

University at Albany
Department of Atmospheric &
Environmental Sciences
Graduate Program Guide

2015/2016 Academic Year

26 August 2015



UNIVERSITY
AT ALBANY

State University of New York

I M. S. Program

Graduate Bulletin Requirements

1. A minimum of 30 credits in graduate courses (500 level or above) is required for the master's degree;
2. Atmospheric science (18 credits, minimum):
 - a. Six credits of atmospheric physics: Atm 504 and 505;
 - b. Six credits of atmospheric dynamics: Atm 500 and a course chosen from Atm 511 or 521 or 523 or 528 or 551 or 622 or 628 or 641;
 - c. Six credits of Atm 699 leading to an acceptable master's thesis.
3. Supporting courses (0-12 credits): Courses in other fields, as advised;
4. Satisfactory completion of a major field examination in atmospheric science.
5. Ancillary Duties: In addition to the completion of course requirements, satisfactory performance in some ancillary teaching, research, or practicum duties contributing to academic development is required, whether or not the student receives financial support from this institution. These duties will be assigned with educational objectives in mind.

Timeline

- **Semester #1**
 - Register for 9 credits (12 credits if on external fellowship). Students should take ATM 500, 504, and either a third class or 3 credits of research.
 - Talk to faculty about potential MS research topics if research advisor not yet decided.
- **Semester #2**
 - Register for 9 credits (12 credits if on external fellowship), including ATM 505; or other courses, independent study (ATM639), as advised, and/or research (ATM699) if thesis advisor has been selected.
 - Arrange for thesis advisor (and summer research stipend) and begin research if not begun during semester #1. [Submit application](#) for approval of subject for master's thesis.
- **Summer One**
 - Work on master's thesis research
- **Semester #3**
 - Register for 9 credits (12 credits if on external fellowship); courses, independent study (ATM639), and/or research (ATM699) as advised.
 - Continue master's research
- **Semester #4**
 - Register for sufficient number of credits to have at least 30 total graduate credits (including at least 6 credits of ATM699 and courses as required). Must register for 9 credit if TA or RA and 12 credits if on external fellowship.

- Complete research; write thesis; get thesis approved by thesis advisor and a second reader (mutually agreed to by you, your advisor and the second reader). The thesis should not exceed 150 pages in the [Graduate Studies format](#).
- [Apply for graduation](#). If in the PhD program and ending at the MS degree voluntarily, you will need to apply for a supplemental degree for which there is a \$20 fee. The form for this can be found on the graduation tab in MyUAlbany
- Present seminar on your research to the Department. (The seminar appears in your transcript as the master's field exam)
- **Summer Two** (if necessary)
 - Complete semester 4 requirements as needed
- **Semester #5 and beyond** (if necessary)
 - No need to register unless supported as a Research Assistant or in need of official student status.
 - Reapply for graduation; must apply for graduation in term that requirements are met even if applied in an earlier term.

The degree must be completed within six calendar years from the date of initial registration unless an extension is requested and granted by the University Graduate Academic Council.

II Ph.D. Program

Graduate Bulletin Requirements

The student follows a program of study and research approved by his/her doctoral advisory committee. Course requirements include a minimum of 45 hours of graduate credit in organized courses, seminars, and independent study in atmospheric, environmental and other sciences or mathematics. Students must complete the Atmospheric Science coursework requirements for the M.S. degree. These requirements must be satisfied by coursework while earning an M.S. degree, subject to the approval of the DAES graduate committee. This program includes, in addition, research leading to an acceptable dissertation.

Departmental Examinations

1. **Written Qualifying Examination:** The student must pass a written exam that covers the student's particular program area: synoptic-dynamic meteorology, physical meteorology and atmospheric physics, atmospheric chemistry, paleoclimatology and environmental systems.
2. **Oral Qualifying Examination:** The student must pass an oral examination that is administered by the student's doctoral committee. The exam is based on a written and oral prospectus prepared by the student that describes the basis and approach for the dissertation research.
3. **Dissertation Defense:** The student must satisfactorily complete an oral presentation and defense of the dissertation.

Ancillary Duties

In addition to the completion of course requirements, satisfactory performance in some ancillary teaching, research, or practicum duties contributing to academic development is required, whether or not the student receives financial support from this institution. These duties will be assigned with educational objectives in mind.

