D. Preliminary Written Exam	STA 260

Year 2

Fall	Winter	Spring
STA 232A	STA 232B	STA 232C
Elective	STA 242	STA 260
Elective	Elective	Ph.D. Qualifying Exam

Years 3, 4: Complete requirements for the Ph.D. degree, including Dissertation and Defense

SOURCES OF FUNDING

The main sources of available funding include TA-ships (in Statistics or Public Health Sciences), GSR positions, and Biostatistics Program Fellowships.

PELP, IN ABSENTIA & FILING FEE STATUS

Information about PELP (Planned Educational Leave, In Absentia (reduced fees when researching out of state), and Filing Fee status can be found in the Graduate Student Guide: <http://www.gradstudies.ucdavis.edu/publications>

LEAVING THE PROGRAM PRIOR TO COMPLETION OF THE PH.D. REQUIREMENTS

Should a student leave the program prior to completing the requirements for the Ph.D., they may still be eligible to receive the Master’s if they have fulfilled all the requirements (see Master’s section). Students can use the Change of Degree Objective form available from the Registrar’s Office: <http://registrar.ucdavis.edu/PDFFiles/D065PetitionForChangeOfGraduateMajor.pdf>

SPECIAL REGULATIONS

For a list of available forms and policies, please visit:

<http://biostat.ucdavis.edu/graduate-program/forms-policies.html>

DOUBLE-MAJOR PROGRAM

Current UC Davis graduate students can apply to enter the M.S. program in Statistics as a Double Major during any quarter. We do not require a separate application, however you will need to complete a Double Major Application (see <http://www.stat.ucdavis.edu/grad/forms-policies> for the form). This form must be signed by the graduate adviser of your present program, as well as either the graduate adviser for Statistics. This form is then submitted to the graduate program coordinator. There will, however, usually be no financial support available for such students.

Under a Graduate Council ruling, a student in a double major program may transfer up to 12 units from one program to another with the approval of the graduate adviser and the Dean of Graduate Studies. The student must spend a minimum of two quarters in regular graduate standing in the Statistics master's program to meet the residency requirements of the Graduate Division.

TRANSFER CREDIT

Master's students may request to transfer 6 units of required credit from an accredited non-UC campus, up to one-half of the quarter-units from another UC campus, or 12 units from UC Davis Extension to their graduate transcript. Only graduate and upper division coursework may be transferred; lower division coursework is not transferrable. For doctoral students, some work taken elsewhere may be used to satisfy certain degree requirements with the consent of the Graduate Adviser and the Dean of Graduate Studies.

FROM UNDERGRADUATE: Up to 6 units of graduate work (that is, only 200-level courses) taken by an undergraduate student may be credited toward their graduate degree program. This does not apply if units were used to satisfy any requirements for the bachelor's degree

RESIDENCE REQUIREMENTS

The minimum residence requirement at the University of California is three quarters for the Master's degree, nine quarters for the degree of Juris Doctor, and six quarters for the degrees of Doctor of Philosophy and Doctor of Engineering, as is prescribed by UC Senate Regulations. Please note that per our degree requirements students must be enrolled full-time in a minimum 12 units each quarter.

REPEAT COURSES AND INCOMPLETE GRADE ASSIGNMENT

Any graduate student may, with the consent of the graduate adviser and the Dean of the Graduate Studies, repeat a course in which a grade of C, D, F, or Unsatisfactory was assigned, up to a maximum of nine units. Any repeated course, except for courses offered only on a S/U basis, must be taken for a letter grade.

The grade of Incomplete ("I") must be removed before the end of the third succeeding quarter of academic residence. In the event a student accumulates more than 8 units of Incomplete, the student shall be subject to disqualification.

A statistics graduate student will be prohibited from taking a qualifying examination if 8 units of "I" appear on the scholastic record or if any of the "I" grades were received for courses required for the master's or Ph.D. degrees.



MINIMUM GPA REQUIREMENT

Graduate students must at all times maintain a cumulative and per quarter GPA of 3.0 or higher to remain in good standing. They also need to make normal progress towards their degree. The sample study plans provided above serve as guidelines for normal progress.

GUIDELINES FOR Ph.D. QUALIFYING EXAMINATIONS

To be eligible for examination, the student must have satisfied all program requirements (course work, Ph.D. Written Exam), have removed all deficiencies, and must have at least a 3.0 GPA in all work undertaken in graduate standing. Students must be registered the quarter in which they take any portion of their Qualifying Examination.

