

**Molecular Biology, Cell Biology
& Biochemistry (MCBB)
Graduate Program Guide**

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MCBB Graduate Program Administration

The MCBB Program is administered by the MCBB Program Committee. The MCBB Program Committee oversees all academic programs and policies. The Committee consists of the Director of the MCBB Program and representative faculty from other Departments. The Program Committee is responsible for evaluating the programs of continuing students and petitions, curriculum development, determining MCBB faculty membership in the program, and maintaining the overall standards of the graduate program. The Admissions Committee is responsible for evaluating applications submitted for admission and accepting students.

Students should consult the Graduate Program Specialist for the MCBB Program, located in the Biology Department (Room BRB 101), with any questions or concerns about administration, policies, resources, and/or procedures. In all cases, if there are problems or concerns the student should first ask his/her major professor.

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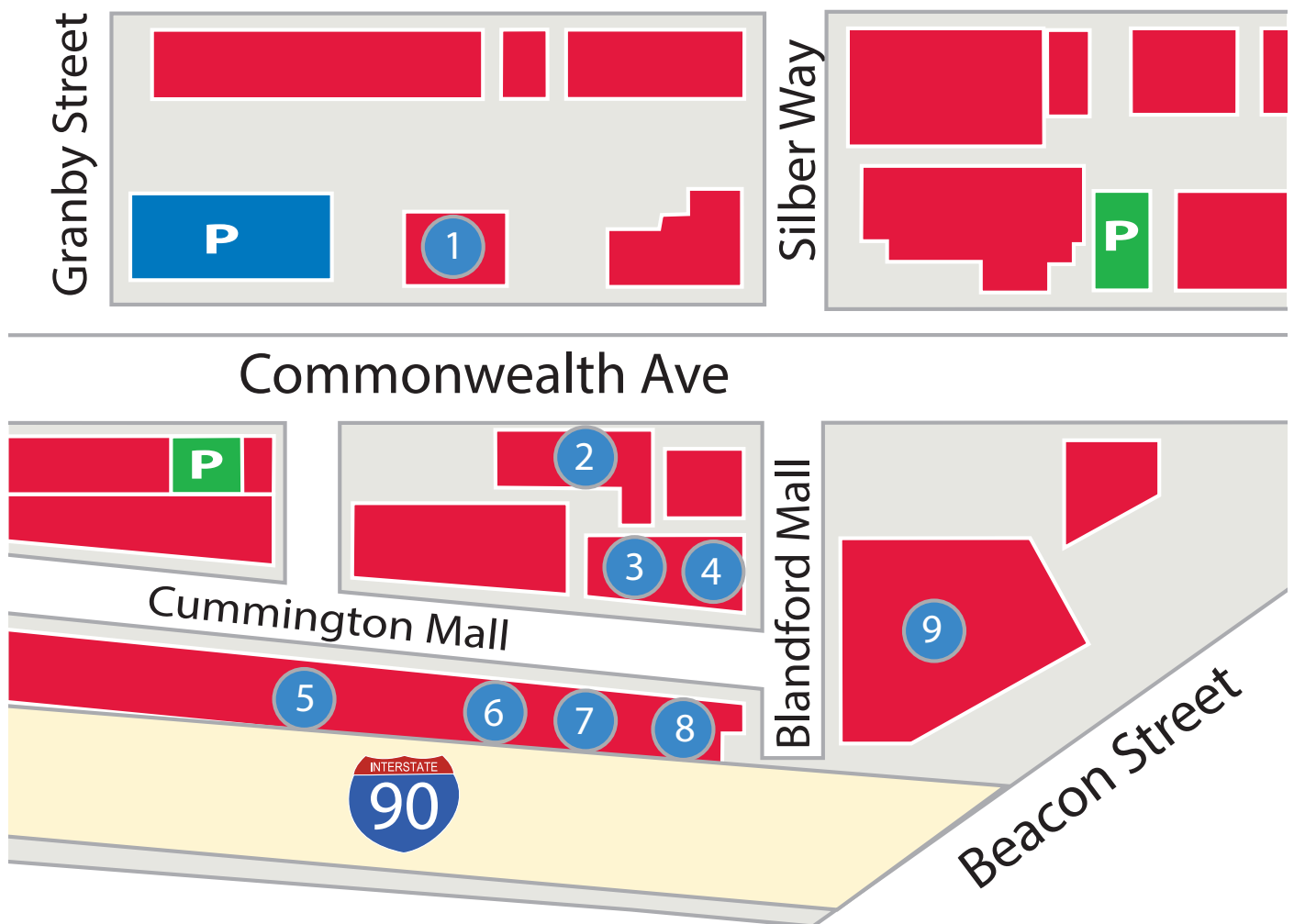
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Facilities

All persons using MCBB Program facilities must arrange for their use through the staff or faculty member responsible for the facility and should use the resources in the department in which the student's advisor is housed. Persons wanting access to these facilities must contact the responsible staff member and must familiarize themselves with the regulations governing instrument use and maintenance.



- 1 Sargent College of Allied Health & Rehabilitative Sciences (SAR)**
635 Commonwealth Avenue

 - Offices and laboratories for Health Sciences
 - Instructional Resource Center
- 2 Center for Integrated Life Sciences & Engineering (CILSE)**
610 Commonwealth Avenue

 - Offices and laboratories for neuroscience, systems/synthetic biology, engineering, and physicians from Medical and Charles River campuses
 - Community and colloquium spaces
 - Cognitive Neuroimaging Center
 - Satellite Vivarium
- 3 Biology Research Building (BRB)**
5 Cummington Mall

 - Biology & MCBB administrative offices (Room 101)
 - Biology & MCBB Graduate Student Lounge (Room 117)
 - Biology research laboratories and offices
 - Classrooms and seminar rooms
 - Biology Department Workshop
 - Stable Isotope Laboratory
- 4 Physics Research Building (PRB)**
3 Cummington Mall

 - Offices and laboratories for Physics
 - Classrooms
 - Electronics Facility
 - Super-Computer Facility
- 5 Engineering Research Building (ERB)**
44 Cummington Mall

 - Offices and laboratories for Biomedical Engineering faculty
 - Seminar rooms, instrument rooms, and environmental rooms
 - Biomedical Data-Acquisition Lab
 - Cell & Biomolecular Mechanics Instructional lab

- 6 Center for Advanced Biotechnology (CAB)**
36 Cummington Mall

 - Research center for College of Engineering and School of Medicine: Engineering, Biology, Chemistry, Physics, and Medicine
 - Darkrooms, clean rooms, tissue culture, seminar, study, and computer rooms

Science and Engineering Library
38 Cummington Mall

 - Library for most of the University's holdings in Science & Engineering
- 7 Life Sciences and Engineering Building (LSE)**
24 Cummington Mall

 - Offices and laboratories for Biology, Chemistry, and Biomedical Engineering
 - Darkrooms, autoclaves, cold rooms, ultracentrifuges, shakers, scintillation counters, and imaging equipment
 - Proteomics and Imaging Core Facility
 - Media Center
 - Department of Biology Stockroom
- 8 Biological Science Center (BSC)**
2 Cummington Mall

 - Biology research laboratories and offices
- 9 Metcalf Center for Science and Engineering (SCI)**
590 Commonwealth Avenue

 - Offices and laboratories for Chemistry, Physics, and Biology
 - Classrooms and seminar rooms
 - Introductory Biology Office
 - Laboratory Animal Care Facility (LACF)

Molecular Biology, Cell Biology & Biochemistry (MCBB) Program

The interdepartmental graduate Program in Molecular Biology, Cell Biology & Biochemistry (MCBB) offers both Ph.D. and M.A. degrees. The MCBB curriculum is designed to provide a solid foundation in these three and related interdisciplinary fields through coursework, seminars, and research, in order to prepare students for research and/or teaching positions in academia, industry, or government.

MCBB Program Requirements:

Seminars

All students participate in the MCBB seminar program that consists of one required weekly seminar, and a number of optional seminars and colloquia.

Required Seminar:

CM/MCBB Graduate Student Seminar (BI/MB 583/584): This seminar is the keystone of the Program. It offers a chance each week for students in the biological sciences and faculty to meet, and creates a forum for the exchange of ideas. Ph.D. students annually present their laboratory research. MA students must also attend. Meets Friday at 12:20pm in LSE B01.

Optional Seminars and Colloquia:

Biology Seminar Series: A colloquium of outside speakers from various fields related to Biology. Meets Monday at 12:20pm in LSE 103. Students are also encouraged to collectively invite 1-2 speakers in this seminar series each year. <http://www.bu.edu/biology/news-events/2017-seminar-schedule/>

Biomedical Engineering Seminars:

The Hearing Research Center Seminar Series – Fridays at 10:30 AM, details can be found at <https://www.bu.edu/hrc/seminars-and-events/seminar-calendar/>

The Brain and Vision Seminar Series - more info can be found at <http://www.bu.edu/bravi/news/seminars/>

Graduate Program in Neuroscience (GPN) Seminars:

More information can be found at <http://www.bu.edu/neuro/>

The Bioinformatics Graduate Program Seminars:

More information can be found at <http://www.bu.edu/bioinformatics/news/events/>

BU-BMC Cancer Seminar Series: More information can be found at <http://www.bumc.bu.edu/cancercenter/seminars/>

Chemistry Department Seminars: More information can be found at <http://www.bu.edu/chemistry/seminars/>

Monday Colloquium - Mondays at 4 PM in SCI113

Physical Chemistry Seminar Series - Wednesdays at 2 PM in SCI 512

Systems Biology Seminars: Thursdays at 12:45 PM, LSE 103. Details can be found at: <http://sysbio.bu.edu/>

Thesis/Dissertation Defense Seminars:

These seminars are widely announced via student email lists and through postings throughout the various science buildings. They vary in frequency; all students are encouraged to attend.

