



PRINCETON
UNIVERSITY

GRADUATE STUDENT GUIDELINES

Program in Applied & Computational Mathematics
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Important PACM Contacts

Name	Title	Email	Telephone	Office
Amit Singer	Director	amits@math.princeton.edu	258-3682	201 Fine Hall
Maria Chudnovsky	Director of Graduate Studies	mchudnov@math.princeton.edu	258-2833	211 Fine Hall
Bernadeta Wysocka	Program Manager	bwysocka@princeton.edu	258-4262	202 Fine Hall
Katherine Lamos	Program Coordinator/Graduate Program Administrator	klamos@princeton.edu	258-3008	203 Fine Hall
Victoria Beltra	Faculty Assistant/Undergraduate Minor Administrator	vb2984@princeton.edu	258-3703	205A Fine Hall
Lisa Giblin	Grants Manager	lgiblin@princeton.edu	258-5128	217 Fine Hall
Ben Rose	IT Manager	compudoc@math.princeton.edu benrose@math.princeton.edu	258-2425	220 Fine Hall
Ali Zaidi	IT Support	compudoc@math.princeton.edu alizaidi@princeton.edu	258-4923	219 Fine Hall

Program Overview/Requirements

First Year of Graduate Study

After the arriving student has his/her feet on the ground, it will be the student's responsibility to choose three areas in which to be examined out of the six possibilities specified below. This decision should be made by the end of October. The Director of Graduate Studies, in consultation with the student, will then appoint a set of three advisors from among the faculty/associated faculty. The advisor in each topic will meet regularly with the student, monitor progress, and assign additional reading material. (They can be any member of the University faculty, but normally would be either program or associated faculty.) The six applied mathematics categories are:

- Asymptotic, analysis, numerical analysis, and signal processing
- Discrete mathematics, combinatorics, algorithms, computational geometry and graphics
- Mechanics and field theories (including computational physics / chemistry / biology)
- Optimization (including linear and nonlinear programming and control theory)
- Partial differential equations and ordinary differential equations (including dynamical systems)
- Stochastic modeling, probability, statistics, information theory

Other topics as special exceptions might be possible, provided they are approved in advance by the Director of Graduate Studies. Typically, students take regular or reading courses with their advisors in each of the three areas, completing the regular exams and course work for these courses.

At the end of the first year, students will take a **Preliminary Exam**, consisting of a joint interview by their three first-year advisors. Each student should discuss with their first-year advisors which of these courses are relevant for their areas. In order to assess whether they have sufficient preparation, or whether it would be good to take a particular course, it is a good idea to obtain some typical homework or a final exam from a previous year. If the student fails the preliminary examination or a part thereof the first time, they may take it a second time.

Second Year of Graduate Study and General Examination

Students who pass the preliminary exam after the first year will be readmitted for the second year of graduate study. Students who did not achieve a Ph.D. level pass on their first-year preliminary exam will be re-admitted for the Fall semester of the second year, and retake the necessary part(s) of the exam during this semester. Students who are admitted to the second year will continue working with at least one faculty member with the goal of achieving competence to begin Ph.D. research. This faculty member should be a potential Ph.D. advisor. Before being admitted to a third year of study, students must pass the **General Examination**. The generals culminate in a presentation (ex: PowerPoint or chalk talk) on a research topic, usually delivered toward the end of the second academic year. A student who completes all program requirements (coursework, preliminary exams, with no incompletes) but fails the general examination may take it a second time. If the student fails the general examination a second time, then Ph.D. candidacy is automatically terminated.

Suggested Examiners for Topics in the Six Basic Areas of Applied Mathematics

Asymptotics, analysis, numerical analysis, and signal processing

Ryan Adams
Marc Gilles
Luigi Martinelli
Liza Rebrova
Clarence Rowley
Guillermo Sapiro
Howard Stone
Amit Singer
Romain Teyssier

Discrete mathematics, combinatorics, algorithms, computational geometry and graphics

Noga Alon
Bernard Chazelle
Maria Chudnovsky
Pravesh Kothari
Paul Seymour

Mechanics and field theories (including computational physics / chemistry / biology)

Roberto Car
Emily Carter
Simon Levin
Howard Stone
Joseph Subotnik
Corina Tarnita

Optimization (including linear and nonlinear programming and control theory)

Amir Ali Ahmadi
Elad Hazan
Naomi Leonard

Partial differential equations and ordinary differential equations (including dynamical systems)

Emily Carter
Peter Constantin
Sergiu Klainerman
Clarence Rowley
Howard Stone

Stochastic modeling, probability, statistics, information theory

Michael Aizenman
Mark Braverman
Rene Carmona
Vincent Poor
Allan Sly
Ramon van Handel

Master of Arts

The [Master of Arts degree](#) is normally an incidental degree on the way to full Ph.D. candidacy, but may also be awarded to students who for various reasons leave the Ph.D. program. Students who have satisfactorily passed the required coursework, including the resolution of any incompletes and have passed the general exam, may be awarded an M.A. degree. Students must complete the required “Advanced Degree Application form” upon learning the Department’s determination of their candidacy in order to receive the M.A.