Dissertation

The student must submit a dissertation in his/her area of specialization, which represents a significant and original contribution in the field of atmospheric or environmental systems.

Full Time Study in Residence

Each student in a doctoral program must engage in full-time study beyond the master's degree or equivalent at the University in at least two sessions after admission to the advanced program. This requirement is designed to ensure for each doctoral student a sustained period of intensive intellectual growth. For this purpose a student will enroll in full-time study (12 credits) taken in each of two sessions, or in a regular session and a summer session, not necessarily consecutive, which must be completed satisfactorily.

Graduate assistants holding a full assistantship may meet the full-time residency requirement by completing one academic year in such a position, including the satisfactory completion of a minimum of 9 credits per semester plus satisfactory completion of assigned duties.

Admission to Candidacy

A student is admitted to candidacy for the degree of Doctor of Philosophy upon the following:

1. Satisfactory record in course and seminar study;
2. Completion of University residence requirements;
3. Satisfactory completion of the research tool requirement;
4. Satisfactory completion of the qualifying examinations.

Department Guidelines

General Information

Students who may consider the Master's Degree as an option for a intermediate or terminal degree or are required by their research advisor to obtain a master's should initially follow the Guidelines for the Master's Program in order to satisfy the requirements for that degree. (Note: Doctoral students should not take ATM699 Research

I unless they are certain they plan to obtain the MS degree since credits for ATM699 are recorded as "Incomplete" until a master's thesis is submitted and approved.)

Doctoral students should register for 9 credits every semester if they are supported as a teaching or research assistant, or 12 credits if they have an external fellowship or unsupported and must maintain full-time student status. Students on TA or RA intending to achieve PhD candidacy at the end of three years also need to take, with their research advisers consent, 12 credits per semester in their third year in order to have accumulated the 60 credits required for candidacy. Doctoral students achieving candidacy need register for only one credit of ATM899. Unless a leave of absence is requested and granted, all other students must register for at least three credits to satisfy the requirement of continuous registration.

A PhD student who seeks award of the MS "along the way" must obtain additional MS program activation via submittal of a request form and fee. This form is available via the graduation tab on MyUAlbany. If a student wishes to terminate with the MS degree, the student should, AFTER activation of the MS program has been completed, e-mail their intention to withdraw from the PhD program to the Department Graduate Committee Chair (who will forward that request to the Graduate Studies Office). A student who has converted to the MS program and is not an international student does not need to register if they have completed all MS requirements except for submittal of the thesis, but note that non-registered students do not have access to student services. International students are required to be registered in order to maintain student visa status.

Benchmarks for progress

0-36 Credits: Register for credits to satisfy master's degree requirements and/or courses to prepare for doctoral written exam as advised, along with independent study (ATM839) and doctoral research (ATM898).

36-54 credits: Doctoral written qualifying exam

Approximate time frame: near or shortly after completion of master's thesis *or* end of second year/beginning of third year if intending to skip master's degree *or* end of first year/beginning of second year of studies in program for students with master's and graduate credit from another institution.

45-63 credits: Doctoral oral qualifying exam (prospectus)

Approximate time frame: about six months after passing written exam. Upon passing oral exam, earning 60 graduate credits, and satisfying University Research Tool Requirement and full time study-in-residency requirement, the Department nominates the student for candidacy. Student must achieve candidacy at least one semester prior to graduation.

>60 credits: Doctoral candidacy. Register for 1 credit of ATM899 each semester; complete research; write dissertation, apply for graduation, present thesis seminar and oral defense.

The degree must be completed within eight calendar years from the date of initial registration in the program unless an extension is requested and granted by the University Graduate Academic Council.

Doctoral Written Qualifying Exam

The purpose of the Doctoral Written Exam is to evaluate the student's critical analysis skills and their ability to apply the scientific method to answer important questions in the field. The written examination focuses on the student's broad area of specialty, such as physical meteorology, synoptic-dynamic meteorology, tropical meteorology, atmospheric chemistry, climate dynamics, or paleoclimatology. Each examination is specialty constructed so as to accommodate the background and focus of individual students. Relevant questions can involve analyzing figures, equations or results, designing an experiment to answer a scientific question, or critical evaluation of papers in the scientific literature. Students who enter with an M.S. degree must take the written exam by the end of the third semester of enrollment, while students who entered without an M.S. degree must take it by the end of the Spring semester of their third year. Students are allowed two attempts to pass the written qualifying examination. A third attempt may be allowed in very unusual circumstances and then only after approval by the Graduate Program Committee upon formal petition by the student.