Ph.D. Course Requirements

A total of 64 credits is required. Of these, a minimum of 20 core credits must derive from lecture or seminar courses, and a minimum of 12 credits from elective courses. Remaining coursework normally consists of research credits. As of Fall 2015, all incoming Ph.D. students are admitted into the dual Masters/Ph.D. program. The MCBB program no longer has a separate post-master's Ph.D. program. However, incoming students with previous graduate credits, including from a Master's degree at a different institution, may apply to transfer course credits toward the Ph.D. degree. The MCBB Program Committee will deliberate as to how many previous courses are appropriate to accept, on a case-by-case basis. Course requirements are as follows:

- GRS BI 735 Advanced Cell Biology (4 cr)
- GRS BI 753 Advanced Molecular Biology (4 cr)
- GRS MB 721 Graduate Biochemistry (4 cr) or MB 722 Advanced Biochemistry (4 cr)
- GRS MB 697 A Bridge to Knowledge: A Practical Seminar for First-Year Graduate Students (1 cr)
- CAS BI 583* Progress in Cell & Molecular Biology (2 cr)
- CAS BI 584* Progress in Cell & Molecular Biology (2 cr)
- Quantitative course (3-4 cr), as most appropriate for the student's PhD research
- 12 credits in elective courses, chosen in consultation with the student's advisor**

M.A. Course Requirements

A total of 32 credits is required. Course requirements are as follows:

- CAS BI 552 Molecular Biology I (4 cr)
- GRS BI 553 Molecular Biology II (4 cr)
- GRS BI 621 Biochemistry I (4 cr)
- GRS BI 622 Biochemistry II (4 cr)
- GRS BI 735 Advanced Cell Biology (4 cr)
- CAS BI 583* Progress in Cell & Molecular Biology (2 cr)
- CAS BI 584* Progress in Cell & Molecular Biology (2 cr)
- 8 credits of elective courses and/or research credits, chosen in consultation with the student's advisor and regulated by the MA program for which they are enrolled**

** Students are required to attend BI 583/BI 584 throughout their graduate career but only 4 credits may count toward the degree.*

*** Research and approved elective courses on page 14. No more than 8 credits may be derived from two-credit seminars.*

Transfer of Credits

Students may make the request for transfer credit through the online Transfer of Credit Request Form from GRS. There are specific steps for requesting transfer credit:

1. Students must submit the form online for the credits they are looking to transfer from another institution. The form first comes to the GRS Records Office to check if these specific courses are eligible to be transferred in accordance with GRS policy.
2. If the courses are eligible, GRS will forward the request via email to the MCBB Director (copying the administrator) for review and approval.
3. GRS staff will never apply credits to a student's record without approval from the program.

Research Courses

MB 907/908 Research in MCBB (variable credit)

Consult your advisor for the specific number of research credits that you should register for each semester. The following can be used as a guide however it is important to review the course credit requirements for your program and your individual academic progress and funding in consultation with your advisor [maximum of 32 total credits of research for PhD students]:

Only registering for research credits (not teaching) - register for 6 credits of research

Only registering for research credits (and teaching) - register for 4 credits of research

Registering for courses and research credits (not teaching) - register for 4 credits of research

Registering for courses and research credits (and teaching) - register for up to 2 credits of research

Elective Courses

The following lists courses approved for MCBB elective course credit. Some elective courses are not offered on a regular basis. Students should consult course bulletins offered by participating departments and/or class schedules, available each semester, for details. Other courses, subject to the approval of the MCBB Program Director, may also be appropriate, depending on the student's area of research. In order to obtain elective credit for courses not on the approved list, students need to petition in advance the MCBB Program Director to request approval.

Molecular Biology, Cell Biology and Biochemistry

MB 701/702 Graduate Readings in MCBB [MA scholarly review track only]

Biochemistry and Molecular Biology

BB 522 Molecular Biology Laboratory (4 cr)

Bioinformatics

BF 527 Bioinformatics Applications (4 cr)

Biology

BI 545 Neurobiology of Motivated Behavior (4 cr)

BI 551 Biology of Stem Cells (4 cr)

BI 572 Advanced Genetics (4 cr)

BI 576 Carcinogenesis (4 cr)

BI 581/582 Seminar in Biology (2 x 2 cr)

BI 610 Cellular Aspects of Development and Differentiation (4 cr)

BI 645 Neurophysiology (4 cr)

BI 655 Developmental Neurobiology (4 cr)

BI 681 Molecular Biology of the Neuron (4 cr)

Chemistry

CH 625 Enzymology: Mechanisms of Enzymatic Reactions (4 cr)

CH 626 Epigenetics (4 cr)

CH 627 RNA Structure and Function (4 cr)

CH 632 Advanced Coordination Chemistry II: Inorganic Reaction Mechanisms (4 cr)
CH 633 Physical Methods of Inorganic and Bioinorganic Chemistry (4 cr)
CH 634 Metallobiochemistry (4 cr)
CH 722 Protein Chemistry (4 cr)
CH 724 Special Topics in Biochemistry: DNA Nanotechnology (4 cr)
CH 744 Chemical Biology (4 cr)

Physics

PY 771 Concepts in Biophysics (4 cr)

Engineering

ENG BE 500 Special Topics in Biomedical Engineering (4 cr)
ENG BE 508 Quantitative Studies of the Respiratory and Cardiovascular Systems (4 cr)
ENG BE 517 Optical Microscopy of Biological Materials (4 cr)
ENG BE 560 Biomolecular Architecture (4 cr)
ENG BE 726 Biomaterials & Tissue Engineering I (4 cr)
ENG ME 500 Special Topics in Mechanical Engineering (4 cr)

Additional Approved Courses in Other Departments

SPH (School of Public Health) BS 704 Introduction to Biostatistics (3 cr)
SPH (School of Public Health) BS 723 Introduction to Statistical Computing (4 cr)
GMS (BU Medical Campus) BT 520 Biology of Cancer (4 cr)
GMS (BU Medical Campus) MI 713 Comprehensive Immunology (4 cr)
GMS (BU Medical Campus) MI 823 Special Topics in Microbiology (4 cr)

*All MCBB, Biology, Chemistry, and Physics course descriptions may be found in the graduate bulletin available on the Graduate School of Arts & Sciences website at <http://www.bu.edu/academics/grs/courses>.
Engineering course descriptions can be found at <http://www.bu.edu/bme/graduate/courses/>*

Academic Requirements

Students must maintain a 3.0 GPA to graduate. Grades below B- and permanent “I” grades are considered failing and do not count towards graduation. The accumulation of more than two grades lower than B- results in dismissal from the Graduate School. Any student receiving a grade lower than B- in a graduate course will be counseled by his or her faculty advisor and the MCBB Director will be informed. Any student who receives a second grade lower than B-, or whose cumulative GPA falls below 3.0 in the core and elective courses used toward the degree for more than one semester will be counseled by the MCBB Director, will lose good academic standing, and will be placed on academic probation. All Program guarantees are dependent on being in good academic standing.

The MCBB Program Director will advise the student on academic probation of the specific time frame [generally within 2 semesters] during which the student must re-establish a cumulative GPA of 3.0 in the core and elective courses used toward the degree and, thus, regain good academic standing. Failure to meet these requirements within the specified time, or receipt of a third grade lower than B- will result in a recommendation to the graduate school for termination of the student’s enrollment at the University. Appeals of the decision to recommend termination may be made to the Program Committee.

Annual Reports

All MCBB students are required to submit an annual report by October 1 for the previous academic year. This report is completed on forms provided and includes a summary of courses completed, research progress, courses taught, examinations passed, committee members and meetings held, publications and presentations, a current transcript, and an assessment by the faculty advisor.

During each year after advancement to candidacy, Ph.D. students should present either a written or oral report on research progress to the dissertation advisory committee. Normally, this occurs at the annual meeting of the committee. The committee meeting date and synopsis must be included on the annual report. The assessment by the faculty advisor should include progress of the student, plus any deficiencies in course work or examinations. Any recommendations, if needed, should be made to the student. Students failing to comply with these recommendations may be subject to probation and loss of financial support. Some sections may not be applicable to all students depending on their degree and their time in the program. **Students failing to submit the report by the deadline are not eligible to register, or their registration is withdrawn, which can result in problems with continued financial support.**

Responsible Conduct in Research

All MCBB Ph.D. students and M.A. students conducting research are required to complete the Responsible Conduct in Research (RCR) training during their first two years in the program. Students are encouraged to continue to attend training sessions subsequently as topics change. RCR is offered through the Provost’s Office and involves a series of afternoon training sessions of lectures and round table discussions covering topics such as proper data acquisition and management, research collaboration ethics, publication do’s and don’ts, social responsibility in research, research that involves human subjects, and research that involves animals. Information about this series will be provided at appropriate times during the academic year.

Teaching

The MCBB Program requires participation in teaching as a part of the Doctor of Philosophy degree. This consists of teaching in laboratory and/or discussion sections for a total of two semesters sometime during the student's graduate career. This requirement can be satisfied by teaching in any of the participating departments in the MCBB program.

Requirements for the Doctor of Philosophy Degree (Ph.D.) in MCBB

Officially, the Ph.D. must be completed within seven years after the first registration for doctoral study. Ph.D. degrees are conferred in either May, September, or January, as specified in the Graduate School Bulletin. In addition, the Ph.D. candidacy expires after the fifth anniversary of passing the Qualifying Examination. Petitions to extend this deadline are possible at the discretion of the MCBB Director and the Dean of the Graduate School and can be obtained from the Office of the Graduate School of Arts & Sciences.

Laboratory Rotations

First-year Ph.D. students who enter the MCBB Program with University or Departmental support (i.e. Teaching Fellowship, Dean's Fellowship) are required to perform at least three laboratory rotations during their first academic year. These laboratory rotations are with MCBB faculty, and each rotation is 6-8 weeks. After these rotations, students provide the faculty with a rank-ordered list of faculty with whom they would like to work. The faculty then meet to determine matches with major dissertation advisors.

