Overview of the Pre-Major in Astronomy Program

Mission Statement

The primary goal of Pre-MAP is to increase the recruitment and retention of students traditionally underrepresented in science, math, and technical majors. Pre-MAP aims to engage students in discipline-specific research; to provide advising, mentoring, and academic support; to build a sense of community; and to enhance diversity awareness of the graduate students, faculty, and staff of the UW astronomy department.

The Pre-Major in Astronomy Program (Pre-MAP) is a research and mentoring program for first year students offered by the University of Washington Astronomy Department. Eligible students enroll in the Pre-MAP seminar to learn astronomical research techniques that they apply to research projects conducted in small groups. Students also receive one-on-one mentoring and peer support for the duration of the academic year and beyond. They are incorporated early into the department by attending Astronomy Department events and Pre-MAP field trips. Successful Pre-MAP students have declared astronomy and physics majors, expanded their research projects beyond the fall quarter, presented posters at the UW Undergraduate Research Symposium, and received research fellowships and summer internships.

Benefits of Pre-MAP

The fraction of science Ph.D.s awarded to women, African American, Latino, and other minority students is far smaller than the fraction these groups constitute of the general population. The greatest obstacles for persistence in science reported by students are loss of interest, intimidation, poor advising, and lack of acceptance in their department. Pre-MAP began to address each of those obstacles but the program's positive effect on our department is much wider than we had expected.

Every staff member gains invaluable professional skills mentoring and working individually with students, writing grant proposals for funding, working with the university administration, and building connections with other STEM recruiting programs. The benefits and positive experiences graduate students who teach the Research Seminar or take on students for research projects are vast and immeasurable.

Faculty and post-docs become intimately involved in the mentoring process of graduate and undergraduate students. Additionally, Pre-MAP has been written into several departmental grants as part of "broader impact" goals.

With incoming Pre-MAP students starting research immediately, other undergraduates seek out research opportunities in their first few years. With so many faculty involved in Pre-MAP, small research projects are easily thought up or exist for future Pre-MAP students. Just as the rising tide raises all ships, Pre-MAP has raised the level of undergraduate research department wide, making our undergraduates a dominating presence at the UW's Undergraduate Research Symposium. Thanks to Pre-MAP, we now have equal numbers of female and male undergraduates.

Pre-MAP only addresses the leaky educational pipeline of under-represented students, how several drop-out in some stage of education even though they maintain the intellectual curiosity to continue, once they arrive at UW.

We believe that if everyone who works within the educational pipeline attempted to fix their little region, students will flow through it. The new prospectives and brilliant thinkers they will bring into science will positively affect every level of our society. And in our experience, it begins with our little region of the pipeline.

How to Make a Pre-MAP

Pre-MAP begins with a research seminar offered during the autumn quarter. After the seminar, students are encouraged to continue their seminar research projects for academic credit or funding. Throughout the first year and beyond students receive research and academic mentoring as well as participate in community building events. One of the goals of Pre-MAP is upon graduation, students that remained in Astronomy should have a reasonably good GPA and have acquired skills to find a job or be accepted into graduate school. Post-graduation, successful Pre-MAP students would enter a STEM career or further STEM studies. The first step to bring Pre-MAP to your institution would be to gather interested staff members and work out a table like the one you see below.

Pre-MAP programmatic goals

Timeline / Goals	Each Quarter	2nd -3rd Year	Graduation
Research and Skills	Continue project Improve research skills	Increase research marketability Improve research skills	Presentations and Publications Improve research skills
Science Degree and Career	Design class schedule to prepare for science degree	Assess prior academic success Formulate college and career goal	Maintain academic success Graduate with science degree Become an active member of field
Undergrad Experience	Increase in self-confidence through use of mentors and advisers	Change in perception of University community membership	Positive experience at UW

Scope of this Document

This document is aimed to explain our program to those who wish to start a similar program in their department. We'd be happy to answer any of your questions and provide all of our documents and templates to ease the overhead start-up time. Please see our website (http://www.astro.washington.edu/groups/premap/) and email us (premap@astro.washington.edu).

The first three sections explain how our program meets our goals and mission statement.

1. Discipline-Specific Research: Our Research Seminar

The basics of the Research Seminar and logistics of its organization, room demands, and set up.