A student may not take the examination prior to approval from Graduate Studies. If the examination is held prior to approval and the committee is deemed unsuitable by the Dean of Graduate Studies after the fact, the examination can be considered null and void. It takes approximately four weeks for Graduate Studies to process the application and to notify the student and the chair of the committee of the approval. The application should be submitted through the graduate adviser early enough in advance of the examination date. For further details, consult Graduate Studies regulations on Ph.D. Qualifying Examinations.

ANNUAL EVALUATION OF PROGRESS

The normative time for the Ph.D. in the Biostatistics program is 5 years. Incentives for timely progress toward completion for Ph.D. students will be instituted by offering support primarily for those students who are making good progress, by encouraging the recruitment of “fast track” Plan 2 students (described in Sample Plans in the Appendix), by efficient advising and mentoring of students, and by annual offerings of required courses. Graduate Council policy requires the Graduate Adviser to file an annual, written evaluation of the academic progress of each graduate student. On the basis of this evaluation as well as GPA, each student who is rated as making unsatisfactory progress receives a warning letter from Graduate Studies indicating specific conditions that must be met in order to continue in graduate status. If the conditions that lead to an unsatisfactory progress report or GPA below 3.0 are not corrected within a specified time, this may lead to termination of the graduate student status in the program. A satisfactory progress report does not necessarily imply that a student will ultimately succeed in completing a graduate program.

Ph.D. students must maintain the level as stipulated by Graduate Studies in all graduate and upper division course work to maintain satisfactory progress. For PhD students in the GGB, satisfactory progress consists of:

- GPA of 3.0 or better;
- advancement to candidacy filed within 2 quarters of becoming eligible to take the examination, within 2 years of entering the program for students with significant Statistics and Biostatistics background and within 3 years of entering the program for students with lesser background;
- taking all pre-qualifying exams as soon as eligibility is established, i.e., at the first offering after the coursework that is examined has been completed.
- passing the pre-qualifying exams.
- completion of all degree requirements, including successful defense of the dissertation and filing of the dissertation, within 3 years of advancing to candidacy and within 5 years of entering the PhD program.

STATISTICS COURSES

Lower Division Courses

10	Statistical Thinking (4)
12	Introduction to Discrete Probability (4)
13	Elementary Statistics (4)
13V	Elementary Statistics (Web Based) (4)
32	Basic Statistical Analysis Through Computers (3)
90X	Seminar (1-2)
98	Directed Study (1-5)
99	Special Study for Undergraduates (1-5)

Upper Division Courses

100	Applied Statistics for Biological Sciences (4)
102	Introduction to Probability Modeling and Statistical Inference (4)
103	Applied Statistics for Business and Economics (4)
104	Applied Statistical Methods: Nonparametric Statistics (4)
106	Applied Statistical Methods: Analysis of Variance (4)
108	Applied Statistical Methods: Regression Analysis (4)
120	Probability and Random Variables for Engineers (4)
130A- 130B	Mathematical Statistics: A Brief Course (4, 4)
131A	Introduction to Probability Theory (4)
131B- 131C	Introduction to Mathematical Statistics (4, 4)
133	Mathematical Statistics for Economists (4)
135	Multivariate Data Analysis (4)
137	Applied Time Series Analysis (4)
138	Analysis of Categorical Data (4)
141A-141B-141C	Statistical Computing (4, 4, 4)
142	Reliability (4)
144	Sampling Theory of Surveys (4)
145	Bayesian Statistical Inference (4)
190X	Seminar (1-2)
192	Internship in Statistics (1-12)
194H / 194 A-B	Special Studies for Honors Students (4, 4)
198	Directed Group Study (1-5)
199	Special Study for Advanced Undergraduates (1-5)

Graduate Level Courses

200A	Probability Theory (4)
200B-200C	Mathematical Statistics (4, 4)
205	Statistical Methods for Research (4)
206	Statistical Methods for Research I (4)
207	Statistical Methods for Research II (4)
208	Machine Learning (4)
222*	Biostatistics: Survival Analysis (4)
223*	Biostatistics: Generalized Linear Models (4)
224*	Analysis of Longitudinal Data (4)
225	Clinical Trials (4)
226	Statistical Methodology for Bioinformatics (4)
231A- 231B- 231C	Mathematical Statistics (4, 4, 4)
232A- 232B- 232C	Applied Statistics (4, 4, 4)
233	Design of Experiments (3)
235A- 235B- 235C*	Probability Theory (3,3,3)
237A- 237B	Time Series Analysis (4, 4)
238	Theory of Multivariate Analysis
240A- 240B	Nonparametric Statistics (4, 4)
241	Asymptotic Theory of Statistics (4)
242	Statistical Programming (4)
243	Computational Statistics (4)
250	Topics in Applied and Computational Statistics (4)
251	Topics in Statistical Methods and Models (4)
252*	Advanced Topics in Biostatistics
260	Statistical Practice and Data Analysis
280	Orientation to Statistical Research (2)
290*	Seminar in Statistics (1)
298*	Group Study (1-5)
299*	Special Study for Graduate Students (1-12)
299D*	Dissertation Research (1-12)
390	Methods of Teaching Statistics (2)