Faculty Advisor

Students admitted to the Ph.D. program are assigned a temporary faculty advisor from the MCBB Program Committee, who is generally the Director of the program. By the end of the second semester of the first year a permanent research advisor should be selected (see above).

Qualifying Exam

The Qualifying Examination consists of two parts; first, a written research proposal and second, the oral defense of this research proposal. The qualifying exam should be completed within 2.5 years of matriculation into the MCBB Ph.D. program.

Qualifying Exam Committee

In consultation with the research advisor, the student selects a Qualifying Examination Committee consisting of five faculty members. This committee shall include the major professor and at least two other MCBB faculty members. If one or two members are chosen outside of MCBB and are not the faculty of Boston University, approval is required by the MCBB Program Director and the Dean of the Graduate School. (A "Special Service Appointment Form" must be submitted to the Program Director. This form is available on the GRS website). A form listing the qualifying examination committee and the proposed date of the examination, signed by both the student and the research advisor, is submitted to the MCBB Director within 6 weeks after passing the Preliminary Examination.

Written Proposal

The student, after limited consultation with the major professor, submits a written proposal of an intended research project. The academic code of conduct applies, and the written document should be from the student's own hand, certainly not just cutting and pasting old grant proposals, papers, etc. The major professor may have some input in the form of suggestions on content and organization, but should not directly edit the document. This proposal should include an extensive introduction, complete with appropriately cited literature, a list of specific aims, and an outline of the intended experiments. Preliminary data may be included, but it is not required. The proposal should be concise, approximately 15-20 pages long, double-spaced. The written proposal must be submitted to the Chair of the Qualifying Examination Committee at least two weeks prior to the scheduled examination. The Chair will confirm that the proposal is done properly and is ready for submission to the remaining committee members. There are several examples of appropriate Qualifying Examination proposals on file in the Graduate Program Specialist's Office. If the proposal is not organized or written properly, the Chair will ask the student to make appropriate changes and resubmit it for approval. The date of the exam will then be re-scheduled. After approval by the Chair, the student will confirm the time and date of the examination for all committee members.

Oral Exam

At the examination, the student gives an oral defense of the proposal. This usually begins with the student giving a short (15-20 minute) audiovisual presentation. The media and content for the presentation should be approved by the Chair prior to the examination with the concept in mind that this is an examination and not a seminar. The committee then poses questions related to the intended research, background information, and the field of the work. The committee will also question the core areas of molecular biology, cell biology, and biochemistry, as they pertain to the general scientific field related to the research proposal. The committee Chair ensures that the questions are appropriate (e.g. not too far afield) and that each committee member has sufficient opportunity to question the student.

Advancing to Candidacy

The student's Qualifying Examination Committee is responsible for grading the exam. By passing, the student advances to Ph.D. candidacy. Two or more negative votes or a negative vote by the major professor on the Qualifying Examination constitutes a failure. Any student failing this examination has the opportunity to take it again; at least three months must elapse before a student can retake the exam. Failure of the second examination is grounds for automatic dismissal from the Ph.D. program and the loss of any further financial aid.

If a student fails for the second time, but at least four members of the Qualifying Examination Committee, including at least two of the MCBB faculty, vote that the student's performance on the examination was at a level appropriate for an M.A. degree, the M.A. degree can be conferred. In addition, the student must have completed at least 32 credits of graduate level course work.

Master's Certificate of Completion

Ph.D. candidates may apply for a M.A. degree in MCBB after they have successfully passed their Qualifying Examination and completed 32 credits of graduate level course work. Applications are available online using the GRS Intent to Graduate for a Master's Degree Form. The student's major professor receives notification of this application process.

Dissertation

Responsibility for the successful completion of the dissertation lies with the candidate, who, through insight, initiative, and resourcefulness, shall make a significant contribution to the knowledge of his or her specialized field. For the Ph.D. degree, a dissertation describing original research of publication quality is required. The dissertation is “defended” at the Final Oral Examination (Dissertation Defense) at a time agreed on by the student and the Dissertation Committee. At least two weeks prior to this defense, all work that comprises the defense and the written dissertation, which has been approved by all readers, must be distributed to the committee. At the Defense, the committee agrees on the adequacy of the body of work and written dissertation for the Ph.D. degree in MCBB. A formal public seminar by the candidate (Dissertation Seminar) is required as well.

Dissertation Committee: Within six months after advancing to candidacy for the Ph.D. in MCBB, the student and his or her major professor must jointly convene a Dissertation Committee, which will then continue to meet at least once a year. At these meetings the committee evaluates the progress and advises on future research directions of the student. This committee consists of no fewer than five faculty members, of whom at least three must be members of the MCBB Program. It shall include the major professor and four other scientists who are either faculty at academic institutions or a comparable level of standing and experience at a scientific institution such as industry. At least one member outside of the MCBB program is encouraged.

The Dissertation Committee shall consist of a Chairperson, a First Reader (major professor), a Second Reader, and at least two other members (a third reader is optional). The dissertation readers are those faculty members who eventually read and approve the written Ph.D. dissertation. They are the final arbiters of this document. The Chairperson and First Reader (major professor) must be members of the MCBB Program and must be present at the final dissertation committee meeting and at the dissertation defense. It is strongly suggested that the Second Reader be a Boston University faculty member, unless the student has been directly advised by a scientist outside of Boston University; this member may not be the Chairperson. The fourth and fifth members of the committee may be chosen from other faculty of Boston University or from other institutions upon approval of the MCBB Program Committee and the Dean of the Graduate School. A “Special Service Appointment Form” must be filled out and, with the C.V. of the proposed committee member, submitted to the Graduate Program Specialist. These forms are available on the GRS website. It is suggested that the composition of the Dissertation Committee remain the same for the duration of the student’s graduate program unless changes in the direction of the research dictate new areas of expertise on the committee. A student cannot change the members of the dissertation committee after submission of the Dissertation Prospectus to the Graduate School without approval of the MCBB Program Committee.

Organization of the MCBB Ph.D. Dissertation: A set of rules concerning page sizes, page numbering, etc., of the dissertation can be obtained on the Graduate School website under *Dissertation Formatting Guide and Draft Submission*. The Graduate School rules must be strictly followed.

Below is an additional set of guidelines, which are applicable to all MCBB Ph.D. dissertations.

The format of the complete dissertation document submitted at the time of the defense should meet the specifications of the Graduate School for final submission of the dissertation as well as the guidelines that follow:

a. Comprehensive Dissertation Format

In general, the dissertation is organized in the following comprehensive format. The exact format to be followed is usually decided by the student in consultation with the first and second readers.

The dissertation normally includes, in order, the following sections: Title Page, Approval Signature Page, Acknowledgments, Abstract, Table of Contents, List of Figures, List of Tables, List of Abbreviations, several Chapters, and a comprehensive Reference List.

The dissertation should have a consistent style format from chapter to chapter. In the most common format, Materials and Methods used in different types of experiments from different chapters are combined into a single consistent Materials and Methods chapter, although in some instances, separate sections for each chapter are more appropriate. References should be cited consistently throughout the dissertation, and there should be an initial Introduction chapter, a final Discussion chapter, and a single Reference List.

Chapter One usually provides a contextual Introduction to the dissertation. This includes an overview of the importance of the work, a specific introduction to the field, and a statement of the dissertation goal(s).

Chapter Two usually details the Materials & Methods used in the dissertation work.

Chapter 3 (and more) describes the Results obtained from the dissertation work. These chapters include figures, tables and descriptions of original work. Often these chapters have short introductions to provide a framework for the results that follow, and sometimes specific discussion sections of those results at the end. Figures and tables must have appropriate legends.

The final Chapter should include both a specific and general Discussion of the dissertation work in light of other work in the field.

b. Specific guidelines for presentation of research and data

In all cases, details for the presentation of original data should be worked out between the student and the first and second readers. However, the following can be used as guidelines:

- i. The dissertation must be written by the student and plagiarism will not be tolerated.
- ii. Large parts of the written dissertation may be taken or adapted from material already published by the student. However, published papers cannot be simply stapled together. When the work is part of a multi-authored paper the student should clearly designate what experiments and analyses were performed by co-authors, giving credit in the text as well as in the figure legends or table footnotes. In order that the student does not encroach on any copyrights, the student should be sure that

they have prior permission from the publisher to use any copyrighted material in their dissertation.

iii. In general, all data relevant to the dissertation should be included in the dissertation. It is usually not acceptable to list primary, relevant data as “data not shown” or to refer to primary data published in another source.

iv. It is recognized that figures within the dissertation may not be consistent. For example, figures may have been taken from published articles in journals with different style formats. In general, it is not necessary to revise figures specifically for the dissertation.

v. Original figures (even in the final Graduate School versions of the dissertation) are required only where it is necessary to see and evaluate primary data. For example, students are encouraged to use electronic scans of autoradiographs if relevant data are clear

c. References

References must be listed and cited according to a standard and consistent journal format.

i. The Reference List must include all authors, year published, title of article, journal (full name), volume and inclusive pages. Journal name abbreviations may only be used if the references are preceded by a list of these abbreviations along with the full name of each journal.

ii. References should be ordered alphabetically in the final Reference List. If a given first author has multiple citations, these should be ordered chronologically in the list (starting with the earliest publication). If a given first author has multiple papers in a single year, they should be designated by “a” and “b” (e.g., Doe et al., 1988a; Doe et al., 1988b, etc.), and should be ordered alphabetically by last name of second author. All references included in the final Reference List must be cited at least once within the text of the dissertation, and all references cited within the text must be included in the final Reference List.

