

REQUIREMENTS AND POLICIES GOVERNING THE GRADUATE PROGRAM IN MARINE BIOLOGY AND BIOLOGICAL OCEANOGRAPHY

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Contacts

Eric Webb, Acting MBBO Program Director for Fall 2019, Chair of MBBO Admissions, eawebb@usc.edu (MBBO graduate program and admissions issues)

Suzanne Edmands, MBBO Program Director (on sabbatical Fall 2019), sedmands@usc.edu (MBBO graduate program issues)

James Moffett, MEB Section Head, jmoffett@usc.edu (MEB research issues)

Doug Capone, BISC Chair, capone@usc.edu (BISC department issues)

Don Bingham, MEB Section Coordinator, dbingham@usc.edu (MEB issues, reimbursements, scheduling MBBO interviews and MEB seminars and social events)

Adolfo Dela Rosa, Student Services Advisor, adolfo@usc.edu (admissions, advise on course schedule, tracking student data and progress)

Doug Burleson, Graduate Programs Manager, burleson@usc.edu (admissions, advise on course schedule, activation of grad student funding, TA assignments)

Linda Bazilian, Director of Academic Programs, bazilian@usc.edu (curriculum, course scheduling, oversight of teaching labs, problem solving)

The Graduate Program in Marine Biology and Biological Oceanography & its Administration

Introduction

Graduate students in the Graduate Program in Marine Biology and Biological Oceanography (referred to subsequently as "GPMBBO" or the "Program") may pursue a Ph.D. degree within the Marine Environmental Biology section of the Department of Biological Sciences at USC (referred to subsequently as "MEB").

At the University of Southern California, graduate education is the responsibility of the Department, but the University's Graduate School establishes minimum requirements concerning grade point average, number and distribution of units, residency, time limits, etc. that are common to all advanced degrees offered within the Dornsife College of Letters, Arts and Sciences at the University. Specific courses, examinations, skills, and research requirements are established by the student's program of study, in this case the Graduate Program in Marine Environmental Biology. Collectively, both sets of regulations constitute the student's "degree requirements," all of which must be met by the student.

Graduate School regulations are listed in the current *University of Southern California Catalogue* in several locations. One part of these regulations is located in the section on "Academic Policies and Information" near the beginning of the *USC Catalogue* and the rest are found near the middle of the *USC Catalogue* under "The Graduate School." Those regulations, which most commonly affect GPMBBO students, are included in this document, but the information in the University of Southern California Catalogue should be considered definitive.

GPMBBO regulations are listed in this document; the major requirements of degrees in the GPMBBO are also listed in the *USC Catalogue* under "Department of Biological Sciences."

The GPMBBO adheres to strict standards of academic integrity and invokes disciplinary actions (up to and including expulsion) against violations such as plagiarism, unauthorized collaboration, violation of examinations, fabrication/alteration of data or other cases of dishonesty occurring in theses or dissertations.

More information on standards of academic conduct can be found at

<https://policy.usc.edu/scampus-part-b/>

Specific information on university policies surrounding scientific misconduct can be found at

<https://policy.usc.edu/scientific-misconduct/>

Program Administration--The Graduate School

The Graduate School maintains the University's official Permanent Graduate Student File and is ultimately responsible for admission of our graduate students and the awarding of their degrees. As noted above, the Graduate School establishes requirements concerning grade point average, number and distribution of units, residency, and time limits that are common to advanced degree programs in all units under their jurisdiction, including the Department of Biological Sciences.

Official forms are used to track a student's progress by The Graduate School and completion and submittal of these usually is to be at a specified point in the student's tenure. Timetables for the completion of degree requirements are available at The Graduate School. The schedule for the Ph.D. student's final and penultimate semesters is especially detailed and needs to be adhered to closely.

All Graduate School forms prepared by or on behalf of the student must be approved by the Director of the Program (Suzanne Edmands) or by the Section Head (Jim Moffett) before their submittal to the Graduate School. All Graduate School forms are available online at <http://graduateschool.usc.edu/current-students/guidelines-forms-requests/> or from Adolfo Dela Rosa or Doug Burleson. *Please turn in all forms to Adolfo Dela Rosa or Doug Burleson who will submit them to the proper office on your behalf.*

Graduate Student Positions

In late spring of each year, GPMBBO students select graduate students to fill the following positions for the coming year:

Graduate Student Representative (aka Chair). The Chair acts as a faculty-student liaison and attends faculty meetings, reports back to students and bring student issues to faculty. They also organize student-led meetings (including lunch after Tuesday seminars) and work to resolve issues brought up during student meetings. The Graduate Student Representative has one vote in meetings of the MEB Faculty representing the opinions of the graduate students in academic and governance issues (but not personnel issues). The Graduate Student Representative has no voting power in either the continuation of fellow graduate students or in the Qualifying Examination. To be eligible for this position the student must have passed their Qualifying Examination. The Chair for 2019-20 is Heidi Aronson.

Retreat Organizers. This committee is normally composed of 2nd-year students who plan the annual fall retreat, acting as liaisons between MEB and Wrigley and delegating jobs to other 2nd year students. Retreat Organizers are charged with planning the retreat date by the end of April (last faculty meeting) of their first year, and ensuring that everyone is invited. For guidance, organizers use the "retreat packet", a set of documents from previous organizers. In 2019-20 the retreat will be organized by Nina Yang and Mac Partridge.

Interview Organizers. This committee works with the Graduate Admissions Chair (Eric Webb) and the MEB Section Coordinator (Don Bingham) to coordinate graduate student candidate interviews (2-3 days in January or February). The Interview Organizers for 2019-20 are Levi Simons and Rae Santora.