* course jointly listed with Biostatistics

** course jointly listed with Mathematics

LIFE SCIENCE COURSES

Agricultural Sciences

- ANG 107 Genetics & Animal Breeding (4)
- ASE 105 Concepts in Pest Management (3)
- ASE 107 Small Fruit Production (2)
- ASE 110ABC Crop Production and Management (3,3,4)
- ASE 112 Forage Crop Ecology (3)
- ASE 150 Cropping Systems of the World (4)
- AVS 100 Avian Biology (3)
- ENH 102 Physiological Principles in Environmental Horticulture (4)

Biological and Environmental Sciences

- BIS 101 Genes and Gene Expression (4)
- BIS 102 Structure and Function of Biomolecules (3)
- BIS 103 Bioenergetics and Metabolism (3)
- ECS 124 Theory and Practice of Bioinformatics (4)
- ENT 100 General Entomology (3)
- ENT 102 Insect Physiology (4)
- EST 100 General Ecology (4)
- EST 110 Principles of Environmental Science (4)
- EST 121 Population Ecology (4)
- EVE 100 Introduction to Evolution (4)
- EVE 101 Introduction to Ecology (4)
- EVE 102 Population and Quantitative Genetics (4)
- EVE 103 Phylogeny and Macroevolution (3)
- EVE 117 Plant Ecology (4)
- MCB 150 Embryology (4)
- FST 104 Food Microbiology (3)
- NPB 100 Neurobiology (4)
- NPB 101 Systemic Physiology (5)
- NPB 102 Animal Behavior (3)
- NPB 112 Neuroscience (3)
- NPB 113 Cardiovascular, Respiratory, and Renal Physiology (4)
- NPB 114 Gastrointestinal Physiology (3)
- NPB 117 Avian Physiology (3)
- NPB 121 Physiology of Reproduction (3)
- NPB 125 Comparative Physiology: Neurointegrative Mechanisms (3)
- NPB 126 Comparative Physiology: Sensory Systems (3)
- NPB 127 Comparative Physiology: Circulation (3)
- NPB 128 Comparative Physiology: Endocrinology (3)

- NPB 129 Comparative Physiology: Respiration (3)
- NPB 130 Physiology of the Endocrine Glands (4)
- NPB 140 Principles of Environmental Physiology (3)
- NUT 110 Principles of Nutrition (5)
- NUT 116AB Clinical Nutrition (3,3)
- NUT 118 Community Nutrition (4)
- PLB 105 Developmental Plant Anatomy (5)
- PLB 111 Plant Physiology (3)
- PLB 112 Plant Growth & Development (3)
- PLB 116 Plant Morphology & Evolution (5)
- PLB 143 Evolution of Crop Plants (4)
- PLB 152 Plant Genetics (4)
- PLB 154 Plant Breeding (4)
- PLB 175 Applied Plant Biology (4)

Epidemiology and Veterinary Medicine

- EPI 222 Epidemiological Modeling (3)
- EPI 223 Spatial Epidemiology (3)
- EPI 206 Epidemiologic Study Design (3)
- EPI 208 Analysis and Interpretation of Epidemiologic Data (3)
- EPI 220 Problems in Epidemiologic Study Designs (4)
- EPI 207 Advanced Study Design (3)
- EPI 210AB Analytic Epidemiology (3,3)
- EPI 270 Research Methods in Occupational Epidemiology (3)
- EST 126 Environmental and Occupational Epidemiology (4)
- VME 217 Evaluation & Diagnostic Tests (3)

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CODE OF ACADEMIC CONDUCT

The University of California, Davis and the Department of Statistics take academic conduct and integrity as a serious matter, and all instances of suspected cheating will be reported to Student Judicial Affairs. The following is an extract from the UC Davis Code of Academic Conduct, which can be found at : <http://sja.ucdavis.edu/cac.html>

Responsibility of Students

The ultimate success of a code of academic conduct depends largely on the degree to which it is willingly supported by students themselves. The following recommendations are made for students:

- Be honest at all times.
- Act fairly toward others. For example, do not disrupt or seek an unfair advantage over others by cheating, or by talking or allowing eyes to wander during exams.
- Take group as well as individual responsibility for honorable behavior. Collectively, as well as individually, make every effort to prevent and avoid academic misconduct, and report acts of misconduct that you witness.
- Do not submit the same work in more than one class. Unless otherwise specified by the instructor, all work submitted to fulfill course requirements must be work done by the student specifically for that course. This means that work submitted for one course cannot be used to satisfy requirements of another course unless the student obtains permission from the instructor.
- Unless permitted by the instructor, do not work with others on graded coursework, including in class and take-home tests, papers, or homework assignments. When an instructor specifically informs students that they may collaborate on work required for a course, the extent of the collaboration must not exceed the limits set by the instructor.
- Know what plagiarism is and take steps to avoid it. When using the words or ideas of another, even if paraphrased in your own words, you must cite your source. Students who are confused about whether a particular act constitutes plagiarism should consult the instructor who gave the assignment.
- Know the rules - ignorance is no defense. Those who violate campus rules regarding academic misconduct are subject to disciplinary sanctions, including suspension and dismissal.

Student Judicial Affairs: <http://sja.ucdavis.edu/>

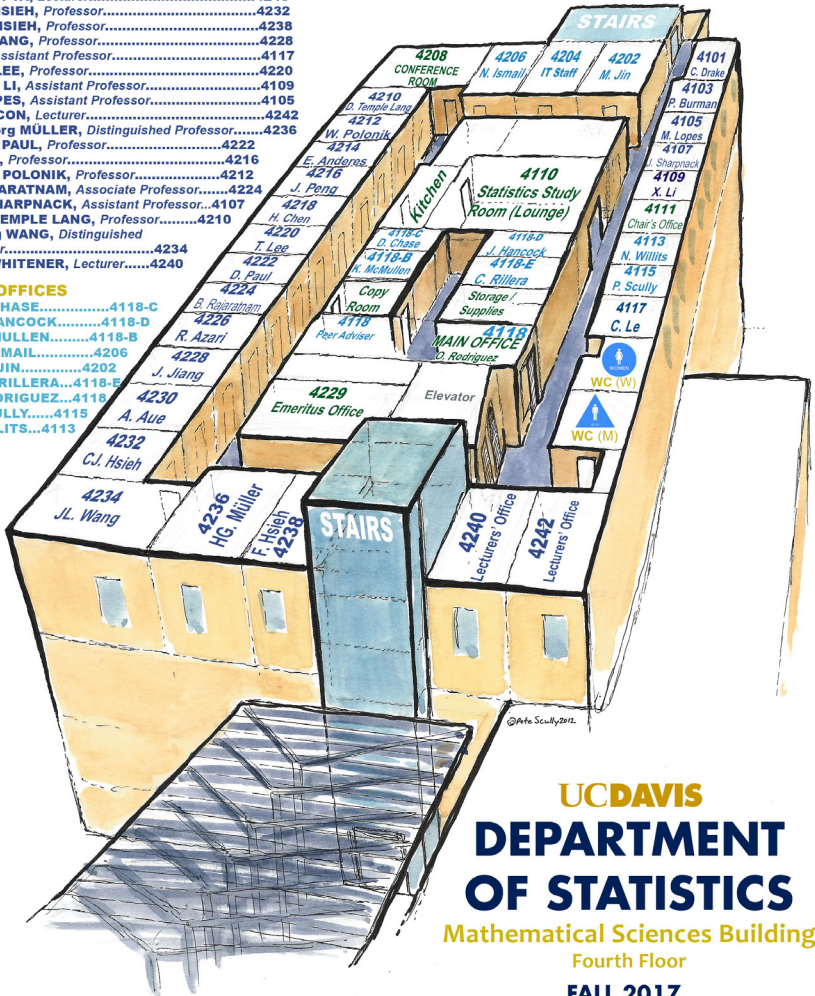
FLOOR PLAN OF MATH SCIENCES BUILDING, 4th FLOOR

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 Mathematical Sciences Building
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 FALL 2017

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RESOURCES AND OTHER USEFUL INFORMATION

Computing

There are two computer labs in the Department of Statistics, which serves as administrative home for the Graduate Group in Biostatistics. These labs are located in the Mathematical Sciences Building and have many Windows-based computers with statistical software packages. Additional computing is available through workstations operating on a version of Unix. Access to common statistical software such as R is available through these computers.