The following provides examples of a suggested concise format for references:

(Journal Sample)	Monod, J., Changeux, J.-P. & Jacob, F. (1962) Allosteric proteins and cellular control systems. <i>Journal of Molecular Biology</i> . 6, 306-309.
(Book Sample)	Pauling, L. (1960) <u>The Nature of the Chemical Bond</u> , 3rd ed., Cornell University Press, Ithaca NY.
(Edited Book - Chapter Sample)	Smith, W.L. & Borgeat, P. (1985) The eicosanoids: prostaglandins, thromboxanes, leukotrienes, and hydroxyeicosaenoic acids) <i>In</i> , <u>Biochemistry of Lipids and Membranes</u> , 2nd ed. (Vance, D.E. & Vance, J.E., eds.) Cummings, New York, pp. 325-360.
Benjamin/ (Abstract Sample)	Pirani, A., Allen, K.N., Tolan, D.R., Craig, X., & Lehman, W.(2004)

Electron Microscopy and 3D Reconstruction of Dimeric Aldolase on F-Actin. *The Biophysical Society*, Baltimore, MD 14-18 February.

iii. Citations within text should provide author(s) and date, and be provided in parenthesis. If two authors, use Doe & Smith; if more than two authors, use Doe et al. If multiple citations are given, they are to be separated by semicolons, and ordered by year. That is, the above references would be cited in the text as (Pauling, 1960; Monod et al., 1962; Smith & Borgeat, 1985; Pirani et. al., 2004). If one discusses a specific study within the text, include only the year in parentheses; for example, "Monod et al. (1962) showed that..."

Preparation and Submission of a Ph.D. Dissertation in MCBB: Conferral of the Ph.D. degree in MCBB is dependent upon the successful preparation and defense of a Ph.D. dissertation on original research conducted by the student. There are three Ph.D. dissertation deadlines per year. A precise timetable for completion of essential steps in submission of a Ph.D. dissertation can be obtained from the Graduate School office. A timetable for the preparation and defense of the dissertation can be found at the end of this section. These steps, and MCBB Program requirements and guidelines, are summarized briefly here.

- a. Approximately 9 months prior to the proposed graduation date, a formal Dissertation Prospectus (dissertation outline) must be submitted to the Graduate School Office. The dissertation outline should be prepared in consultation with, and approval of, the first and second readers. The Director of the MCBB Program must also approve it. This document generally provides an outline of the major chapters and subheadings to be included in the Ph.D. dissertation. The Dissertation Outline is approximately 3 to 7 typed, double-spaced pages. It is recommended that the outline be approved by the Dissertation Committee before final submission.
- b. At least 3 months prior to the proposed graduation date, a Diploma Application must be completed and submitted to the Graduate School. Diploma applications are available from the Graduate School, and simply indicate the student's desire to be considered for the next graduation date. If that deadline passes, and the dissertation is not yet complete and defended, another Diploma Application needs to be submitted for the subsequent deadline.
- c. Approximately two months before the defense, the student should meet with the Graduate Program Specialist to review the timeline and requirements for graduation.
- d. At least 3 weeks prior to the Dissertation Defense:
 - i. An Abstract of the dissertation must be submitted to the Graduate School Office. This Abstract (maximum of 350 words) must be approved by the first and second readers, and by the MCBB Director.
 - ii. For formatting purposes only, the draft of the dissertation should be submitted to GRS by attaching the draft to an email message to grsrec@bu.edu. Notification will be sent if the format is approved.

Because the formatting of the dissertation can be very time consuming; it is advised

that all formatting issues be resolved prior to the dissertation defense. Following the defense, ample time is required to complete all corrections and content revisions that are required by the Defense Committee; 7-14 days for rewrites is advised.

Six videos that are helpful when formatting the dissertation are located at BUniverse at: http://www.bu.edu/buniverse/search/?q=&sort=created_on&view=detailed&owner=dioa

- e. At least 2 weeks prior to the Dissertation Defense, all work that comprises the dissertation, which is prepared as described below and approved by both readers must be distributed either as hard copies or electronically to all members of the Dissertation Committee, depending on each committee member's preference. The student should prepare the dissertation in close consultation with the first and second readers. Ordinarily the dissertation will go through several revisions by the first reader, followed by one or more revisions by second reader.

Preparation for the Ph.D. Dissertation Seminar and Defense in MCBB: Defending the Ph.D. dissertation requires both a public seminar and a private defense with the Dissertation Defense Committee. Generally these two events occur together on the same day, although an option exists under special circumstances for delaying the public seminar until a later date. Formal announcement of the Dissertation Seminar and Defense will be made in several ways. It is the responsibility of the student to see that the following matters are taken care of:

- a. At least 2 weeks prior to the Dissertation Defense a schedule of the Final Seminar and Defense (time, place and list of Dissertation Committee members) must be submitted to the Graduate School Office, along with a copy of the approved Dissertation Abstract. The Graduate School Office will then mail a formal announcement of the Dissertation Defense to all committee members. The Chair of the committee will also receive paperwork needed to be filled out at the defense.
- b. A booklet containing an announcement of the Dissertation Seminar and Defense, the Dissertation Abstract, and a brief CV of the candidate must be distributed. This must be prepared by the student and can be given to the Graduate Program Specialist for printing and distribution. A template is provided by the Graduate Program Specialist. The Dissertation Seminar is also publicized by informal posters and e-mail by the Graduate Program Specialist).

Formal Dissertation Seminar

This PowerPoint presentation of the dissertation research will ordinarily last 45-50 minutes and is open to the public. This seminar is usually presented immediately before the dissertation defense, at which all five Dissertation Committee members must be present. However, at the discretion of the student and the first reader, an option also exists for the student to present the Dissertation Seminar at a date following the Dissertation Defense, which would be scheduled at the Dissertation Defense. In this case, only the First Reader and Chair of the Dissertation Committee are required to attend the seminar.

Dissertation Defense

At the private dissertation defense, the committee discusses with the candidate the dissertation research and the written dissertation. All five Committee members must

participate. By prior arrangement one out-of-town member of the committee may participate via Skype with interactive video and audio, however a backup committee member must be available in the event of technical difficulties. If the formal Dissertation Seminar is to occur at a later date, the student still prepares a 45-to-50-minute powerpoint presentation of the dissertation work for the committee, to initiate the proceeding. The student should be prepared to defend all aspects of the work. Committee members ensure that the research is complete, that it was performed by the candidate, and that the candidate understands both the methodological and scientific underpinnings, as well as the overall significance to the field. Furthermore, committee members voice any concerns over data or the preparation of the dissertation. The discussion usually lasts 1-2 hours. Depending on how well the dissertation experiments are designed, performed, and defended, and how well the dissertation is prepared, the committee votes on whether the dissertation is complete and satisfactory. Two or more committee members voting that the dissertation is not complete or not satisfactory requires another Dissertation Defense for a decision about whether the Ph.D. degree is offered. Furthermore, the First Reader (Major Professor) must vote positively for the candidate to pass, as the first reader's signature is required on the final, submitted dissertation. If the vote results in a positive outcome, but revisions are required, the committee and candidate must agree on the amount of time necessary for the candidate to meet any of the committee's objections. The Dissertation Defense Committee also must sign the Graduate School Exam Report and agree on the wording of the dissertation title and abstract.

Revision and Submission of the Final Dissertation

Ordinarily the candidate receives written comments from all committee members, which should be incorporated, in consultation with the first and second readers, into a final version of the dissertation. Upon satisfactory completion of revisions, the first and second readers must sign and approve the signature pages of the final version of the dissertation. Once all corrections and revisions required by the Defense Committee have been completed, the final approved dissertation is submitted electronically to the ETD Administrator (<http://www.etsadmin.com/bu>). The final electronic version will be reviewed by GRS and then forwarded to the Mugar Library ETD Administrator for the final format review, before its submission to ProQuest/UMI Administrator.

Policy on Embargoing Dissertations

In some circumstances, a student may not want his or her dissertation to be available from ProQuest or the Digital Common immediately after it is submitted to them. Circulation restrictions (referred to by ProQuest as "embargoes") may be allowed by the Graduate School of Arts and Sciences for compelling circumstances, e.g. if the work is planned for sale to a publisher, is intellectual property intended for a patent application, requires completion by colleagues/collaborators prior to submission to a journal or covers a sensitive subject that cannot be published safely or appropriately at the time. In such cases, you may request a restriction for any period between six months and two years (ProQuest default options are 6 mos., one year, or two years). For any time period, you must submit a letter requesting a restriction along with the PDF of the dissertation through ProQuest's ETD Administrator. The letter must explain the compelling reason for the restriction, the time limit desired, an address where you can be contacted when the time limit expires, and the signed approval of both you and your major advisor. These letters are reviewed and, if appropriate, approved

by the associate dean. The restriction will start from the date on the letter. A sample letter is provided on the GRS website. Your thesis manuscript will not be available until the restriction is released. No one is permitted to look at your work unless they have your express written permission to do so. Requests to read your manuscript will be forwarded to you. It is your responsibility to respond to them.

Note: If either office notifies the student of necessary corrections or changes, they must be made immediately. A quick response will avoid being required to register for another semester, a delay in verifying the completion of the degree requirements, and a delay in issuing of the diploma. It may take some time before the final library review is complete.

Final Administrative Tasks for Completion of Program Requirements

- The student must provide final copies of the dissertation to the first and second readers (and, when requested, to other members of the Dissertation Committee) as well as an electronic copy to the Graduate Program Specialist.
- See following pages for the complete list of deadlines for the Ph.D. requirements.