Graduate Student Government (GSG) position/ Social Chairs. These people work with Don Bingham to coordinate tea time once every two weeks. They are the "go-to" people to help organize events, mainly dealing with how much money we may have from GSG or MEB for these events. Other duties include:

- website management
- attending monthly GSG senate meetings, senator orientation, and financial training
- joining a GSG senate committee and attending committee meetings twice a month, as well as fulfilling other senate committee duties
- acquiring GSG funding for MEB programming
- communicating GSG meeting notes and other news to the graduate student body

The 2019-20 GSG Senators are Babak Hassanzadeh, Nico Lorenzon and Gerid Ollison.

Science Policy Chair. This person works with the Science Policy group, an organization that promotes scientific collaboration for policy making (<http://earth.usc.edu/sciencepolicy/>). The Chair works with the Earth Science Department to organize events and to keep MEB students informed and active. This position is currently open.

Seminar Committee. This committee, collects names for possible seminar speakers beginning in the summer for the following academic year. Working with the Graduate Student Chair, this committee ensures that each speaker has a host and that the host lab KNOWS they are the host. They also work with Don Bingham to ensure that travel arrangements are made. In addition, they organize student seminars and lunches after guest speaker seminars, in coordination with Don Bingham. The 2019-20 committee is Elaina Graham and Melissa DellaTorre, with assistance from faculty members Carly Kenkel and Naomi Levine.

Mentorship Chairs. These people match third year PhD students with first year incoming students. The pairs then meet every other month. In addition, the Chairs organize an activity in August/September to help welcome incoming students. The 2019-20 Mentorship Chairs are Maria Ruggeri and Kyla Kelly.

Outdoor Adventure Committee. This committee coordinates a camping trip for first-year MBBO students, as well as other adventures. The 2019-20 leaders are Wyatt Million, Celeste Lanclos and Zach Evans.

Graduate Programs Manager of GPMBBO

The Graduate Programs Manager of GPMBBO, Doug Burseson is the staff member responsible for maintaining graduate student files; serving as liaison between the students, GPMBBO Faculty, and the Graduate School. Documents such as application materials and Graduate School forms are obtained and filed with Adolfo Dela Rosa or Doug Burseson. A permanent Department file on each student is maintained in the GPMBBO Office.

Example Program for MBBO student with a TAship during first semester (required courses highlighted, see below sections for details)

Year 1, Fall	Year 1, Spring
Establish 3-person First Year Committee	
BISC 529 #1 (MEB Seminar, 1 unit)	BISC 529 #2 (MEB Seminar, 1 unit)
BISC 582 (Adv. Biol. Oceanography, 4 units)	BISC 583 (Evol. & Adaptation, 4 units)
BISC 593 (Teaching Practicum, 2 units) + TAship	BISC 584 (MEB Faculty Lecture Series, 2 units)
BISC 790 (1-5 units)	BISC 790 (1-5 units)
Meet with First Year Committee	First Year Committee research/coursework talk
Year 2, Fall	Year 2, Spring
Establish 5-person Guidance Committee	Statistics course?
BISC 585 (Scientific Writing, 2 units)	BISC 529 #4 (MEB Seminar, 1 unit)
BISC 529 #3 (MEB Seminar, 1 unit)	Advanced Graduate Seminar #2 (2 units)
Advanced Graduate Seminar #1 (2 units)	Complete Research Proposition (15 pp)
Discuss Research Summary (1-2pp) with Committee	Qualifying Exam (written and oral)
BISC 790 (1-7 units)	BISC 790 (1-5 units)
Year 3, Fall	Year 3, Spring
Advanced Graduate Seminar #3 (2 units)	Advanced Graduate Seminar #4 (2 units)
BISC 790 (2 units)	BISC 790 (2 units)
BISC 794a (2 units)	BISC 794b (2 units)

Establish 4-person Dissertation Committee	
Year 4, Fall	Year 4, Spring
BISC 790 (1-4 units, if necessary)	BISC 790 (1-4 units, if necessary)
BISC 794c (2 units)	BISC 794d (2 units)
Meet with Dissertation Committee	
Year 5, Fall	Year 5, Spring
BISC 790 (1-6 units, if necessary)	BISC 790 (1-6 units, if necessary)
BISC 794z (0 units)	BISC 794z (0 units)
Meet with Dissertation Committee	Ph.D. Defense!

First Year Advisement and Guidance

Initial Advisement and Evaluation by Student's Advisor

Most students have a first-year advisor who is identified in the acceptance letter. This initial advisor may be replaced by another faculty member with whom the student has closer research affiliations at the request of the student and with the approval of the GPMBBO Program Director and the new advisor. That request can be made by the student to the GPMBBO program office or to the GPMBBO Program Director. If an incoming student has not chosen an advisor or been appointed one, this should be a priority during the first semester.

The Program provides an initial orientation for all incoming students. During registration week of a graduate student's first semester, the student's initial advisor meets with the student to review his/her previous course work and experiences and to discuss career objectives. A primary purpose of this initial interview is to identify major deficiencies in a student's preparation and to suggest means of remedying any such deficiencies.

First Year Committee

In consultation with their advisor, each student should choose a three-person First Year Committee (the advisor plus two others). Co-advisors count as one, so if a student had co-advisors they will need an additional (fourth) committee member. As early as possible (before classes begin or early in the first semester) the student should meet with each committee member (either individually or as a group) and have them sign the **First Year Committee Form**, which is filed in the GPMBBO office. This committee is responsible for providing advice and evaluating the student's progress in their first year. This includes progress in research as well as coursework and any TA duties. At the end of the first semester (November/December) the student should schedule a meeting with their First Year Committee to discuss progress and plans for the coming semester. At the end of the second semester (April/May) the student should submit a progress report and convene another meeting in which they give a short presentation (~30 min) on their research and coursework progress to date and outline plans for the future, followed by discussion. The goal of the committee is to assess whether the student is making good progress (do they have academic deficiencies? are they getting into the lab and developing a skill set? are they generating good data? are they developing ideas for their thesis?) and to advise the student on how to move forward. At the end of the year the committee will send a report to the student, their advisor, and the GPMBBO student progress committee, and the report will also be filed in the GPMBBO office. This committee meeting and presentation serves as the Screening Examination.