Doctoral Dissertation

The doctoral dissertation may consist of a mathematical contribution to some field of science or engineering, or the development or analysis of mathematical or computational methods useful for, inspired by, or relevant to science or engineering. Satisfactory completion of the requirements leads to the degree of Doctor of Philosophy in applied and computational mathematics.

Reenrollment

[Reenrollment](#) is the annual process (which takes place towards the end of the Spring semester) in which PACM and the Graduate School evaluate the academic progress of graduate degree candidates. Students are encouraged to participate actively in the annual readmission process by preparing their own written statement of academic progress during the current year and goals and objectives for the coming year. All students eligible for reenrollment, including those writing dissertations, must make formal application each year through their departments. Students who have satisfied all academic requirements within their departments and have demonstrated their readiness for continuing graduate work will be offered reenrollment no later than June; others will be notified about reenrollment when a basis for judgment is available.

Students who may be eligible to be enrolled but will not, because of leave, graduation or termination, also use the Graduate School Reenrollment System to provide progress reports and declare end-of-enrollment status to the Graduate School. If the student does not wish to reenroll, they should discuss the decision with their advisor and the Director of Graduate Studies.

When notified to reenroll, students should log on to the Princeton University [TigerHub](#) website, click through to the Graduate Reenrollment section, fill in the online form, and submit. This information will then be transmitted to the Advisor who will review the application, make any comments, and submit to the Department. The Department will review the application, enter department support recommendation and submit to the Graduate School. Students will receive their reenrollment contract from the Graduate School.

Final Public Oral Examination (FPO)

At the end of your tenure at PACM, you will need to pass the Final Public Oral examination (FPO) in order to graduate. The FPO is a final examination in the student's field of study as well as a defense of the dissertation.

The department holds the final public oral examination after the Graduate School reviews and accepts the readers' reports and is satisfied that all other requirements have been met. The department is required to post prominently the date, time and place of the examination for a minimum of three days (including Saturday) between the dean's authorization and the date of the examination, in order to assure the open, public character of the oral. **There are at least three principal examiners, all of them normally members of the PACM faculty at the rank of assistant professor or higher, at least two of whom have not been principal readers of the dissertation.** The department determines whether or not the candidate has passed the examination.

In case the examination is not sustained, the candidate may stand for it a second time after at least one year has passed. If unsuccessful a second time, the candidate is not permitted another opportunity to retake the examination, and Ph.D. candidacy is terminated. In cases where an appearance for the final public oral examination would constitute a substantial financial hardship for the candidate, the director of graduate studies may recommend to the dean of the Graduate School that the examination be waived.

Starting the Process

You must inform the program coordinator of your committee members and desired date and time of FPO as soon as possible (a minimum of one month in advance). The program coordinator will book a room for the FPO, send your readers/advisor the paperwork they need to complete, and go over the necessary documents you will need to submit in order to get approval from the Graduate School. Checklist for guidance and [Graduate School Website](#) for any updates.

When the dissertation has been formally presented, the department takes action on the positive recommendation of **at least two principal readers** to request that the dissertation advance to the final public oral examination. Qualified principal readers are those who are authorized to supervise doctoral dissertations in the University (such as, regular faculty at the rank of assistant professor or higher, and certain others in senior research ranks). External readers must be of comparable standing in another university or in the non-academic research community. Each principal reader submits a written and signed dissertation reader's report to the department. One copy of the dissertation must be available for interested readers in the department prior to the final public oral examination. During the FPO, there are at least three principal examiners, all of them normally members of the Princeton faculty at the rank of assistant professor or higher, at least two of whom have not been principal readers of the dissertation.

Business Travel Policy and Reimbursements

Students and researchers conducting research-related travel (presenting a talk/poster at conferences, collaborating with other universities, etc.) must comply with [University Travel Policy](#). Please note that before planning foreign travel, all travelers should review information for country-specific alerts and warnings posted by the U.S. State Department, see [International Travel Resources](#)

Pre-Travel Requirements. Before your trip, please ensure the following steps are completed:

Advisor Approval: Obtain approval from your advisor to attend a conference/workshop.

Funding Coordination: Contact the appropriate business manager to confirm that funds are available for your trip.

Chart-string Request: Send the completed **travel questionnaire** to PACM grant Manager Lisa Giblin to request a chart-string. Include your advisor's approval in the email. *If your advisor's home department is different than PACM, please coordinate your trip with the appropriate business manager as other departments may have different requirements.*

Travel Questionnaire:

1. Requestor's Name _____ and Title: (e.g., 2nd-year PACM Graduate Student)
2. Business Purpose: (e.g., "Travel to Boston to present at AMS Conference")
3. Advisor/Sponsor/Grant: _____
4. Conference Name: _____
5. Dates of Travel: _____
6. Conference Dates: _____
7. Attendance Dates: _____
8. Format: In-person or Online
9. Location: _____
10. Conference Website: _____
11. Tentative Budget: \$ ____ (Include airfare, hotel, meals, transportation, approved by your advisor)

Once you receive the chart-string from a grant manager you can proceed with booking your flight, registration, and other travel arrangements. Reservations should be booked through [Concur](#), or through the University's designated travel management company, [World Travel Inc.](#) The University's negotiated rates, and other benefits are only available by booking via one of these methods.