Requirements for the Doctor of Philosophy Degree (Ph.D.) in MCBB

- ☐ Participation in weekly seminars
- ☐ 64 credits (minimum of 32 credits of lecture/seminar courses: 20 core credits and 12 elective credits)
- ☐ Grade point average of greater than or equal to 3.0
- ☐ No more than two failing grades (lower than a B-)
- ☐ Submission each year of an annual report
- ☐ Completion of Responsible Conduct in Research (RCR) trainings
- ☐ Teaching in laboratory and/or discussion sections for a total of two semesters

By the end of the first year:

- ☐ Completion of at least 3 rotations through MCBB research laboratories
- ☐ Matching to the faculty member with whom he/she will perform dissertation research

By the end of the second year:

- ☐ Completion of all core course requirements
- ☐ Completion of most, if not all, elective courses
- ☐ Completion of Responsible Conduct in Research (RCR) trainings

Annually after the second year:

- ☐ Presentation of research in the Friday noon Graduate Student Seminar series
- ☐ At least one meeting with dissertation advisory committee

By the end of the third year:

- ☐ Successful completion of the oral qualifying examination

Within the final year prior to finishing the Ph.D. degree (see next page for more details):

- ☐ Submission of prospectus describing the proposed dissertation (~9 months prior to defense)
- ☐ Defense of the dissertation, including both a public seminar presentation and a private defense with the dissertation defense committee of the research
- ☐ Submission of the approved final dissertation to the Graduate School of Arts and Sciences

GRS Ph.D. Graduation Deadlines (with MCBB Program deadlines)

All degree requirements are complete only when the doctoral dissertation has been certified as meeting the standards of the Graduate School of Arts and Sciences and of the Mugar Memorial Library

GRADUATION DEADLINES FOR:	SEPTEMBER 25, 2018	JANUARY 25, 2019	MAY 20, 2019
Last date to hold Final Oral Exam (Defense)	August 10, 2018	December 7, 2018	April 8, 2019
Last date to submit dissertation to ETD	August 17, 2018	December 14, 2018	April 12, 2019
Last date to submit dissertation to ETD for graduation in the next semester without registering for that semester	September 5, 2018	January 17, 2019	May 13, 2019

9 - 12 months before proposed graduation date	Dissertation Prospectus & approval form due to Graduate Program Specialist for departmental review and submission to GRS
Semester prior to your intended graduation cycle	Intent to Graduate Form Completed online
About 2 months before dissertation defense	Meet with Graduate Program Specialist to review requirements for defense Arrange for Special Service Appointments if committee members are not BU faculty Send first draft of dissertation to readers
Once defense date is confirmed with committee	Reserve room(s) for public seminar and defense
At least three weeks prior to dissertation defense	Schedule of Final Oral Exam with Abstract Approval due to GRS Properly formatted draft of dissertation submitted as .pdf to gsrec@bu.edu
At least two weeks prior to dissertation defense	Send dissertation to all committee members
At least one week prior to dissertation defense	Send booklet to Graduate Program Specialist
See above for final dates to submit dissertation to ETD	Submit final dissertation to ETD (online submission) Submit signature page to Graduate Program Specialist with original signatures from readers

Requirements for the Master of Arts Degree (M.A.) in MCBB

Officially, all Master's degree requirements must be completed within three years from the date of first registration. However, students may apply to the Graduate School for extensions past the three-year deadline. M.A. degrees are conferred in either May, September, or January, as specified in the Graduate School Bulletin. The MA in MCBB culminates with a thesis, which can be either research- or literature-based.

Faculty Advisor

Each student who is admitted to the M.A. degree program is assigned a faculty advisor from the MCBB Program, either the Director of the Program or a faculty member based on the student's interests. This advisor recommends a course of study for the student. It is the responsibility of the student to find an appropriate faculty member to serve as the first reader on the scholarly paper or research thesis.

Types of M.A. Degrees

There are two types of MA programs for MA MCBB students:

1. Master's with Scholarly Review Paper

Coursework

As stated above, students must complete 32 credits, 24 of which are fulfilled by the Required Core Courses. Students normally take MB 701 and MB 702, Graduate Readings (2 x 2 credits) under the direction of their Graduate Advisor, which serves as credit for preparation of the required Scholarly Paper. However, if this option is taken, students may not count any other two-credit courses, other than BI 583/584, towards graduation. For the remaining 4 credits, students must select from the list of Elective Courses approved by the MCBB Program. Prior course work that might be equivalent to the Required Core Courses may be petitioned to the MCBB Program Committee which may either waive the required course or accept the course for credit. Students may not use credits used to satisfy the requirements of a degree earned at BU or another institution. A typical full-time schedule would be as follows:

Fall		Spring	
CAS BI 552 Molecular Biology I	(4 cr)	CAS BI 553 Molecular Biology II	(4 cr)
GRS BI 621 Biochemistry I	(4 cr)	GRS BI 622 Biochemistry II	(4 cr)
CAS BI 583 Progress in CM Biology	(2 cr)	CAS BI 584 Progress in CM Biology	(2 cr)
GRS MB 701 Graduate Readings	(2 cr)	GRS MB 702 Graduate Readings	(2 cr)
Elective Course	(4 cr)	GRS BI 735 Advanced Cell Biology	(4 cr)
Total Credits		16 cr	16 cr

Scholarly Review Paper

Students must write a Scholarly Review Paper on a selected topic in the field of Molecular Biology, Cell Biology, or Biochemistry in consultation with a faculty advisor from the MCBB Program who serves as the first reader. The paper should review a selected current research topic and usually includes several chapters and extensive literature references. The final version of the paper must be read and approved by the first reader and at least

one other MCBB faculty member. The paper must comply with the format described below. A final copy must be given to both readers, and an electronic copy must be sent to the Graduate Program Specialist.

Format of a Scholarly Review Paper for the M.A. in MCBB

- a. The first page must be a Title Page and must include the following information: the title of the paper (in capital letters); your name and BU identification number; and

A Scholarly Review Paper
submitted in partial
fulfillment of the degree
of Masters of Arts in
Molecular Biology, Cell Biology
& Biochemistry
Month, Year

- b. The second page must be a signature approval page and should be organized, for example, as follows:

First Reader: _____
John Caradonna, Professor of Chemistry

Second Reader: _____
Dean Tolan, Professor of Biology

- c. The third page must be a Table of Contents that lists the chapter titles and subheadings of chapters.

d. Description of Chapters: There should be a series of chapters describing the topic. Usually the first chapter provides a broad Introduction to the topic. One or more chapters should follow this that describe in some detail the specific topic, including experiments that led to the models and hypotheses that now dominate the field, or conflicting hypotheses. Usually the final chapter provides a Summary and Perspective for the field.

e. Figures and Tables: If figures or tables are included in the thesis, the source from which the information has been taken must be cited, such as "(taken from Doe et al., 1995)" or "(adapted from Doe et al., 1995)". Each figure or table should follow its first citation in the text; they should not be grouped at the end.

f. Bibliography: A comprehensive reference list must be included at the end of the text, and information taken from references must be cited properly within the text.

- i. Listings in the bibliography: List must include authors, year published, title of article, journal, or book, volume/edition, and inclusive pages.

References must be ordered alphabetically in the final reference list. If a given first author has multiple citations, these should be ordered chronologically in the final reference list (starting with the earliest publication). If a given first author has multiple papers in a single year, they should be designated by "a" and "b" (e.g., Doe et al., 1988a; Doe et al., 1988b,

etc.), and should be ordered alphabetically by first letter of second author's last name. All references included in the final Reference List must be cited at least once within the text of the paper, and all references cited within the text must be included in the final Reference List.

The following provides examples of a suggested concise format for references:

(Journal Sample)	Monod, J., Changeux, J.-P. & Jacob, F. (1962) Allosteric proteins and cellular control systems. <i>Journal of Molecular Biology</i> . 6, 306-309.
(Book Sample)	Pauling, L. (1960) <u>The Nature of the Chemical Bond</u> , 3rd ed., Cornell University Press, Ithaca NY.
(Edited Book - Chapter Sample)	Smith, W.L. & Borgeat, P. (1985) The eicosanoids: prostaglandins, thromboxanes, leukotrienes, and hydroxyeicosaenoic acids) <i>In, Biochemistry of Lipids and Membranes</i> , 2nd ed. (Vance, D.E. & Vance, J.E., eds.) Benjamin/Cummings, New York, pp. 325-360.
(Abstract Sample)	Pirani, A., Allen, K.N., Tolan, D.R., Craig, X., & Lehman, W.(2004) Electron Microscopy and 3D Reconstruction of Dimeric Aldolase on F-Actin. <i>The Biophysical Society</i> , Baltimore, MD 14-18 February.

ii. Citations within text should provide author(s) and date, and be provided in parenthesis. If two authors, use Doe & Smith; if more than two authors, use Doe et al. If multiple citations are given, they should be separated by semicolons, and ordered by year. That is, the above references would be cited in the text as (Watson & Crick, 1953; Pauling, 1960; Monod et al., 1962; Smith & Borgeat, 1985). If one discusses a specific study within the text, include only the year in parentheses; for example, "Monod et al. (1962) showed that..."

g. Costs: All costs related to photocopying and binding of the paper are the responsibility of the student.

2. Master's with a Research Thesis

This option is available on an individual basis upon approval by an MCBB faculty member, who agrees to serve as the research advisor.

Coursework

As stated above, students must complete 32 credits, 24 of which are fulfilled by the Required Core Courses. Prior course work that might be equivalent to the Required Core Courses may be petitioned to the MCBB Program Committee which may either waive the required course or accept the course for credit. Students may not use credits used to satisfy the requirements of a degree earned at BU or another institution. Students who are seeking this type of Master's degree may not take BI 701/702 for credit toward graduation. For the remaining eight credits, students select from the list of Elective Courses approved by the MCBB program or enroll for research credits under their advisor (MB 907/908). Typically, students complete the Required Core Courses in their first year.

Research Thesis

The student must write a thesis detailing the original research that was conducted under the sponsoring faculty member. This thesis generally includes the following sections: Title Page, Approval Signature Page, Table of Contents, Abstract, Introduction, Materials & Methods, Results, Discussion, References and figures and/or tables from that research. The M.A. thesis must meet the format specifications of the Graduate School as well as those of the MCBB Program (see pp. 18-20 on Organization of a Ph.D. dissertation for guidelines). This thesis must be read and approved by a committee of three faculty members that includes at least two faculty members from the MCBB Program; one committee member must be the faculty member who acted as the research advisor. The student must provide final copies of the thesis to the first and second readers (and, when requested, to other members of the Dissertation Committee) as well as an electronic copy to the Graduate Program Specialist.