For more information please see our Research Seminar Materials online, especially the Curriculum Guide for Pre-MAP

2. Community Building

We provide several levels of involvement from informal pizza parties, to weekend field trips.

We also have a repository of fliers, posters, and other advertisements available by request to incite students in attending extra-curricular events

3. Advising, Mentoring, and Academic Support

The increased demands of Pre-MAP, advising and academic support should only be attempted with a staff of around 10 people. This would be a good thing to add after the autumn Research seminar.

The last sections are logistical information for future Pre-MAPs

4. Attracting Students and Research Mentors

If you build it will they come? We've tried many ideas over the last five years, here are the ones that work.

Please see our Web Templates for easy implementation of recruitment emails and information gathering web forms

5. Funding Pre-MAP

How much is necessary to do what we do, what can you cut out for a first time run, and where we've found the cash.

6. Evaluation

This is a bit of a catch-22 in new programs. To do one takes funding, to fund it requires evaluation of its effectiveness, to have an outside evaluation one needs funding. Here are way's we've evaluated on the cheap.

Pre-MAP Research Seminar

Please see *Curriculum for Pre-MAP* for research seminar lesson plans

The Pre-MAP research seminar is an established class that is listed as part of the Astronomy Department curriculum. The seminar, Astronomy 192, fits into the 100-level curriculum designated for "pre-major" students and counts for natural world credits (a part of the College of Arts and Sciences General Education requirements).

Astronomy 192 is a three credit, 10-week for up to 14 students. It meets twice a week for 80 minutes each session offering instruction in basic computing skills, data manipulation, science writing, and statistical analysis. The seminar instructor teaches the first half of the quarter, meets with students individually and academically mentors them formally during autumn quarter. In the second half of the quarter, students choose from research projects presented by astronomy faculty, post-doctoral fellows, and graduate students. At the end of the quarter Pre-MAP students present their progress to the department. We try to treat the final presentations as we do colloquia, in a different room from the seminar and with snacks before. Students are encouraged to continue their research during winter and spring quarters for academic credit after the Pre-MAP seminar ends.

At UW, freshmen are encouraged to join a Freshman Interest Group (FIG) which is a pre-packaged quarter of classes based upon areas of interest (e.g. Pre-Med FIG students will take math, chemistry and English). Pre-MAP is very similar to a FIG in that in addition to the Pre-MAP seminar students are recommended to take Astronomy 102, an introductory Astronomy course assuming students have taken high school calculus. Pre-MAP students are also encouraged to take whichever math course they have placed into. Due to the diversity of math backgrounds Pre-MAP is not considered a FIG since students are enrolled in different math courses. However, having a FIG-like setup, with Astronomy 102 and the Pre-MAP seminar,

can make scheduling easier for some students and helps to create a community within courses.

Since UW is on the quarter system, students are expected to take 12-15 credits. Pre-MAP staff recommend students to take two 5-credit courses in addition to Pre-MAP to put the students at 13 credits. The benefit of having only 13 credits is that it allows Pre-MAP students to focus on their first quarter classes with minimal non-science related academic distractions. This minimizes the potential for students to feel academically overwhelmed. However, the University expects students to take an average of 15 credits per quarter so that at the end of the year they have 45 credits to be a sophomore. Pre-MAP students must make up these other two credits if they need to be sophomore standing by the end of spring.

The seminar's 80 minute sessions are ideal for the course since it allows for longer lesson plans. Additionally, if students take Astronomy 102 they have Friday mornings class-free. This allows the Pre-MAP instructor to hold office hours and informal study sessions knowing students have the possibility of attending.

Community Building

Community building might not seem as important as academic mentoring or research. We disagree. Community building events are informal mixers when students learn to rely on each other and seek out which graduate students or faculty they will be able to talk to for mentorship. Community building paves the way for open communication and positive mentorship. We have incorporated three levels of field trip and cohort building activities to adjust to planning demands, and scheduling conflicts, and funding.

Overnight Field Trips

A weekend trip need lots of lead time to plan, we usually assign a Pre-MAP staff member only this task. Try to find something astronomy or physics related that minimizes travel expenses. Plan astronomy related and non astronomy related activities. Overnight field trips are excellent because eating and traveling with a group are a huge part of the bonding experience.