Graduate Student Handbook, Teaching Assistant Handbook and Forms

An important resource for all regulations that apply to graduate students is the Graduate Student Handbook published by Graduate Studies, and available at http://gradstudies.ucdavis.edu/students/handbook/GS201_GraduateStudentGuide.pdf

Biostatistics website, contacts and student organization

More information about the current program faculty, committees, and student representatives may be found on the Graduate Group in Biostatistics website (<http://biostat.ucdavis.edu/>). Students are encouraged to bring any problems or concerns to the attention of the Graduate Master Adviser, their mentor, any of the other graduate advisors, the program chair, or Pete Scully, the graduate staff administrator. The Biostatistics graduate students maintain their own organization, selecting representatives, a web master and a President who leads the organization. Active participation of Biostatistics students in their student organization is highly encouraged.

Graduate Student Community

Office of Graduate Studies: The Office of Graduate Studies (<http://gradstudies.ucdavis.edu>) handles all of the academic and administrative policies affecting graduate students. There is a lot of information available on the website, including necessary forms for exams and advancement to candidacy, financial support, and general information for graduate students.

Graduate Student Association (GSA): According to the GSA website (<http://gsa.ucdavis.edu>), the GSA was established "to provide a forum where matters of concern to graduate and professional students may be discussed, where opinions on actions of the Administration, departments and graduate groups may be initiated, and to conduct programs and services of special interest to graduate studies." The GSA is located at 253 South Silo. There are typically representatives from each graduate program, graduate group, etc. that meet throughout the year and discuss issues of importance to graduate and professional students. Check the website for other offerings by the GSA.

ACADEMIC CALENDAR 2017-18

Campus Dates	Fall '17	Winter '18	Spring '18
Quarter begins	Sept 25	Jan 5	Mar 29
Instruction begins	Sept 27	Jan 8	Apr 2
Instruction ends	Dec 8	Mar 16	June 7
Quarter ends	Dec 15	Mar 23	June 14
Late registration/last day to drop courses	Oct 10	Jan 22	Apr 13
Last day to add	Oct 2	Jan 24	Apr 17
Holidays	Nov 10, 23-24, Dec 22,25,29	Jan 1, 15, Feb 19	Mar 30, May 28
Diploma Date	Dec 15	Mar 23	June 14
Graduate Commencement			June 14

Statistics Department Dates	
New Student Orientation	September 26, 2017
PhD Written Pre-Qualifying Exam	March 26-29, 2018
Statistics / Biostatistics Spring Picnic	June 8, 2018

All dates subject to change

PhD Deadlines			MS Deadlines		
DEGREE LIST	File PhD Candidacy*	File PhD Thesis online	DEGREE LIST	File MS Candidacy*	Final Date for MS Exam**
Dec 2017	Aug 4	Dec 1	Dec 2017	Aug 4	Dec 1
Mar 2018	Oct 16	Mar TBD	Mar 2018	Oct 16	Mar TBD
June 2018	Jan 26	May TBD	June 2018	Jan 26	May TBD
Sept 2018	May 10	Sep TBD	Sept 2018	May 10	Sep TBD

**Candidacy filing dates are suggestions and not firm deadlines. PhD Thesis filing dates however are firm deadlines.*

***Final date for MS Exam report to be submitted to Graduate Studies upon completion of coursework.*

GRADUATE FEES AND TUITION REMISSIONS, 2017-18

California Residents:

	Total Annual	Fall	Winter	Spring
Tuition	\$17,891.26	\$5,963.76	\$5,963.75	\$5,963.75
GSR Fee Remission		\$5,963.76	\$5,963.75	\$5,963.75
TA / AI Fee Remission		\$5,687.77	\$5,687.76	\$5,687.76
Student in TA position pays		\$275.99	\$275.99	\$275.99

Non-California Residents:

	Total Annual	Fall	Winter	Spring
Tuition	\$17,891.26	\$5,963.76	\$5,963.76	\$5,963.76
NRST*	\$15,102.00	\$5,034.00	\$5,034.00	\$5,034.00
GSR Fee Remission		\$10,997.76	\$10,997.75	\$10,997.75
TA / AI Fee Remission		\$5,687.77	\$5,687.76	\$5,687.76
Student in TA position pays (if also receiving full NRST waiver)		\$275.99	\$275.99	\$275.99

**Non-Resident Supplemental Tuition. For international students who are Advanced to PhD Candidacy the rate is reduced to \$0 for three years only*

GRADUATE GROUP IN BIOSTATISTICS

Please visit the graduate group website:

<http://biostat.ucdavis.edu>

The University of California does not discriminate on the basis of race, color, national origin, religion, sex, sexual orientation, handicap, age, veteran's status, medical condition, ancestry, or marital status.

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