GRS M.A. Graduation Deadlines (with MCBB Program deadlines)

Master's with Scholarly Review Paper Deadlines

Deadline Dates for:	September 25, 2018	January 25, 2019	May 20, 2019
<input type="checkbox"/> Intent to Graduate Form completed online	May 31, 2018	September 28, 2018	January 25, 2019
<input type="checkbox"/> First draft of scholarly review paper to be submitted to readers	1st week of July	1st week of October	1st week of March
<input type="checkbox"/> Final copy sent to Graduate Program Specialist	1st week of September	1st week of January	1st week of May

Master's with a Research Thesis Deadlines

All degree requirements are complete only when the master's thesis has been certified as meeting the standards of the Graduate School of Arts and Sciences and of the Mugar Memorial Library

Deadline Dates for:	September 25, 2018	January 25, 2019	May 20, 2019
<input type="checkbox"/> Intent to Graduate Form completed online	May 31, 2018	September 28, 2018	January 25, 2019
<input type="checkbox"/> First draft of thesis to be submitted to readers	1st week of July	1st week of October	1st week of March
<input type="checkbox"/> Properly formatted draft of thesis submitted as a .pdf to grsrec@bu.edu	Last week of July	Last week of November	Last week of March
<input type="checkbox"/> Last date for submission of Thesis to ETD, Thesis Processing Fee, and signed Approval Page to GRS Office, and Contact Information form	August 17, 2018	December 14, 2018	April 12, 2019

Financial Assistance

Ph.D. Students

All MCBB Ph.D. students who are in good standing in the MCBB Program are eligible for financial aid. Students admitted to the program with financial aid are guaranteed continuing support for at least five years, provided that satisfactory progress toward the Ph.D. degree is made (progress is evaluated by the student's Dissertation Advisory Committee and is based on an Annual Report). This aid includes Teaching Fellowships provided by the participating departments, Fellowships provided by the Graduate School, Research Fellowship stipends provided by the participating MCBB faculty, Traineeships provided through Training grants, and Fellowships from outside agencies awarded to students on an individual basis. The MCBB Program Committee coordinates allocation of financial aid until a Ph.D. student is associated with a Ph.D. research advisor. Thereafter, the Ph.D. dissertation advisor and his/her associated department has primary responsibility for providing financial aid. If all other options within the participating department and laboratory have been exhausted, the MCBB Program Director can be consulted regarding other possible financial options, although these are highly limited.

Ph.D. graduate students who are admitted to the MCBB Program at Boston University are typically supported the first year by a combination of Teaching and Dean's Fellowships during the academic year and research grant support during the summer. The MCBB faculty consider teaching to be an important part of a student's training for the Ph.D. degree, and all Ph.D. students are required to have teaching experience before the degree is conferred (also see page 17). Generally, Ph.D. students who satisfactorily complete their course work, pass the qualifying examination, and become associated with a major advisor in MCBB, receive Research Assistantships from their second or third year onward. The details of each award are given below:

Teaching Fellowships (TF): These provide a stipend plus full tuition and fees for up to four full courses per semester plus a 2-credit teaching course. Teaching responsibilities usually require approximately 20 hours per week. Full or partial awards may be given.

Doctoral Research Fellowship (RF): These awards are given to students who assist individual faculty with specific areas of research and the stipend amount is funded by faculty research grants. There are a substantial number of graduate student research positions in the MCBB Program, which are funded through faculty research grants. These Research Fellowships provide the stipend and full tuition. The supervising faculty member determines the specific duties of the Research Fellow. Consult your faculty advisor.

M.A. Students

MCBB Master's students normally are not considered for financial aid (except for the Federal work-study program). If the Master's student is granted a Teaching Assistantship (distinct from a Teaching Fellowship), tuition must still be paid by the student.

Training Grants: Opportunities for support through this avenue exist. Consult your faculty advisor.

Work Study Aid: All eligible graduate students may apply for summer and academic year awards. Applications may be obtained from the Graduate School. Students receiving work-study aid are expected to provide service to the Department (teaching) or in the laboratory of their major professor (research). Masters candidates are eligible for these awards as well as Ph.D. students.

National Science Foundation (NSF) Graduate Fellowships: Graduate students in either their first- or second-year are encouraged to apply for these prestigious three-year fellowships. NSF Fellowship applications are due in November of each year. For applications and instructions go to: http://www.nsf.gov/funding/education.jsp?fund_type=2

Graduate Travel Grants: Travel Grants may sometimes be available to assist students in their travel to professional scientific meetings. Students presenting papers or posters on their research will receive first consideration. Further questions should be directed to the MCBB Director.

Other sources: Students see their faculty advisors for information on other potential sources of financial support. Please consult with the Director of MCBB prior to applying for other sources of financial aid so you can avoid pitfalls common with various sources and obtain in a timely fashion any required supporting documents from the Director for the application.

Sigma Xi

<http://www.sigmaxi.org/>

The Leopold Schepp Foundation

<http://www.scheppfoundation.org/>

Dr. Nancy Foster Scholarship

<http://fosterscholars.noaa.gov/>

American Association of University Women

http://www.aauw.org/fga/fellowships_grants/index.cfm

Explorer's Club

http://www.explorers.org/index.php/expeditions/funding/expedition_grants

Switzer Foundation Fellowship

<http://www.switzernetwork.org/>

NSF Graduate Research Fellowship

<https://www.fastlane.nsf.gov/grfp/>

Graduate Women in Science

<http://gwis.org/programs.html#travel>

NSF Doctoral Dissertation Improvement Grant

<http://nsf.gov/>

NIH NRSA Fellowships

<https://researchtraining.nih.gov/resources/>

EPA GRO / EPA STAR

<http://epa.gov/ncer/fellow/>

Josephine de Karma Fellowship Trust

<http://www.dekarman.org/>

Lewis and Clark Fund for Exploration and Field Research

<http://www.amphilsoc.org/grants>

National Defense Science and Engineering Graduate Fellowship

<http://www.asee.org/ndseg/>

ESAF Graduate Study Fellowship

<http://www.esaintl.com/esaf/graduatestudy.html>

BU Graduate Research Abroad Fellowship

<http://www.bu.edu/cas/admissions/graduate/aid/fellowships/graf/>

NOAA Graduate Fellowship

http://www.csc.noaa.gov/cms/fellows/grad_opportunities.html

SICB Fellowship

<http://www.sicb.org/awards.php3>

StraightForward Media Dale E. Fridell Scholarship

<http://www.straightforwardmedia.com/fridell/index.php>

AIBS Diversity Scholars Program

http://www.aibs.org/diversity/diversity_scholars_program.html

National Geographic Young Explorers Grant

<http://www.nationalgeographic.com/yeg/>

NSF East Asian and Pacific Summer Institute for US Graduates Fellowship

http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5284

The Boehringer Ingelheim Fonds PhD fellowships (max. age: 27 years)

<http://www.bifonds.de/fellowships-grants/phd-fellowships.html>

California Policy Fellowships

fellowships.ccst.us

The American Society for Biochemistry and Molecular Biology

<http://www.asbmb.org/advocacy/Advocacy.aspx?id=14744>

Fellowship Search Databases:

Michigan State University

<http://www.lib.msu.edu/harris23/grants/index.htm>

Cornell

<http://www.gradschool.cornell.edu/?p=132>

Community of Science

<http://fundingopps2.cos.com/>

Fastweb Grant Search

<http://www.fastweb.com/>

Science

<http://sciencecareers.sciencemag.org>

Stanford

http://www.stanford.edu/group/HMSGSO/funding_database_2005.htm

The National Academies

http://www7.nationalacademies.org/fellowships/Other_Sources_of_Funding.html

Policies and Procedures

Patents & Research Materials

All Ph.D. and M.A. students should be aware that Boston University serves as the guardian of research conducted at Boston University, including research supported by all government agencies and most private foundations. This has several implications.

- Patents that arise from research conducted at Boston University are the property of Boston University, as outlined in the Faculty Handbook.
- Students are required to leave all original data and notebooks at Boston University upon completion of their studies. Students may take photocopies of their original research data and notes.

Both Ph.D. and M.A. students performing research must fill out a patent policy form available from the Graduate Program Specialist.

MCBB Program Sexual Harassment Guidelines

The MCBB Program expects the learning and work environment to be free of sexual harassment, including unprofessional conduct in faculty-student relationships and sexism in the classroom. Sexual harassment is an abuse of authority. Such behavior is unacceptable, and serves as a barrier to the educational, scholarly, and research goals of the University. The MCBB faculty has adopted the following guidelines:

1. Professors, teaching fellows, or undergraduate assistants may not date a student in their class, laboratory section, or discussion section until the final grade has been given. A teaching fellow already dating a student in his/her sections cannot be responsible for the grade of the student.
2. Professors should avoid dating members of their laboratory (i.e., graduate students, technicians, or postdoctoral fellows). If such a relationship exists, the member of the lab should consider and/or be advised to change labs. If the person remains in the lab, the professor must excuse him or herself as an official member of all evaluating committees (e.g., qualifying and defense committees) for the student, and can only serve as an ad hoc non-voting member of the committees. Remember that although both parties may initially consent to this relationship, it is only the professor, by virtue of his/her special responsibility, who is held accountable for unprofessional behavior.
3. A professor dating a graduate student from another laboratory must excuse him or herself from all evaluating committees (e.g., qualifying and defense committees) for the student.
4. Faculty and students should be discouraged from touching a student, technician, or postdoctoral fellow except with the universally accepted handshake. Hugs, kisses, high-fives, or slaps on different regions of the body may be acceptable in American culture, but may be interpreted in unintended ways by students of other cultures.
5. When a faculty member is meeting alone with a student, the door should be kept open if possible.