The dates of the written examination is determined by the student and the committee, though it must occur either two weeks prior to the end of the fall semester until the beginning of the spring semester, or two weeks prior to the end of the spring semester until two weeks after the end of the spring semester exam period. The Graduate Program committee may approve exceptions to the above exam dates. The student's thesis advisor should send a note to the Graduate Program Committee Chair stating a student's intention to take the exam. This will assist in coordinating the exam with other students, particularly if multiple students have the same examining committee members. The examining committee should consist of at least four faculty members, include the student's research adviser(s), and at least one member whose primary affiliation is with the Department of Atmospheric and Environmental Sciences. Exceptions to the committee membership requirements can be made with the approval of the Graduate Program Committee. A student's examining committee may consist of the same people as the student's PhD thesis committee; however, this is not a requirement. The examining committee creates questions that are designed to test the student's ability to understand, synthesize and critically evaluate material in their subfield, including topics covered in advanced graduate courses as well as in the refereed literature. An examiner may give the same question to multiple students taking the exam at the same time. Students are strongly encouraged to meet with each committee member to discuss possible question topics or literature to review. The committee should meet prior to administering the exam to evaluate the breadth, depth and appropriateness of the questions and has the final responsibility for exam preparation and administration. Following the exam, the committee shall meet to determine the outcome of the exam. The student's advisor is responsible for sending a memo with the outcome of the student's exam, the names of the committee members, and scores to the Graduate

Program Committee Chair. A copy of exam questions and the student's graded answers shall be placed in the student's file in the Department Office.

Typical Structure of Doctoral Written Qualifying Examination

1. Two questions are obtained from each member of the exam committee.
2. Traditionally, the written exam is comprised of eight total questions, with four questions given to the student on each of the two days of the exam. The student is given the option to answer three of the four questions each day. To ensure that the student answers at least one question from each committee member, the first day should consist of both questions from two committee members, while the second day should consist of both questions from the other two members.
3. The student should be given four hours per day to answer the questions. As a consequence, the questions should be designed so that a student can answer in less than four hours. The committee may grant extra time if necessary.
4. Exam questions are graded on a scale of 0 to 10 with an average score of 7 or more considered to be passing. The examining committee votes on passing. The student passes the exam if the average score on the exam is 7 or greater. For an average score in the gray area (around 6.5 to 7), the examining committee decides whether to fail, pass, or conditionally pass (for instance, require course work to make up a deficiency). The definitions of scores are:

- 10 Question is answered completely and thoroughly
- 8.5 Answer contains appropriate analysis and information, with minor issues in either fact or logic
- 7.0 Answer is characterized by some flaws in either logic or analysis, but meets minimum standards of PhD quality work
- 5.0 Answer contains either a major logical flaw, error in the analysis of the results or lacks sufficient depth as would be expected for a PhD student
- 3.0 Answer contains multiple major logical flaws, errors in analysis and lacks sufficient depth

Doctoral Oral Qualifying Exam and Prospectus

Upon successful completion of the written examination, the student, with the advice of his or her thesis advisor, has the responsibility to organize a Ph.D. thesis advisory committee. The student must submit the composition of the committee to the Graduate Committee Chair and must be approved by the Graduate Committee. The committee must consist of at least four faculty members, one of which must have his/her primary affiliation in the Department of Atmospheric and Environmental Sciences. The student's thesis advisor will serve as chair (co-advisors serve as co-chairs) of the committee. This committee will have the responsibility for guiding the student in all aspects of his or her

dissertation research. The student is strongly encouraged and expected to confer with all committee members, individually or as a group, on a regular basis. At the discretion of the committee, the student may be required periodically to provide a written and/or oral progress report.

The student must submit a formal written thesis prospectus to his or her Ph.D. thesis advisory committee. The prospectus will serve as the basis for the oral qualifying examination and must consist of: (1) a clear statement of the research objectives and their scientific importance, (2) a critical review of the background scientific literature, and (3) a carefully described proposed research plan including the method of attack to solve the problem. The prospectus is not intended to be a preliminary dissertation of the student's research. Description of the student's research should be included only in so far as it provides background for the proposed research plan. The prospectus should not need to exceed 25 pages of text (figures and references are not included in the limit).