We wouldn't do these trips unless they were fully funded (free for Pre-MAP students) and intended for all of Pre-MAP, regardless if they've continued with the major. Students who have shown up despite not continuing with the major are reminded of the support and commitment the astronomy department has shown to them as people, not just as students.

Pre-MAP has developed a four year cycle on overnight trips, so that in a four year undergraduate career, a Pre-MAP student gets to participate in each one. In our experience, the students that make it to the weekend field trip tend to make it the other community building events.

The Four-Year Field Trip Cycle

1. Victoria Clipper/Dominion Astrophysical Observatory
2. Laser Interferometer Gravitational Wave Observatory
3. Manastash Ridge Observatory
4. University of British Columbia, TRIUMF (Canadian Subatomic Physics Lab) and Large Zenith Telescope

Local Events

We would expect Pre-MAP students and staff to make their own travel arrangements for this type of trip. This is a good once or twice a year trip, or even a summer trip for the students still in town. These trips show that astronomy is not confined to campus or select distant spots.

Examples:

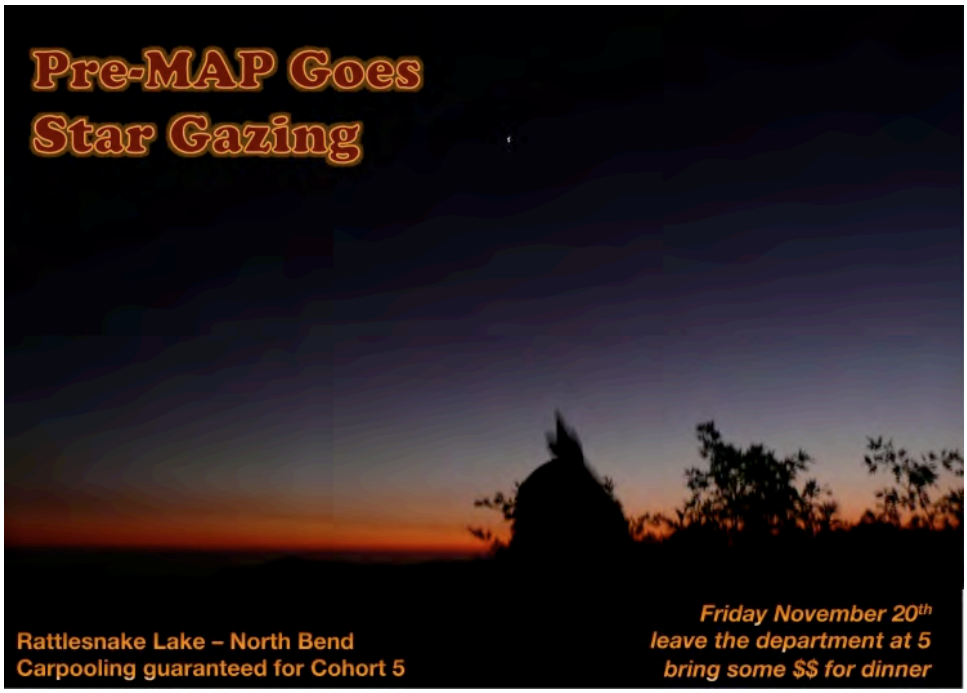
- Museum of Flight (Seattle Museum)
- Leonids Viewing (Just outside the city)
- BBQ at a Pre-MAP staff member's house

On-Campus Events

The campus events build the sense of ownership to the major. They are quick, minimally planned, and during the Research Seminar, monthly. We like to have a yearly kick-off event at the on-campus observatory with an upper level undergraduate Pre-MAP student giving a guest lecture.

Examples:

- Planetarium show, or movie night
- On-campus Observatory star gazing
- Pizza party



Advising, Mentoring, and Academic Support

Pre-MAP students, that is, under-represented students in STEM fields who self-select a research seminar for their first quarter, need structure to help them succeed in the science environment in college. Mentoring happens at many levels, and we don't assume to be experts, we use the resources available at the UW for ideas on mentoring. Below are three of the ways our last seminar instructor academically advised the students during semi-structured office hours (see our Curriculum Guide). They were given as handouts after discussing their study plans and going over tests individually or in pairs. For more information, please contact Phil Rosenfield (philrose@astro.washington.edu).