6. Faculty should not invite a student to his or her home when the faculty member and the student would be alone. More than one member of the class should be included in all social occasions.
7. Inappropriate sexual comments in classrooms, laboratory sessions, or discussion sessions are not acceptable. Inappropriate messages may be subtle and even unintentional, but nevertheless these comments compromise the learning experience of the students.
8. When hanging material on doors or walls, everyone must be sensitive to other people's feelings. Remember, sexual harassment is a form of sex discrimination that is illegal under the Civil Rights Act.

Resources can be found online at www.bu.edu/safety/sexual-misconduct/

Childbirth and Adoption Accommodation for Full-Time Ph.D. Students

Please find official University policy here:

<http://www.bu.edu/academics/policies/childbirth-and-adoption-accommodation/>

The childbirth and adoption accommodation policy for full-time or certified full-time Ph.D. students in good academic standing provides for extensions for academic coursework and other requirements to the primary caregiver of an infant or adopted child. It also provides for a continuation of stipend support for funded students during the accommodation period.

A GRS full-time or certified full-time PhD student taking an accommodation due to the birth of a child should notify the relevant department Chair or Program Director in writing no later than 30 days prior to the start of the semester during which the birth is expected using the procedures described below. In the case of adoption, notification should be made once the student becomes reasonably certain of the expected dates of adoption.

Notification Procedures

Students are given two options for notifying the relevant offices.

1. By email:

Please include the following information in an email with the subject: "GRS Childbirth and Adoption Accommodation" to your department Chair or Program Director, copying your Director of Graduate Studies, the GRS Director of Admissions & Financial Aid at grsaid@bu.edu, and if a research assistant, the Principal Investigator of the research project on which you are working:

- Your name
- BU ID number
- Program
- Expected date of birth or adoption
- The start and end dates of the 60-day accommodation period if known, or approximate dates if not

The Chair or Program Director must acknowledge receipt of this email via a reply to all parties initially included.

If you are expecting to be a Teaching Fellow during the semester in which you take the accommodation, this must be discussed with your department/program and GRS Financial Aid; if you are expecting to be a Research Assistant, the details surrounding the accommodation must be determined at the department/program level.

2. By form:

Please complete a notification form from the GRS website, obtain the necessary signatures, and submit to the GRS office – 112 College of Arts & Sciences Building.

Emergencies & First Aid

Visit <http://www.bu.edu/ehs/comm/> for more detailed information regarding emergencies. In case of emergencies in building services for BRB, BSC, or SCI (heat, electricity, water, refrigeration, air-conditioning, etc.), call Tom Symancyk, Materials/Facilities Administrator, at 3-2467. For LSE, please contact the building supervisor, Dennis Batista, at 8-4282. For Biomedical Engineering labs please contact Phil Allen at 8-3814. For Chemistry labs, please contact Paul Ferrari at 8-2851. For Health Sciences labs, please contact Lisa Tornatore at 3-2705. The Building & Grounds off-hour emergency number is 3-2105. In case of emergencies posing threat to health or safety (chemical spills, etc.), contact the Director of Life Safety, at 3-9734. For immediate assistance or to report an accident, fire, or medical emergency dial 3-2121 (Campus Police). A police officer will be sent to evaluate the situation and to determine what action should be taken. Later you should contact the Graduate Program Specialist to file the required Accident Report Form.

BU Alert

BU Alert is an emergency notification system that will help ensure rapid and reliable mass communication to students, faculty, and staff. The BU Alert system is designed to communicate with cell phones (text and voice messages), landlines, e-mail systems, and pagers during a crisis or time-sensitive situation on the Boston University Charles River and Medical campuses. Students are required to provide an emergency number as part of their registration and can update their contact preferences on the Student Link. Questions concerning enrollment in the BU Alert program may be addressed to the Admissions Office (617-353-2300).

Building Hours and Security

Main doors to 2 & 5 Cummington and the Metcalf Science Center (590 Commonwealth Ave.) are unlocked from 7:00 a.m. to 6:00 p.m. (or 9 p.m. when classes are in session) Monday through Friday. The main doors of the Life Sciences and Engineering Building at 24 Cummington are open from 6:00 a.m. until 7:00 p.m. Off hours require BU ID access/clearance. The 2nd through 6th floors are locked 24 hours a day, seven days a week, BU ID access/clearance is needed for these floors.

For access to Biomedical Engineering at 64 Cummington Mall off-hours, please see the Biomedical Engineering Graduate Program Administrator at 3-7609.

Admittance to these buildings, when appropriate for their research and teaching, is possible 24 hours a day (including weekends) for MCBB graduate students. See the MCBB Graduate Program Specialist for information.

It is important to remember that Boston University is located in a large urban area. Thefts do occur. Please make certain that doors are kept locked and valuables are secured.

MCBB Administrative Support Policies

Computers

Many students choose to bring their own personal computers into their office or labs. A lock for a laptop is highly recommended. Boston University's Information Services & Technology (IS&T) designed and maintains a number of computer labs, both physical and virtual, including the University's primary PC lab in the BU Common @ Mugar and the Linux Virtual Lab. Links for computing resources on campus, as well as information on where to obtain support for your personal computer can be found at www.bu.edu/tech. The College of Arts & Sciences offers a file server (casfsb.bu.edu) to all faculty, staff, and students to back up and share their data. To establish a folder on this server, go to <http://www.bu.edu/casit/> click on "File Services" and follow the instructions.

Internet

There are limited Ethernet connections within the department for Internet access. Check with your advisor for more information about ethernet port availability in your office. Wireless on campus is available in most academic buildings, but signal strength can vary floor to floor and building to building. To join the BU wireless network, you will need to accept the certificate for the secured and encrypted 802.1x security protocol with your user login and kerberos password. For more information on how to join the wireless network, go to <http://www.bu.edu/tech/accounts/wireless/> or stop by one of the IT Help centers at Mugar Library.

Getting a BU Email Account

All new students will be given a BU Google Apps account and can log in to it at www.bu.edu/google or www.bu.edu/webmail. You can enable this account by following the instructions on www.bu.edu/tech/support/google/enable/. If you have an existing email account that you prefer to use, you can forward your BU email using the Settings menu within BU Google Mail. Please note that all departmental communication will be sent to your BU email address.

Getting on MCBB Email Aliases

Once you have an email account, you will automatically be added to the graduate student alias ("mccb-grad-list@bu.edu") for the MCBB Program. Please read all emails sent to this alias, as it has information pertaining specifically to your program and often action must be taken on the part of the student.

Memos and Announcements

Memos and announcements are routinely sent to graduate students via email. Also check the easel outside of BRB 101 for announcements.

Keys

First-year MCBB graduate students are given desks in a common office. Keys to this room are distributed by the Graduate Program Specialist. For second-year students and beyond, see your major professor for gaining access to the laboratory and related spaces. The keys for all departments participating in MCBB can be obtained from the respective departmental administrators. When you leave the University, you must turn in your keys.

Mail

MCBB graduate student mailboxes are located in the department in which their Major professor resides. Biology Department mailboxes are in the corridor outside BRB 101. They are set up alphabetically. Chemistry Department graduate students have individual mailboxes at the Chemistry Office (SCI 299). Physics Department mailboxes are in the Departmental Office (SCI 201). Biomedical Engineering Department mailboxes are in room 407, 44 Cummington St. Health Sciences Department graduate student mailboxes are in the Departmental Office, Room 433.

The federal and interdepartmental mail is picked up from the respective mailrooms once a day by the Boston University Mail Services in most departments. The BU Mail Service sorts this mail into interdepartmental and U.S. Mail, so please use manila envelopes for interdepartmental mail and clearly mark as such. There are usually interdepartmental ink stamps in the mailroom for this purpose. If you must use a white envelope for interdepartmental mail it should be clearly marked or it will be sorted into the U.S. Mail and charged back to the Departments. It will also take a long time for this mail to arrive at its destination as it will be sent outside the University and then returned to go once again through the BU Mail Service. The mail service is only for Department and University business, and is not for personal mail. All mail must have a return address.

Telephones

There is a telephone in the MCBB first-year graduate student office. After the first year, students have offices or desks within the faculty advisor's laboratory. You are expected to use that telephone unless your advisor has made other arrangements. You will need to check with your advisor as to his or her policy regarding use of laboratory phones. To make on-campus calls, first dial a 3 or 8 for offices, or a 2 for residences, followed by the last four digits of the phone number. To get an outside line for a local call you must dial '9' followed by the number you wish to reach. For toll-free 800-numbers, dial '9-1-800' and the number. For long-distance calls you must use a telephone code and must make arrangements with your advisor about using his or her telephone code to make these calls.

Photocopying

There are copying machines within the various Departments available for general use; after the first year you should use the copiers in the department in which your faculty advisor is affiliated. In 5 Cummington Mall, BRB 101C, there is a large Canon copier. This room can be accessed from the corridor at any time. The key that opens all common spaces also opens this room.

Please keep in mind:

- To avoid conflict with routine office staff, large copying jobs should not be carried out between 9 AM and 5 PM, Monday through Friday
- Faculty and staff have priority at the copying machines
- If you have questions about how to use the machines please see Front Desk Staff in BRB 101

There is an ImageRunner 3500 copier located in Room 601 of the Life Sciences and Engineering Building at 24 Cummington Mall. For copying through the Chemistry Department the copier facilities are available in the Chemistry office (SCI 299). Students receive a copier access code from their research advisor. For use of machines in Biomedical Engineering, please see the Academic Programs coordinator for Biomedical Engineering at 3-7609.