Requirements for the Ph.D. Degree

Time Schedule

All course requirements for the Ph.D. degree are normally completed within three calendar years from

the date on which the student took his/her first course at USC and must be completed within eight calendar years from that time.

General Requirements

A total of 60 units must be completed for the Ph.D. Degree.

Course Requirements--Core courses

Four core courses are currently required: BISC 582 (Advanced Biological Oceanography), BISC 583 (Evolution and Adaptation of Marine Organisms), BISC 584 (MEB Faculty Lecture Series), and BISC 585 (Scientific Writing and Reviewing). BISC 582, 583, and 584 should be taken during the student's first year; BISC 582 is currently offered in the Fall while 583 and 584 are offered in the Spring. BISC 585 is open to second year students only (Fall semester). Students are also required to take 4 units of BISC 529 (MEB Seminar) and four advanced graduate seminars. Finally, students are required to take an approved course in statistics (e.g. BISC 444, PM 510L).

Students must maintain a cumulative Grade Point Average of 3.0 or above in all coursework available for graduate credit in order to fulfill the requirements of the Graduate School.

Official Guidance Committees

A five-person Ph.D. Guidance Committee should be established soon after the spring meeting with the First Year Committee, but no later than the third semester of enrollment for a student seeking a Ph.D. degree. After the student passes the Qualifying Examination, the Ph.D. Guidance Committee is dissolved and a new Dissertation Committee is formed.

The Student and His/Her Responsibilities

The student is ultimately responsible for his/her graduate career and must be familiar with Graduate School and GPMBBO requirements and responsible for their timely completion.

If a student's needs are not being met, he/she should seek redress, using the following chain of command: advisor, advisory committee (first year, guidance, dissertation), Director of the Program, MEB Section Head, Department Chair, and Graduate School. The Director of the GPMBBO Program is always available to provide guidance on how to deal with particular situations.

In addition to all other rules, the University has established codes of conduct to which all students must adhere. One aspect of graduate training— service as a teaching assistant —places them in a position of power over undergraduate students. The position implies added responsibilities and liabilities, especially in respect to such matters as fairness, equal treatment, sexual harassment, etc. Information on University policies concerning conduct is available in *SCampus*. Further information or sources of information may be obtained from the Department office.

Formal Graduate Seminars

Students must complete a minimum of four 2-unit graduate seminars. Three- or 4-unit seminars can also be used but each counts as only one seminar. Because a critical feature of such seminars is exposure to current literature, all four required seminars must be completed during the student's tenure at USC. With the written permission of the student's committee, a formal course completed at another institution may be counted as one of the four required seminars (the course must have been completed during the student's tenure at USC).

Research Tool Requirement

Proficiency in statistics is a necessary skill for all scientists. Proficiency may be demonstrated by

- a) completion of a course approved by majority vote of the MEB faculty. Several courses with

the University are available.

- b) acceptance of course work previously completed either at USC or elsewhere. The acceptability of a previously completed course will be made by an examiner selected by the GPMBBO Program faculty.

A rigorous graduate level course in Biostatistics is available at the Medical School in the Department of Preventive Medicine, PM 510L. Permission is needed from the PM Department. A free shuttle bus runs routinely between the University Park and Med School Campuses. Other statistics courses are listed in the appendix.

Research Units

BISC 790 Research units are normally taken whenever the student is conducting his/her doctoral research. Dissertation research will normally take the equivalent of about 2.5-3 years of full time work, but the number of research units taken usually does not reflect this. Typically, advanced graduate students will take 6 units of 790 and possibly a 2-unit seminar each semester. Adolfo Dela Rosa or Doug Burleson can provide guidance on balancing course and research units.

Grade Point Average Requirements

Students must maintain a grade point average of at least 3.0 in all courses taken at USC, in conformity with regulations of the university.

If a student's cumulative grade point average falls below 3.0 at any time, the student will be placed on departmental academic probation. The cumulative average must be raised to 3.0 by the completion of the next two semesters of registration at USC in courses approved by the student's guidance committee. Note: this may require that the student take additional formal and/or seminar courses since directed research and dissertation units are on a Pass/No Pass basis and are not computed into the GPA. If the student does not improve his/her overall GPA to 3.0 within this period, the student will be dismissed from the program. A student who has been removed from probation but subsequently fails to meet the scholarship requirement is subject to immediate termination (will be terminated) from the program.

Marine Program Noon Seminar Series

Students must regularly attend the Marine Environmental Biology Noon Seminar series throughout their tenure at USC (traditionally held on Tuesdays). In addition to attending other seminars, each student presents a 20-minute seminar on his/her current research once each academic year, beginning in their second year. Attending faculty will provide short written evaluations of the seminar to help students improve their public speaking skills.

BISC 794 Doctoral Dissertation

After a student successfully completes the Qualifying Examination (see below) and is therefore a formal candidate for the Ph.D., he/she must register for BISC 794 Doctoral Dissertation each semester except summer. The student would sequentially register for BISC 794a, 794b, 794c, 794d in the first four semesters after completing the Qualifying Examination, and then BISC 794z each subsequent semester as needed. Students must have at least 4 units of 794 credit, but can receive no more than 8; hence BISC 794a-794d are valued at 2 units and BISC 794z at 0 units. Graduate Programs Manager Douglas Burleson can provide guidance on balancing course and research units.