The Ph.D. thesis advisory committee must have at least one week to read the formal thesis prospectus before the scheduled oral examination. The oral examination consists of an open departmental seminar with questions allowed from the audience followed by a closed session with the committee for additional questioning. The public presentation should not exceed 45 minutes. During the student's presentation, questions from the audience should be limited to clarifications only. Following the end of the presentation, the members of the audience who are not on the Ph.D. committee are free to ask questions related to the presentation. Once all of the general audience questions are answered, the general audience will be excused and the student will answer questions from the Ph.D. committee related to the topic and prospectus.

A student who conditionally passes the oral qualifying exam may be asked to correct demonstrated deficiencies through additional course work and/or by submitting a revised prospectus for approval by his or her thesis committee. A student who does not pass the oral examination after two tries may be allowed a third attempt in very unusual circumstances and then only after approval by the Graduate Committee upon formal petition by the student.

Doctoral Candidacy and Thesis Defense

The Department upon the student's completion of the residency and research skill (foreign language/computer programming) requirements, and the written and oral Ph.D. exams nominates the student for Ph.D. candidacy. Candidacy should be attained at least one semester prior to the semester in which application for graduation is made.

Students should proceed with their doctoral dissertation research in close collaboration with their advisor(s). The other committee members will be available to the student for consultation. The research program may be carried out away from the University at Albany with the approval and supervision of the student's Ph.D. thesis advisory committee. Such students must also satisfy the University residency requirements.

The dissertation should demonstrate the candidate's mastery of a research problem and his or her ability to arrive at results and conclusions that contribute significantly to knowledge of the subject area. In general, it is expected that the dissertation will be of the quality comparable to that found in articles in high-quality, well-regarded, refereed scientific journals. When the student and advisor agree that the doctoral dissertation is in final form, copies should be submitted to the rest of the student's committee and a date for the formal Ph.D. thesis defense scheduled. Committee members must be allowed at least two weeks to read the dissertation. The student will defend his or her dissertation before the full committee and any other interested faculty members, students, and colleagues. The thesis committee, including the student's advisor, must formally vote to approve the dissertation. If two or more members of the committee do not approve, the dissertation must be revised and resubmitted for approval at a later date. The Departmental Chair or his or her designee must also approve the dissertation. Approved dissertations are presented to the Office of Graduate Studies in partial fulfillment of the requirements of the degree of Doctor of Philosophy in Atmospheric Science.

Research Tool Requirement

A doctoral student can satisfy the requirement in any one of the following ways:

- By earning a grade of B or better in a graduate foreign language course.
- By passing the University's Foreign Language Translation Exam. Students will be given approximately two pages of text in the foreign language of their choice to translate into English. Currently, the exam is offered in French, Italian, Portuguese, Russian or Spanish.
- By earning a grade of B or better in CSI 501
- By obtaining formal certification of competency in a scientific computer language (Fortran or C) from a designee of the Atmospheric Science Department. Dr. David Knight is the designated Computer Competency Certifier for the Department. The student may propose or be assigned a task that demonstrates competency. A project, which may be part of thesis research, must be proposed to the Certifier for approval as sufficient to demonstrate competency. After approval of the project, the student must demonstrate to the Certifier that the programming is satisfactorily understood and performed. If the student prefers, the Certifier can assign a task with certification achieved upon satisfactory performance of the task.
- By demonstrating competence in a laboratory or field-based research technique or skill certified by the student's doctoral committee or a person designated by that committee for this purpose.

Requests may also be made to the Graduate Committee for approval to satisfy this requirement in any manner consistent with the [General Regulations Governing Research Tool Requirements](#) as described in the Graduate Bulletin.

Ph.D. Timeline

Entering Department without M.S.:

Years 1-2: Follow M.S. Timeline above

Year 3: Form committee, take Ph.D. written exam

Year 4: Complete prospectus. Must have 60 credits completed before then

Entering Department with an M.S.:

Year 1: Take courses as discussed with advisor

Year 2: Must take Ph.D. written exam by end of Fall Semester

Year 3: Complete prospectus.