Reimbursements & Travel

Reimbursements

Supplies, and other expenses incurred that are course or grant related, can be reimbursed if the proper procedures are followed. Reimbursements can be either check or direct deposit depending upon the amount and the nature of the expense. The University SAP and Concur Travel System is used to create reimbursements. All students are asked to contact their supervisor before making any out of pocket expenses. University regulations must always be followed. If you make a purchase you **MUST** have the original receipt and/or proof of payment. Shipping lists, on line order confirmations are not valid for reimbursement.

Petty Cash

A cash reimbursement can be made under the following conditions:

1. Supplies are needed the same day.
2. Supplies are not normally available through the Biology stockroom.
3. An original receipt is given for each reimbursement.
4. The receipt is under \$10.00.

Travel and Airfare

A reimbursement form may also be used for scientific travel-related expenses. Please speak to your supervisor about any and all travel plans before you make any reservations. The university has strict policies regarding travel and procedures to purchase airline tickets.

Travel Advances

Travel advances are on a per request basis. University travel cards are to be requested via the Department Business Manager. These cards are usually for full time faculty and staff only. Students should ask their PI for more information regarding travel.

Clearing a Travel Advance and Travel Reports

Travel must always be cleared with the university as soon as the trip is complete. The use of a personal car can only be reimbursed for the mileage at the University mileage reimbursement rate. Receipts for gasoline purchase are accepted for car rentals or a University vehicle, but not for personal car use.

Student Life Resources

Graduate Student Groups

Biology Graduate Student Association (BGSA): An organization comprised of graduate students within the Department of Biology and MCBB programs dedicated to increasing the level of academic, scientific, and professional integration among the graduate students through academic and recreational activities. In addition to MCBB, these four program areas in Biology are: Cell and Molecular Biology (CM), Ecology, Behavior, and Evolution (EBE), Marine Biology (BUMP), Neurobiology (NEURO). bgsa@bu.edu

Graduate Women in Science and Engineering (GWISE): A community to support and promote women in science, technology, engineering, and math fields. Through professional development seminars and workshops, social events, mentoring, and outreach, GWISE fosters interaction across disciplines at Boston University and connects graduate students to postdocs, faculty, and broader networks in Boston and beyond. GWISE is open to men and women. Groups within GWISE consist of accountability groups for thesis/dissertation writing, book club, coffee groups, intramural sports, mothers' group, yoga and WISE guys, a program to increase the participation and engagement of men in GWISE. <http://www.bu.edu/gwise/>

Graduate Student Organization (GSO): The GSO is the official representative body of the graduate students in the Arts and Sciences at Boston University. The GSO also offers travel awards to graduate students within programs whose students participate by attending GSO meetings during the course of the year. <http://www.bu.edu/gso/>

The purpose of the GSO is:

- To provide a forum for the discussion of matters pertaining to the welfare of graduate students at BU.
- To advocate on issues of concern to our graduate student community.
- To serve as a liaison between the graduate student body and the BU administration.
- To recommend graduate students to serve on BU committees for which graduate representation is necessary.
- To assist with the process of integrating new students into graduate student life at BU.
- To sponsor social activities and other events that encourage the development of the graduate student community.
- To foster effective communication and cooperation among undergraduate students, graduate students, faculty, staff and other members of the community.

Office of the University Ombuds

19 Deerfield Street, Suite 203 | (617) 358-5960 | ombuds@bu.edu

The Boston University Office of the Ombuds is an independent, impartial, informal, and confidential resource available to all members of the Boston University community. Confidentiality, one of the fundamental principles of the office, is essential to Ombuds practice. The Office provides a safe place to have off-the-record conversations about any kind of problem related to life at BU. Talking to the Ombuds can be a good first step to resolving problems, especially if you are con-

cerned about confidentiality or don't know where to turn for assistance.

International Students and Scholars Office

www.bu.edu/isso/ | 888 Commonwealth Avenue | 617-353-3565 | isso@bu.edu

The International Students and Scholars Office (ISSO) is a resource for professional expertise on immigration and employment, and help ensure student, scholar, and institutional compliance with federal regulations. ISSO staff are available to guide students and scholars through the often complicated requirements for foreign nationals studying and working in the United States.

Office of Family Resources

www.bu.edu/family | 985 Commonwealth Avenue | 617-353-5954 | chippie@bu.edu

The Office of Family Resources is committed to helping families manage the challenges of work life and family life and provides many resources and services to support families of the Boston University community.

Resources and services available include:

- Referral service and resource materials for parents seeking childcare
- Information about how to find Boston University students interested in babysitting
- Educational programs co-sponsored with the Faculty/Staff Assistance Office
- School vacation programs for children in Kindergarten through fourth grade during the February and April school vacation weeks
- Recreational summer camp program for children entering Kindergarten through fourth grade during summer school vacation weeks
- Elder care resource materials

Fitness & Recreation Center | Physical Education, Recreation & Dance

915 Commonwealth Avenue | 617-353-2748 | fitrec@bu.edu

All full-time graduate students receive free membership to the FitRec. The Fitness & Recreation Center offers a variety of state-of-the-art facilities, including an 18,000-square-foot weight and cardio room, two swimming pools, racquetball and squash courts, two multi-use gymnasiums, an elevated jogging track, a 35' climbing wall, a Pro Shop, and the Healthy Blends Café. Physical Education, Recreation & Dance offers for-credit and non-credit classes in everything from fitness to climbing to martial arts. Intramural and club sports programs also exist in some of the MCBB-affiliated departments.

Educational Resource Center

100 Bay State Road, 6th Floor | 617-353-7077 | <http://blogs.bu.edu/erc/>

The Educational Resource Center provides academic support programs to the University community, including peer tutoring, the Writing Center, Language Link conversation groups, and various workshops. These services are available free of charge.

BU Parking and Transportation Services

1019 Commonwealth Avenue | 617-353-2160 | <http://www.bu.edu/parking/>

Boston University Parking & Transportation office provides students, staff, and faculty information on various ways to travel in and around Boston. This office provides information on: Parking per-

mits, parking lots and locations, parking regulations and towing, weather related emergencies, the BU Bus, rideshare, bike safety, zip car, and MBTA (the “T”) passes and transportation.

BU BUS

The Boston University Shuttle (the BUS), is an inter-campus shuttle service with 11 stops between the Charles River Campus and the BU Medical Campus. BU ID is needed to board. During the academic year, the BUS operates every 15 minutes (7AM – 10AM & 4PM – 7PM) Mondays – Thursdays, and every 20 minutes on Fridays. The BUS provides 30-minute off-peak service from 7AM until 11PM. During the summer, the BUS runs every 30 minutes between 7AM and 11PM. More information about the BUS service is available online. Evening & Weekend Shuttle provides service 7 days a week during the evening and early morning hours. The shuttle, which runs until 2:00AM Sunday-Wednesday and 4:00AM Thursday-Saturday, is intended to provide the Boston University community with convenient transportation exclusively throughout the Charles River Campus.

The Center for Gender, Sexuality and Activism

775 Commonwealth Avenue, Lower Level | 617-358-5575 | cgsa@bu.edu

The Center for Gender, Sexuality and Activism (CGSA) strives to be a safe space for people of all genders and sexualities. Using a social justice framework, the CGSA aims to end gender oppression and violence, and advocates for the full equality and inclusion of women, queer and trans students. This dynamic community fosters challenging and open discourse, promotes student activism, and provides resources and education for the Boston University Community.

Chaplains

735 Commonwealth Avenue | 617-353-3560 | chapel@bu.edu

A variety of chaplains are available to all students, regardless of religious affiliation. Appointments can be scheduled, or students can visit the chapel office on weekdays between 9 a.m. and 10 p.m.

The University Service Center (USC)

881 Commonwealth Avenue | 617-358-1818 | usc@bu.edu

The USC is an excellent starting point for anyone unsure of where to turn for help. The staff will point you in the right direction, or—if your concern is complex, multilayered, or involves multiple offices—help you figure out the best way to address the situation.

Disability Services

19 Deerfield Street, 2nd Floor | 617-353-3658 | access@bu.edu

Disability Services provides services and support to ensure that students with disabilities are able to access and participate in the opportunities available at Boston University. Disability Services also employs students as note-takers, readers, and in other positions assisting disabled students.

The Howard Thurman Center

775 Commonwealth Avenue, Lower Level | 617-353-4745 | thurman@bu.edu

The Howard Thurman Center is Boston University’s center for cultural learning and collaboration. Through a variety of workshops, programs, and celebrations, the Howard Thurman Center aims to

build community by eliminating barriers of divisiveness that separate individuals, groups, races, cultures, religions, and ethnicities.

Judicial Affairs

19 Deerfield Street, 3rd Floor | 617-358-0700 | dos@bu.edu

The Judicial Affairs office and student safety programs serve as the primary administrators of the Code of Student Responsibilities and also provide information and resources to the University community regarding personal safety on and off campus.

Boston University Police Department

32 Harry Agganis Way | 617-353-2121

Anonymous Tip Line: Text the BUPD at tip411 (847411) and type BU <space> your message

The Boston University Police Department is a full-time, professional law enforcement agency that also provides a wide variety of public services, including emergency medical response, Rape Aggression Defense classes, and laptop and bicycle registration. Through the community policing program, officers are assigned to various areas of campus to work closely with the community in addressing crime and crime prevention, as well as social issues, which directly affect the quality of life at Boston University.

Environmental Health & Safety

704 Commonwealth Avenue, 2nd Floor | 617-353-4094 | oehs@bu.edu

Environmental Health & Safety provides a full range of environmental, health, and safety services to the University community. These services include, but are not limited to, fire and life safety programs and support of the University's recycling program.

Dean of Students

775 Commonwealth Avenue, 3rd Floor | 617-353-4126 | dos@bu.edu

The mission of the Dean of Students office and the Division of Student Affairs is to enhance the quality, character, and perspectives of our students. Through its many orientation, mentoring, and counseling programs, the division promotes an environment that encourages intellectual exchange and individual expression. The dean of students has an open-door policy and is available to all students by appointment.