Other Course and Unit Requirements

Additional formal course requirements may be established by the Section and/or by the student's First Year or Guidance committees.

A course in scientific ethics is strongly recommended, although not a course requirement for the program. Some aspects of scientific ethics may be covered in BISC 593 (Practicum in Teaching the Biological Sciences).

The minimum number of units required for the Ph.D. by the Graduate School is 60. Units must include 4, but no more than 8, units of BISC 794 credit and may be completed with other formal classes or BISC 790 work.

The student must be registered at USC during the semester that the dissertation is submitted.

Teaching Assistantship Requirement

Graduate students pursuing the Ph.D. in the GPMBBO must serve as a teaching assistant for at least two semesters; ideally, the student should serve in at least two different courses. Students must enroll in BISC 593 (Practicum in Teaching the Biological Sciences, 2 units) either before or concurrent with their first semester as a Teaching Assistant.

Student Progress Committee

Student progress will be evaluated annually by a standing committee of MEB faculty (the GPMBBO Student Progress Committee). Each student and his/her advisor will complete an annual evaluation form (Annual Student Progress Report Form by student, Faculty Evaluation Form by advisor; forms available from the GPMBBO office). The information contained in these reports will be used to judge the progress of each student toward degree, including course preparation and grades achieved, research training, manuscript preparation, seminars presented, and the level and type of student support. Each student (and his/her advisor) will receive a report of his/her progress following a formal committee meeting and review.

Guidance Committee

Composition of the Guidance Committee

After the first year, the student's program of study is placed under the direction of the student's advisor and Guidance Committee (5 people, excluding the advisor). The Guidance Committee must be established at least one semester before the student takes his/her Qualifying Examination. Members of the Guidance Committee and its Chair are proposed to the Graduate School via the **Appointment of Committee** form by the student, with the advice and consent of the student's advisor. Therefore, the student should request appointment of the committee as soon as possible after the spring meeting with their First Year Committee, but certainly before the end of his/her third semester of enrollment in the Ph.D. program.

The composition of the guidance committee must meet the following guidelines:

- a) One member of the committee must be a tenured or tenure-track USC professor who is not in MEB. This "outside member" serves as the representative of the Vice Provost for Graduate Programs, as required by Dornsife.
- b) Normally, the other four members of the committee are tenure-track faculty of the Marine Environmental Biology Section of the Department of Biological Sciences, but members may also be from other Sections in Biological Sciences. USC RTPC faculty may also serve on the committee and a separate petition process is no longer required. The Chair of the committee must be a tenured member of the Marine Environmental Biology section. Co-Chairs are normally not permitted unless required by the Vice Dean of the College, Office of Graduate Programs (see next paragraph). The student's advisor cannot be a member of the Guidance Committee but may attend and observe the Qualifying Examination and the subsequent executive session, in which the student's performance is evaluated.

In exceptional cases of academic merit, a person not meeting the above guidelines may be approved by the Graduate School to serve on a Guidance Committee. To request such an exception, the student must submit to the Graduate School a current Curriculum Vitae of the proposed member and a letter from the chair of the committee citing the particular expertise of the person and the relevance of the requested appointment along with the **Appointment of Committee** form. A specially approved member may not serve as the outside member (see below) or as sole chair of the committee, but may serve as a co-chair with a regular, tenured faculty member of the Marine Environmental Biology section. A guidance committee may include no more than one specially approved member unless the size of the committee is enlarged past five.

Request for changes in the composition of the Guidance Committee must be made in writing by the student to the Program. If approved, the committee is officially changed using the Graduate School's **Request for Change of Committee** form.

If the chair of the Guidance Committee will be absent from campus for any extended period of time (e.g., on leave) (s)he must appoint a temporary chair. The permanent chair will continue as a member of the Committee during his/her absence and will be in communication with the Guidance Committee. If the permanent chair must be absent at the time of the Qualifying Examination or the defense of the dissertation, a petition for formal appointment of a temporary chair must be submitted to the Graduate School.

Responsibilities of the Guidance Committee

The Guidance Committee is responsible, in consultation with the student's advisor, for preparing the student for the Qualifying Examination. The Guidance Committee is responsible for the evaluation of the student's performance on the Qualifying Examination. Specific responsibilities include:

- a. Meeting with the student and the student's advisor to evaluate progress towards meeting the recommendations of the First Year Committee and preparedness to take the Qualifying Examination.
- b. Monitoring the student's compliance with deadlines leading to the Qualifying Examination.
- c. Approval of the 1-2 page Research Summary and full, 15-page Research Proposition.
- d. Administration and evaluation of the written and oral parts of the Qualifying Examination.

Qualifying Examination

Prerequisites for the Qualifying Examination

During the semester the exam is taken, the student must be enrolled in a departmental graduate course or GRSC 800. Permission to enroll in GRSC 800 is needed from the Graduate School. Students may register for GRSC-800 up to three times without having to petition. However, students are strongly encouraged to complete the qualifying examination during the first semester of GRSC 800. The GPMBBO requires that students have:

- a) completed all required core courses.
- b) a GPA of at least 3.0 on all USC course work available for graduate credit.
- c) completed at least one advanced graduate seminar.
- d) satisfied the statistics research tool requirement.
- e) removed any inadequacies noted in the screening examination.
- f) completed the **Request to Take Ph.D. Qualifying Examination** form.

Depending on how the above requirements were met, the student may have to take additional course work to satisfy the Graduate School requirements that students have completed at least 24 units of course work applicable to the degree while in residence and with a minimum cumulative GPA of 3.0.