III Department Policies

Teaching Assistant Policies

University rules dictate that a student may serve as a teaching assistant for up to four years if entering the university without a M.S. degree; otherwise, the limit is three years. A student who enters the university with teaching assistant support will automatically receive TA support for a second academic year, so long as the student remains in good academic standing. In order to receive TA support beyond two years, the student and academic advisor must petition the graduate committee in writing prior to 15 January. The graduate committee's decision to grant an additional year of TA support will be based on the student's progress toward degree in relation to the program timeline and the availability of other funding. Current students who wish to be shifted onto TA support during the next academic year are subject to the same requirements as a student requesting TA support beyond two years.

Prior to the beginning of each semester, the graduate committee shall assign teaching assistants to specific courses. Priority will be given to courses based on enrollment, course workload, and special needs of the instructor. Faculty requests for particular teaching assistants will be taken under advisement. Proctoring assignments will be made after the second week of the semester.

Teaching assistants are assigned to individual courses based on the following priority guidelines:

100-200 level courses: Up to one TA per 100 students.

300-400 level courses:

- Courses that include a scheduled lab session
- Medical limitations of the instructor
- Courses with significant one-on-one instruction time
- Course Enrollment

Residency

U.S. citizens and permanent residents should promptly [establish New York State residency](#). After the first year of study, any tuition scholarship will cover only the in-state New York resident rate. You will need to decide if it is in your best interest to establish New York residency or pay the extra for the out-of-state rate. Attend orientations (typically in the week before classes begin).

Stipends

There are three different stipend levels depending on progress toward degree. The lowest level is for students who enter the university without an M.S. degree and have not passed the Ph.D. written exam, the second level is for student who enter the university with an M.S., or have passed the written exam, while the highest level is for students who have passed the Ph.D. prospectus exam.

Thesis Due Dates

In order to graduate in a particular academic term, the written thesis must be turned in to the Office of Graduate Studies by the following dates. There are no exceptions.

- Fall – 1 December
- Spring – 1 May
- Summer – 1 August

Obtaining an MS Degree

A student who is admitted into the PhD program may obtain an MS degree “along the way” by taking the following steps:

- Log into MyUAlbany and click on the “Graduate Education” tab
- Under “Application and Graduate Information” click on “Supplimentary Degree Application”
- Fill out the request form and pay the fee. The program name is Atmospheric Science
- You should receive two emails confirming your purchase and a second that says you can now apply for an MS degree. Once you receive the second email, you may log back into MyUAlbany and apply for MS degree graduation

Research Credit Descriptions

- ATM 639 (1-3 credits): research credits that can be taken by Master's students. This course can be repeated multiple semesters, but cannot be taken for more than 3 credits per semester.
- ATM 699 (2-6 credits): Master's thesis research credits. Any student who wishes to complete a Master's thesis must complete at least 6 credits of this course. Should only be used if a student is going to submit a thesis to the Office of Graduate Studies. There is no limit on the total number of credits of this course.
- ATM 839 (1-3 credits): PhD version of ATM 639.
- ATM 898 (1-9 credits): PhD research. This course can be taken by a student in the PhD program at any time and can be repeated multiple semesters.
- ATM 899 (1 credit): 1 credit class for students who have obtained candidate status (Prospectus approved, 60+ credits earned).

Transfer Credit Requests

Up to six graduate credits from another institution may be applied to the 30 credits required for the master's degree. [Request for Transfer of Credit to a Master's Degree or Graduate Certificate Program](#)

Graduate Student Activity Reports

All students are required to submit a yearly graduate student activity report prior to the end of spring semester final exams. This report should include a list of publications, presentations (both oral and poster), and a short description (less than one page) of progress toward degree during the previous academic year. These reports should be submitted to the DAES main office and to the chair of the graduate committee. Students who fail to submit these reports are subject to sanctions by the committee.

Evaluation of Student Progress

At the end of each academic year, the graduate committee will meet to evaluate each student's progress toward degree. Students who have not completed the appropriate milestones will be required to provide a written summary of why he/she did not meet the program benchmark(s). If the graduate committee deems the explanation is not satisfactory, the committee has the ability to sanction the student, or set a deadline to meet the milestone(s).