Doing Problem Sets

How do you do a problem set? Alone! Well, at least at first. Try it, think about it, and get stuck, before working with one or two other people.

Group Work:
Ask yourself these questions after working in a group: Did that help me? Can I do all that on my own (seriously)? What did I gain from that? Did I help them as much as they helped me?

This is how you know if you should work in groups in the future.

A good idea is to do what you did again on your own right after a group meeting to better ingrain the information in your memory. So when everyone leaves, or when you are back home, write up the assignment nicely without the book or any notes.

AVOID LIKE THE PLAGUE: Anyone who answers how do a problem like this: "first you have to use this equation, then you sub in equation 3 from page ...[series of page flips in a text book]..." That sort of thing actually hurts you. You may have perfect problem set scores and finally have the time to work on other course work, but your exam scores will suffer hard. In science classes the correct answer is never as important as learning how to think and reason through a problem. This stuff is hard, you will a lot of need time to learn it!

Preparing to do a Problem Set:
A problem set should be done after you read the relevant text or background material and examples—*not during*. Keep track of how often you need to look in the book when you do a problem set. You should minimize that as much as

possible. You won't have a book during the exam, and you'll have a hard time in the next few years if you have to keep looking in every book you ever used to do future problem sets. A way to think about it is to treat problem sets as mini exams to test how much you know. Don't be too hard on yourself though!

Timing:
Set your own due date of the problem set to the office hour before the problem set is due, that way you can get help from an expert who knows why you are doing the problems not just how to do the specific problems assigned.

Studying for Exams

Some of this material was adapted from websites many years ago... If the sources are found, please contact us.

This is an overkill method for studying for exams. The process is go all out on your first couple exams and adjust to figure out the ways you work best. Remember that you need to approach and exam with your mind ready to think. Too much stress and too much work will hurt you, so try to take it easy on yourself. For example, pretend that what you think to yourself while studying you say to another student, would they consider it mean?

Continue the habits of good nutrition and exercise. Continue your recreational pursuits and social activities all contribute to your emotional and physical well-being.

Follow a moderate pace when studying; vary your work when possible and take breaks when needed. Real breaks! If you are using a computer, a break will be something not involving a computer. If you're doing physics problems at a desk, a break could be going for a walk.

When to Begin Studying:

The best thing to do is start 7 or 8 days before the exam, especially if you haven't taken many college exams or if you have lots of other stuff going on. When you get good at exams, 3-4 days is all you'll need. Never think you can do it in a day before the exam.

Check what support is around. Do you have prof/ta office hours? A CLUE session? Review sessions? What other outside help is there? Group studying?

Try to have as much studying as possible done before the last TA or professor office hour or review session. Keep a list of questions as you go, some you'll be able to answer, others you can bring to the TA or professor.

Group Studying?
Figure out fast what works for you with group studying. I can't study with more than 2 others. I study best on my own or with one other person to bounce ideas off of (after I've studied for a while on my own). It also depends on the person. Don't feel bad exiting a group session with "I don't think this is helping me very much, I think I need to look at this material on my own."

What materials do you have to study with?
Textbook, your notes, lecture slides, homework, review sheet, old exams?

Make a schedule
Below is what I typically would use. If I were only studying for one final, I would start 4 days in advance. I don't recommend any less than that. The purpose of a schedule is to make sure you do everything before the exam. It shouldn't stress you out, don't make a schedule that you can't change, be sure to give yourself flexibility. Don't simply work hard; work efficiently. Think about how you want to arrive mentally and physically to the exam.

Day 1: Make sure you're all caught up on textbook reading, re-read the tough sections.

Day 2: Notes - use a different pen color than normal and go over them, that is write on the notes, can you reproduce them? Can you do the derivations on your own? Don't worry about your notes with pages of derivations (you should know the results and why the professor took the time to go over them), but you should be able to do all important ones that take under 10 minutes or a page to write down. I've even numbered my notebook pages and wrote down "WTF pg 23" for example.

Day 3: Lecture slides - can be combined with textbook or notes, I like to do it after notes and check back with my notes to see where I missed stuff.