Timing of the Qualifying Examination

The Qualifying Examination **is normally taken during the student's fourth semester in the Ph.D. Program** and must be taken before completion of his/her sixth semester. As an added incentive towards timely completion of the exam, students who have advanced to candidacy receive a \$2K bonus in their annual summer salary.

Components of the Qualifying Examination

The Qualifying Examination consists of a written part followed by an oral part. The student's Guidance Committee conducts and evaluates both parts.

The Research Summary and its Preliminary Approval

At least two months prior to the written part of the Qualifying Exam, the student must provide their

Guidance Committee with a written Summary of their anticipated research program. The body of this Summary should be a maximum of two pages, with up to an additional page of references. The student should then schedule a meeting of the Guidance Committee where the student presents a short (~20 min) summary of proposed research followed by discussion. The purpose of this meeting is to ascertain whether the anticipated research constitutes a defensible dissertation topic so that the student does not develop a detailed plan for a research program that has serious flaws and probably cannot be successfully defended in the oral examination. It is also to evaluate the student's academic preparedness for the Qualifying Exam. If the committee has reservations, modifications that are mutually satisfactory to the student and the committee can be worked out during this meeting or the student can be asked to submit a revised or new Summary.

The Research Proposition (The Fifteen Pager)

Upon approval of the Research Summary by the Guidance Committee, the student will develop it into a formal Research Proposition. At least two weeks before the date of the oral examination, the student must submit one copy of the Research Proposition to each member of the Guidance Committee and one copy to Adolfo Dela Rosa (Student Services Advisor) for the student's permanent file. The Research Proposition is to be in the form of a grant proposal and should include a short historical introduction, a statement of the problem and its significance, one or more hypotheses (if appropriate), the research design, anticipated results, methods to be used in interpretation of the results, and pertinent references. The treatment should be concise and should not exceed 15 single-spaced pages, including tables and figures but not references. The Written Proposition must have 1-inch margins all around, use an approved typeface (Arial, Courier New, or Palatino Linotype at a font size of 10 points or larger; Times New Roman at a font size of 11 points or larger; or Computer Modern family of fonts at a font size of 11 points or larger), with no more than 6 lines of text per inch. The details of proposal components, formatting and content will be discussed in BISC585. Furthermore this class is intended to provide the student with a vetted draft that, with advisor approval, can be submitted to their Guidance Committee at the end of their second Fall semester.

The Written Examination

The written examination will consist of two sets of questions each day continuing over consecutive days until all sets of questions are complete. This examination is taken on a laptop computer supplied by the MEB department administrator (i.e., the student cannot use their own computer). Each Guidance Committee member (with the possible exception of the "outside member" whose participation is optional here) submits three questions; the student must answer two of this set, spending about equal time on each and having a maximum of two hours per set. The order in which the sets of questions are taken is at the student's option.

Questions will be comprehensive in scope with respect to the student's chosen area of specialization and will be designed to test the student's conceptual, analytical and integrative ability and preparation.

Each member of the Examination Committee will grade his/her question on a scale of 1.0-5.0 using 0.5 unit steps if necessary (1.0 as poor and 5.0 as exceptional). The examination result will be calculated by averaging all the grades. Scores are tallied by the Chair of the Guidance Committee at the time of the oral exam, just prior to conducting the oral examination. A mean score of 3.3 or above for all questions is passing; below 3.0 is failing. Cases where the mean is between 3.0 and 3.3 or where two or more questions are graded below 3.0 are evaluated by the Guidance Committee followed by a vote, using a secret ballot. More than one negative vote of the Guidance Committee will result in failure of the student to pass the written examination.

The written part of the Qualifying Examination must be taken before (normally 2 weeks before) the oral examination described below. *The results of the written examination and the oral examination are given only at the completion of the oral examination.*

The Oral Examination

The oral examination will be in the area of the student's intended research and will be based on a research project selected and developed by the student into a Research Proposition.

The oral examination is usually taken two weeks after and must be taken within one month of the written

examination.

The oral examination will be conducted and evaluated by the student's full 5-member Guidance Committee. Typically, the Committee meets briefly without the student to review the student's course work, other preparation and progress; to review the student's performance on the screening examination (copies of the student's transcript and Screening examination report should be obtained for each committee member from the Graduate Student Administrator by the Chair); and to agree on the exact format and order of questioning during the oral examination. Subsequently, the student typically presents the highlights of the research proposition [*15 minutes or less*]. Then members of the committee ask two or more rounds of questions. The questions are largely focused on the student's ability to conceive, conduct, evaluate of independent research and to communicate the results of such work. However, the oral examination is not limited to the context of the Written Proposition; as specific examples, questions are often asked a) from the written examination and b) concerning the removal of deficiencies identified by the First Year or Student Progress Committees.

On completion of the examination, the Guidance Committee meets in executive session (without the student) to evaluate the student's performance on the oral examination. Each member has one vote, pass or fail. More than one negative vote will result in failure of the student to pass the examination.

At the end of the executive session, the student is notified of the results on the two portions of the Qualifying Examination. The student passes the Qualifying Examination (as a whole) only if his/her performances on both the written and oral portions are satisfactory. If the student passes both the oral and written examinations, he/she is indicated to have passed the Qualifying Examination on the Graduate School form **Report on Ph.D. Qualifying Examination**.

If the student fails the written examination or the oral examination or both, the committee must indicate that the student failed the Qualifying Examination on the Graduate School form **Report on Ph.D. Qualifying Examination**. The committee must make recommendations concerning the student's continuation in the graduate program. The committee usually grants the student a second chance to pass the failed portions (either part satisfactorily completed in the first examination does not have to be retaken), but may recommend that the student not repeat the exam or even deny a second chance (the latter action could be appealed to the Graduate School). The second attempt is a final one and can be taken after one month and within 6 months of the initial failure.