Reimbursement. In order to get reimbursed you must prepare and submit your expenses report in Concur. First, set up your [Concur Profile](#) and then prepare your [Expense Report](#). See a quick reference card how to prepare a [Concur Report](#) and use [other Concur training resources](#) if needed. Itemized **receipts** must be provided for all travel related expenses. **Meals need an itemized receipt** (not just a credit card receipt). If you attend a conference where meals are provided, please indicate that on the report.

Important: Add Katherine Lamos as your **Expense Delegate** in your Concur Profile Settings, who will review your report, and Bernadeta Wysocka as your **Expense Approver**.

Please note in order for expenses to be recorded in a timely basis you have **30 days** from the day you incurred the travel expense to request reimbursement. This includes all expenses incurred in advance of a trip, conference, or event (e.g. airfare, conference fees, registration, advance deposits, etc.). For expenses incurred while traveling (lodging, ground transportation, meals, etc.) the traveler will have **60 days** upon returning from travel to submit expenses.

Submitting expenses in a timely manner is in agreement with Princeton University's best practices. Please do not keep your expenses to submit at a later date. Payment of expenses months after traveling can be considered a "red flag" during audits by government sponsors. Please also review [Reimbursement Policy](#) for more details.

HOTELS/LODGING

Reservations: Reservations may be made online through Concur Travel or by contacting World Travel, Inc. When booking a hotel for a conference where there is a special conference rate, the reservation may be made directly with the hotel.

The itemized hotel bill must always be included on the expense report.

Travelers must cancel reservations in accordance with hotel/lodging policy to avoid no-show charges. No-show charges are not an allowable expense if the traveler fails to cancel prior to arrival without a valid business reason.

Hotel Class and Rooms: The class of hotel must be reasonable and appropriate for the business purpose and location. University travelers should stay in standard rooms only. Suites and other upgraded rooms are not allowable expenses.

Alternative Lodging

If deemed appropriate for a business purpose, alternative lodging such as Airbnb and VRBO are permitted and are an allowable expense with the following conditions:

- Maximum occupancy as stated on the listing cannot be exceeded.
- The booking must be exclusive – no cohabitation with owners or other non-Princeton University renters at the property
- Residential properties with a private pool are not permitted.
- Private residences cannot be used for alternative lodging unless booked through an established property management company.

AIR TRAVEL

Booking Airfare: Reservations should be made in advance, ideally 14 days or more, to ensure the most convenient and cost-effective fares.

Airline Requirements for Federally Funded Sponsored Research Projects

Under the Fly America Act (FAA), government regulations require the use of a U.S. air carrier when traveling outside the U.S. For more information about the Fly America Act and how to ensure compliance, see [Fly America Act](#).

Fares/Ticket Types: Non-refundable fares should be booked in the majority of cases. Change fees on non-refundable tickets are an allowable expense if the change is necessary for a business purpose. To be allowable on a sponsored research project, the change fee must be justified as having a direct benefit to the research.

Trip Insurance: Trip cancellation insurance is not an allowable expense.

Class of Service: Travelers must purchase the lowest available economy class airfare that meets the needs of the business trip. Travelers may upgrade the level of service at personal expense or by using their “frequent flyer” points, except as outlined below.

Travelers should be aware of the overall University Policy General Considerations:

- Travelers should neither gain nor lose personal funds as a result of business travel on behalf of Princeton University.
- Be sure to have necessary approvals and travel documents in order prior to your travel.
- Use University contracted travel suppliers, travel agency, credit card, and booking and expense management tools.
- Follow the terms of sponsored research agreements for travel under such agreements.

Unallowable Expenses on Federal Sponsored Projects: Federally funded contracts and grants carry a specific list of rules and prohibited costs that cannot be directly charged to a sponsored account. For complete list of allowable and unallowable expenses go [here](#). If you have any questions regarding policies and procedures related to sponsor research funding, allowable and unallowable expenses, please feel free to contact Lisa Giblin.

Hardware and software travel restrictions

Travelers should limit the amount of sensitive information that is stored on or accessible to any mobile device taken on the trip, and travelers should avoid contact with the Princeton network in general, specifically when traveling to high risk countries (see [U.S. State Department's Alerts and Warnings](#)). Traveling can pose significant risks to information stored on or accessible through computers, tablets and smartphones. Some of the risk is associated with increased opportunities for the loss or theft of the device and just merely the distraction of traveling. Additionally, our devices are put at risk because they will use networks that may be managed by entities that monitor and capture network traffic for competitive or malicious purposes. Review [Travel Guidelines](#) before preparing for your trip.

Enroll your trip: With the limited exception of faculty, postdocs, and staff traveling domestically, all members of the Princeton University community are required to enroll the details of University Travel in the [Enroll My Trip](#) system prior to departure.

The U.S. Department of State provides current information on health and safety for travelers. Before planning your trip check [the following website](#)