Office Space

Students who are on campus on a daily basis will be provided office space. The location of the office space is determined by the primary affiliation of the student's advisor (i.e., students advised by DAES faculty will have an office in DAES; students advised by ASRC faculty will have an office in ASRC). All first year students and teaching assistants are given office space in DAES, regardless of affiliation. Requests to move office space must be submitted to the DAES administrative manager or ASRC staff prior

to the beginning of the Fall semester. Requests will be honored based on seniority on an as-available basis. Students who are already in an office may move desks prior to new students moving in, also based on seniority within the office.

Appeals

A student may request a waiver from any of the DAES program policies by petitioning the graduate committee in writing. An exemption will be granted if a majority of committee members are in agreement. If the graduate committee does not grant the request, the student may appeal to the DAES voting faculty, with 2/3 required for the exemption to be granted.

Conflict Resolution Guidelines

Issues between students and advisor(s) or between students should be brought to the attention of the Graduate Program Coordinator, who is responsible for making a good faith effort to develop a resolution. If the issue persists or the resolution is not deemed satisfactory, all parties may speak with the Department Chair and then the CAS Dean's office.

Important Notes

- Students should establish residency as soon as possible. See the Residency section of this guide
- If the student and advisor choose to proceed through the Ph.D. program without writing a M.S. thesis, he/she SHOULD NOT register for ATM 699
- After the student earns 60 credits and passes the PhD prospectus, he/she can register for one credit afterward. This can provide a significant cost savings to research grants. Taking 12 credits each semester can speed up the process of getting to 60 credits.

Planned Course Offerings (subject to change):

Fall 2015:

- ATM 500 Atmospheric Dynamics I
- ATM 504 Introduction to Atmospheric Physics I
- ATM 515 Aerosol Physics
- ATM 525 Troposphere-Stratosphere Exchange
- ATM 550 Paleoclimatology
- ATM 562 Numerical Weather Prediction
- ATM 641 Mesoscale Dynamics

Spring 2016:

- ATM 501 Synoptic Laboratory II

- ATM 505 Introduction to Atmospheric Physics II
- ATM 511 Synoptic Dynamic Meteorology II
- ATM 522 Climate Variability and Predictability
- ATM 551 Climate Dynamics and Modeling
- ATM 561 Applied Data Analysis
- ATM 619 Seminar in Atmospheric Science (Cyclone Workshop Seminar)
- ATM 741 Special Problems in Tropical Cyclone Research

Fall 2016 (TENTATIVE):

- ATM 500 Atmospheric Dynamics I
- ATM 504 Introduction to Atmospheric Physics I
- ATM 509 Atmospheric Precipitation Processes
- ATM 552 Climate Change
- ATM 622 Global Circulation

Spring 2017 (TENTATIVE):

- ATM 501 Synoptic Laboratory II
- ATM 505 Introduction to Atmospheric Physics II
- ATM 511 Synoptic Dynamic Meteorology II
- ATM 520 Remote Sensing in the Atmospheric Sciences
- ATM 523 Large-scale Dynamics of the Tropics
- ATM 551 Climate Dynamics and Modeling
- ATM 623 Climate Modeling

Useful Links

DAES Graduate Program: <http://www.albany.edu/atmos/atmospheric-environmental-sciences-graduate-programs.php>

Course Descriptions: http://www.albany.edu/graduatebulletin/a_atm.htm

DAES Wiki Page: <https://wiki.albany.edu/pages/viewpage.action?title=Home&spaceKey=deas>

Masters Thesis Subject Approval Form:

<http://www.albany.edu/MasterThesisSubjectApproval.doc>

Masters Thesis Guidelines:

http://www.albany.edu/graduate/assets/Thesis_DIGITAL_Submission_Instructions.pdf

Ph.D. Thesis Guidelines:

http://www.albany.edu/graduate/assets/Dissertation_DIGITAL_Submission_Instructions.pdf

Request for Graduation: http://www.albany.edu/gradstudies/graduation_application.php

Residency Rules: <http://www.albany.edu/studentaccounts/residency.php>

Request for Transfer Credit: <http://>

www.albany.edu/.../REQUEST_FOR_TRANSFER_OF_CREDITS_TO_A_GRADUATE_PROGRAM.pdf

Research Tool Requirements:

http://www.albany.edu/graduatebulletin/requirements_doctoral_degree.htm#doctoral_tool

Graduate Committee

Ryan Torn, Chair
Kristen Corbosiero
Paul Roundy
Scott Miller
Brian Rose
Liming Zhou