Admission to Candidacy

After the student passes the Qualifying Examination, the Guidance Committee recommends to the Graduate School that the student be admitted to candidacy for the Ph.D. Degree. Following admission to candidacy the student must register for BISC 794 Dissertation every semester, except summers, until the degree is awarded.

After the Qualifying Examination has been passed, the Guidance Committee will be dissolved and a Dissertation Committee requested via an Appointment of Committee form. The Dissertation Committee will comprise the student's advisor, serving as Chair, an outside member as required by Dornsife College, and two members of the GPMBBO faculty. Service on the Guidance Committee does not preclude or necessitate service on the Dissertation Committee. The GPMBBO does not allow the reduction of the Guidance Committee to a three-member Dissertation Committee as permitted by the USC Catalogue, except under special circumstances. If these circumstances are met, at least 2 members must be from the GPMBBO faculty. As with the Guidance Committee, if the chair of the Dissertation Committee (i.e. the student's advisor) will be absent from campus for any extended period of time (e.g., on leave), a temporary chair must be appointed.

Research

A student must undertake original investigation of a selected problem in marine biology or biological oceanography. This is normally based on the Written Proposition as presented in the Qualifying Examination, subject to acceptance by the student's committee. Subsequent changes of research direction or content must have advance approval by the student's advisor and Dissertation Committee.

Research Prior to Admission to Candidacy

Students in the GPMBBO are encouraged to conduct research at their earliest opportunity. Credit may be obtained for this research by registering for BISC 790. Ideally, this early research will develop into an appropriate dissertation topic. Certainly, the student will find it difficult to develop and defend a Research Proposition without significant exposure to research in general and the specific problem in particular. Such preliminary research should be based on a detailed plan prepared by the student and approved by his/her advisor.

Research Subsequent to Admission to Candidacy and its Relationship to the Research Proposition

As noted above, dissertation research is normally based on the Research Proposition as presented in the Qualifying Examination, subject to its acceptance by the student's committee. Difficulties frequently force revision of the planned study. The student's Dissertation Committee must approve in advance any such changes of research direction or content. *It is the student's responsibility to keep their Dissertation Committee members apprised of progress and/or changes. At least annual meetings between the student and the Dissertation Committee will be held, preferably shortly after the student's annual presentation in the weekly seminar series.*

Publication Prior to Submittal of the Dissertation

Prompt publication of research results is very strongly encouraged in the GPMBBO. Students should organize their research efforts into blocks that a) can be completed in sequence, and b) represent topics for separate future papers so that submittal of one or more papers can be completed during their graduate tenure. Advisors often require students to submit two papers before completing their dissertation.

Authorship of such papers is significant. If the student is the sole author or if the student is the first author with the advisor as the only additional author, it implies that the student did most if not all of the research and hence the entire contents of the paper may be acceptable for incorporation into the dissertation. If the advisor contributed significantly to the research or if other individuals (other graduate students, faculty, post docs, research technicians, etc.) are co-authors, only that part of the paper which represents the student's work may be incorporated into the student's dissertation.

The format of the entire dissertation must be consistent, so published reprints may be incorporated only if they follow the same format as other chapters. Publisher's permission should be obtained to include the published work in order to avoid any plagiarism issues. In addition, the student is advised to seek the approval of the dissertation committee before submittal of a manuscript that is to be included in the dissertation since that committee must ultimately approve all contents of the dissertation. The fact that material has been submitted (accepted, published) does not mean that it will be allowed to be incorporated without revision by the committee.

Preparation and Defense of the Dissertation

A dissertation represents a significant contribution to science that is based on an original research program completed by the student. Determination of the adequacy of the research program is the sole responsibility of the student's Dissertation Committee. Approval of the dissertation itself is primarily the responsibility of the student's Dissertation Committee, but the completed dissertation must also be examined by the Thesis Editor of the Graduate School to determine if it meets the grammatical standards and other requirements described in ***Guidelines for the Format and Presentation of Theses and Dissertations*** published by the University of Southern California and available online at <https://graduateschool.usc.edu/current-students/thesis-dissertation-submission/guidelines-for-format-and-presentation/>.

GPMBBO students defend an advanced draft of the dissertation rather than a "final" copy typed on dissertation paper. The advanced draft should be complete, including all text, figures, tables, references, etc. and the draft must be in a suitable form for final typing. Before assembly of a complete draft is initiated, the

student should confer with his/her full committee to determine whether adequate research has been completed.

The student's advisor is the individual responsible for determining whether or not a draft is sufficiently refined for distribution to the full Dissertation Committee. Portions or all of earlier drafts may be submitted to some or all of the committee members for suggestions and evaluation at any time. The thesis draft to be defended must be given to the Dissertation Committee at least one month prior to the thesis defense date.

Presentation and oral defenses of the dissertation are achieved in a formal seminar open to all members of the academic community and in a closed meeting of the student and the Dissertation Committee.

Since the final copy of the dissertation must be uploaded to the Graduate School and Library at least three weeks prior to the end of the term in which the degree is to be granted and since the student must allow adequate time after the defense for corrections and final typing, the defense should be scheduled at least six weeks before the end of the term in which the student plans to graduate. Please consult with the Graduate Programs Manager in order to ensure that all requirements and deadlines are met. Dissertation checklist and manuscript submission deadlines can be found on the Graduate School website:

<http://graduateschool.usc.edu/current-students/thesis-dissertation-submission/submission-deadlines/>

Before undertaking the Dissertation Defense, the student must have completed (or be in progress of completing) all other degree requirements.

The Chair of the Dissertation Committee is required to notify the Student Affairs Administrator of the GPMBBO (Don Bingham) of the date, time, and place of the defense of the dissertation, so that a notice of the Dissertation Seminar and Defense may be distributed to all faculty and graduate students of the Department at least two weeks in advance. The date selected for this defense cannot be on an official University holiday (e.g., Labor Day, President's Day, etc.).

The open oral defense of the dissertation is achieved in a formal 50-minute research seminar such as would be given by a visiting scholar. The presentation is open to the public and the student should be prepared to answer all questions from members of the audience, including those on the Dissertation Committee. The period of questioning is not to be limited in time.

The dissertation is also subject to a detailed defense made before the full Dissertation Committee in a meeting that is usually held shortly after the conclusions of the seminar. At this meeting, which can be two-three hours in length, the Dissertation Committee must critically evaluate the dissertation and determine whether or not it is to be accepted. To be acceptable, the dissertation must represent a major, original contribution to science.

Only members of the Dissertation Committee may vote whether to pass or fail the student (accept or reject the dissertation and its open defense in the seminar). A vote to pass the student must be unanimous and such a vote does not preclude that the committee may require modifications of the dissertation. Reasons for failure of the defense should be clearly identified by the committee and may include a) a flawed research plan, b) non-conclusive or inadequate research results, c) major deficiencies in the dissertation, etc. A student who fails the defense the first time is normally given a second opportunity, but any decision on re-examination is at the discretion of the Dissertation Committee.

If the defense is satisfactory and no major revisions of the dissertation are required, all members of the Dissertation Committee approve the dissertation through the electronic **Approval to Submit form**, administered by the Graduate School. If significant revisions of the manuscript are required, the **Approval** form is not accepted until such revisions are completed. The Chair of the Dissertation Committee may be assigned full responsibility for determining that the required revisions have been made, but some or all other members of the committee may request that they also be involved in the final approval. The endorsed **Approval** form signifies approval of the dissertation and defense by the committee.

If the Approval form is signed and dated by the drop/add deadline for FALL or SPRING, no further registration is required.

Once the student has successfully defended the dissertation, a dissertation profile should be created on the Graduate School web site <https://grad.usc.edu/ThesisCenter> and the document checklist process must be completed. Required documents are described at <http://graduateschool.usc.edu/current-students/thesis-dissertation-submission/required-documents/>. When approved, the manuscript can be uploaded in PDF format for review by the editing staff.

The student must pay a Publication and Processing Fee in the University's Cashier's office and submit a receipt of payment to the Graduate School upon submitting the dissertation.

The **SURVEY OF EARNED DOCTORATES** must be completed and returned to the Graduate School for approval.

COURSES AVAILABLE IN MARINE ENVIRONMENTAL BIOLOGY

Core Courses

- BISC 582 Biological Oceanography, offered each Fall
(4 units)
- BISC 583 Evolution and Adaptation of Marine Organisms, currently offered in Spring
(4 units)
- BISC 584 Faculty Lecture Series, offered each Spring (MEB Faculty)
(2 units)
- BISC 585 Scientific Writing and Reviewing, offered each Fall
(2 units)
- BISC 529 Marine Environmental Biology Seminar, Tuesdays at noon, offered each semester
(1 unit; 4 units required, maximum)

Advanced Graduate Seminars, offered on a rotating basis; check current Schedule of Classes
(2 units each; 4 seminars required)

- BISC 530 Plankton Biology (Caron & K. Heidelberg)
- BISC 531 Physiology of Marine Organisms (Gracey & Edmands)
- BISC 532 Molecular and Microbial Ecology (Fuhrman & Capone)
- BISC 533 Remote Sensing and Modeling (Kiefer)
- BISC 534 Population Genetics of Marine Organisms (Edmands & Hedgecock)
- BISC 536 Marine Biogeochemistry & Microbial Ecology (Capone & Ziebis)
- BISC 538 Metals and Biology in Oceanic Regimes (Moffett & Hutchins)
- BISC 586 Biological Oceanographic Instrumentation (Ziebis, Moffett, & Kiefer)
- BISC 587 Communicating Ocean Science (Jacobsen, Parr & Sullivan)
- BISC 588 Introduction to Bioinformatics (Kenkel & Thrash)
- BISC 599 Phylogenetics and Evolution (Sigurdson)

MEB Relevant Courses (other than MEB graduate courses listed above)

BISC Courses offered on the UPC

- 403 Advanced Molecular Biology (4 units)
- 419 Environmental Microbiology (4 units)
- 427 The Global Environment
- 434 Introduction to Genome Science
- 435 Advanced Biochemistry (4 units)
- 450 Principles of Immunology (4 units)
- 460 Seminar in Marine and Environmental Biology (2 units)
- 469L Marine Biology (4 units)
- 478 Computational Genome Analysis (4 units)
- 483 Geobiology and Astrobiology (4 units)
- 502ab Molecular Genetics and Biochemistry (4, 4 units)
- 510 Integrative and Evolutionary Biology (4 units)
- 545 Modeling and Numerical Techniques for Marine Scientists (4 units)
- 549 Seminar in Integrative and Evolutionary Biology (2 units)

Related Advanced Courses in Other Departments that can be used to meet course requirements

- GEOL 412 Oceans, Climate and Environment (4 units)
- GEOL 460L Geochemistry and Hydrogeology (4 units)
- GEOL 500 Paleocology (3 units)
- GEOL 501 Paleobiology (3 units)
- GEOL 512 Introduction to Physical and Chemical Oceanography (3 units)
- GEOL 514 Marine Geology (3 units)
- GEOL 555 Paleooceanography (3 units)
- GEOL 560 Marine Geochemistry (3 units)
- GEOL 564 Isotope Geochemistry (3 units)
- GEOL 567 Stable Isotope Geochemistry (3 units)
- GEOL 577 Micropaleontology (3 units)
- GEOG 587 GPS/GIS Field Techniques (Catalina Island Summer Source) (4 units)

- PPD 694 Coastal Policy and Planning (4 units)

- ENE 443 Environmental Chemistry (3 units)
- ENE 463L Water Chemistry and Analysis (3 units)
- ENE 503 Microbiology in Environmental Engineering (3 units)
- ENE 513L Instrumental Analysis (3 units)
- ENE 562 Aquatic Chemistry (3 units)

Statistics Courses

BISC 305 Introduction to Statistics for Biologists (4, Fa/Sp). Statistical methods in biological sciences and medicine, including populations and samples, random sampling, confidence intervals, paired samples and regression.

BISC 444 Practical Analysis of Biological Data in R (2, Fa) Instruction in the open-source statistical program environment R to analyze biological data; manipulation of large datasets and customization of statistical tests using simulations.

PSYC 501 Classic and Modern Statistical Methods (4, Fa) An introduction to classic statistical techniques as well as modern robust methods for dealing with violations of standard assumptions. (Wilcox)

PSYC 502L Analysis of Variance and Experimental Design (4, Sp) ANOVA, including three-way and within groups designs, multiple comparisons, ANCOVA, plus related methods based on robust smoothers and multivariate techniques. *Prerequisite:* PSYC 501.

PSYC 503L Regression and the General Linear Model (4, Fa/Sp) Multiple regression as a tool in experimental and non-experimental data; analysis of variance and covariance as regression on coded variables. Computer applications Laboratory exercises. *Prerequisite:* PSYC 501.

PM 340L Health Behavior Statistical Methods (4, Fa/Sp) Intermediate statistics for health behavior studies; topics include descriptive statistics, hypothesis testing, correlation and regression, and use of computer software in data analysis.

PM 510L Principles of Biostatistics (4, Fa) Concepts of biostatistics; appropriate uses and common misuses of health statistics; practice in the application of statistical procedures; introduction to statistical software including EXCEL, SPSS, nQuery. Laboratory.

PM 511abL Data Analysis (4-4, a: Fa, b: Sp) *a:* Major parametric and nonparametric statistical tools used in biomedical research, computer packages including SAS. Includes laboratory. Lecture, 2 hours; laboratory, 2 hours. *Prerequisite:* PM 510L. *b:* Statistical methods for analysis of categorical data including dichotomous, multinomial and count data, using Strata package. Includes laboratory. *Prerequisite:* PM 511aL.

Catalina Semester and Maymester Courses:

BISC 352 Conservation Biology (4, Sp)
BISC 431L Aquatic Microbiology (4, May)
BISC 469L Marine Biology (4, Sp)
BISC 457L Methods in Marine Biology and Biological Oceanography (4, May)
ENST 310 Sustainable Fisheries Management (4, Sp)
ENST 320a Water and Soil Sustainability (4, Sp)

'Quick Check List' of Student/Advisor Responsibilities

Late Summer, before classes begin.

Each student consults advisor to discuss background and courses to be taken in the first semester to develop the student's training in marine science as well as their specific area of interest. Also, student and advisor should discuss the plan for financial support for the first year (fellowships, TAships, RAships).

Year 1, Fall

Each student establishes a 3-person First Year Committee. The student should meet with each committee member (either separately or all together) and have them sign the "*First Year Committee Form*", which should be filed by September. At the end of the semester (Nov/Dec), the student meets with the full committee to discuss progress and plans for the coming semester.

Year 1, Spring

Student meets with Committee at the end of the semester (April/May) to discuss progress (including a research presentation) and future plans. Before the meeting the student should submit a "*Graduate Student Progress Report*" form to the committee. The student will receive written comments from the committee.

Year 2, Fall

Student and advisor compose and request appointment of a 5-person Ph.D. Guidance Committee (form available at the Graduate school website) which meets with the student Fall semester. Prior to the meeting, the student submits a 1-2 page Research Summary to committee members outlining proposed research (this document must be submitted at least 2 months prior to the written portion of the Qualifying Exam). Following a brief presentation by the student, the committee provides feedback, including a second review of the student's coursework and training, and any appropriate recommendations for further course work or directed study. Student develops a preliminary thesis proposal as part of the course BISC 585. Also, the student must file the "*Request to Take Ph.D. Qualifying Examination*" form at least one month prior to the Qualifying Exam in Spring semester.

Year 2, Spring

The student should complete both the written and orals parts of their Qualifying Examination this semester. The 15-page Research Proposition must be submitted at least 2 weeks prior to the oral exam. The Chair of the Guidance Committee should obtain the student's file for the Qualifying Examination. A "*Report on Ph.D. Qualifying Examination*" form will be in the file for all committee members to sign.

Years 3-5

Following successful completion of the Qualifying Examination, the Ph.D. Guidance Committee is dissolved and a new 4-person Dissertation Committee is requested (form available at the Graduate school website). The student meets *at least* annually with the committee. A short memo describing the students' progress (signed by all committee members) is submitted to the Section office following each annual meeting.

Additional Annual Requirements:

Yearly Seminar: *Each student must present a 20-minute seminar once each academic year beginning in their second year.*

Yearly Progress Reports: *Every Springs, each student will complete and submit to the Section office a brief progress report detailing their activities during the previous 12 months (courses taken, research undertaken, seminars given at USC and elsewhere, participation in cruises, etc.). Forms for these reports will be emailed to students as a reminder.*