Day 4-5: Homework - Most important in science classes! You need to be able to do all the homework on your own stressing out in a silent room! The best way is to go slowly as you do the homework the first time realizing you'll need it for the test. Next, go to office hours to be sure you understand where you lost points on homework. You may not have time to re-do all the problems when studying. If that's the case, do the hardest ones and the ones you got wrong (everyone probably got the same ones wrong and they often show up on exams).

Day 6: Extra problems - Do the odd number problems in the back of the book with solutions, not all of them, but pick some that cover every section. Bring them to office hours if you have questions. Doing problems and extra problems is what helped me understand the material the most. What helps you the most?

Do old exams with homework and extra problems. You may need to rearrange the schedule to make sure that can be done with old exams. If you get an old exam from someone besides the professor, let the professor know you have it and do your best to make sure the whole class has access as soon as possible. Don't turn it into an ethical drama, everyone knows they are out there, just make it fair. If the professor doesn't change the questions from one exam to another, you still need to study and learn the material for yourself. You aren't in college to get grades you may be responsible for knowing information from a bad class later in life. I would feel stupid to have to tell people, "oh I had a bad professor. I didn't learn E&M."

Day 7: Don't study the night before the exam. Have a good dinner and take it easy. You got this, you studied hard, and the answers will come to you.

If you have a review sheet, keep it with you as you study. I don't make my own review sheets, I have nothing against them, I just don't use them. If it helps you make one.

Up to the Exam

- Get plenty of sleep the night before the test when you are overly tired you will not function at your absolute best.
- Once you feel you are adequately prepared for the test, do something relaxing. Aim for this time to be the evening before the test.
- Begin your day with a moderate breakfast and avoid coffee if you are prone to "caffeine jitters." Even people who usually manage caffeine well may feel light-headed and jittery when indulging on the day of a test.
- Try to do something relaxing the hour before the test last minute cramming will cloud your mastering of the overall concepts of the course.
- Plan to arrive at the test location early this will allow you to relax and to select a seat located away from doors, windows, and other distractions.
- Avoid classmates who generate anxiety and tend to upset your stability.
- If waiting for the test to begin causes anxiety, distract yourself by reading a magazine or newspaper.

Getting the exam back: Take three days before going over it with the professor. That will give you time to emotionally detach from the test. It isn't a measurement of you, it measure how much you can reproduce from this one class. Don't just find out what you did wrong and how it should be right. Figure out what types of mistakes you made, minus signs? Didn't study the right stuff? Part of college is learning the material. The other part is getting good at proving you learned it.

Taking a Test

I took these from various websites over four years ago and added to them. Just know they aren't all my ideas.

- Remember that the most reasonable expectation is to try to show as much of what you know as you can.
- Your goal should be to maximize your point total on the exam. Not to answer each individual question perfectly.
- First review the entire test; then read the directions twice. Try to think of the test as an opportunity to show the professor what you know; then begin to organize your time efficiently. Work on the easiest portions of the test first.
- For essay questions, construct a short outline for yourself then begin your answer with a summary sentence. This will help you avoid the rambling and repetition, which can irritate the person grading the test. For short-answer questions, answer only what is asked short and to the point. If you have difficulty with an item involving a written response, show what knowledge you can. If proper terminology evades you, show what you know with your own words.
- For multiple choice questions, read all the options first, then eliminate the most obvious. Unsure of the correct response? Rely on your first impression, then move on quickly. Beware of tricky qualifying words such as "only," "always," or "most."
- Do not rush through the test. Wear a watch and check it frequently as you pace yourself. If it appears you will be unable to finish the entire test, concentrate on those portions that you can answer well. Recheck your answers only if you have extra time and only if you are not anxious.

If you're feeling anxious during the test:

- Avoid thinking of yourself in irrational, all-or-nothing terms.
- Tell yourself "I can be anxious later, now is the time to take the exam."
- Focus on answering the question, not on your grade or others performances.
- Counter negative thoughts with other, more valid thoughts like, "I don't have to be perfect."
- Tense and relax muscles throughout your body; take a couple of slow deep breaths and try to maintain a positive attitude.
- If allowed, get a drink or go to the bathroom.
- Ask the instructor a question.
- Eat something.
- Remind yourself that a test is only a test there will be others.

After the test:

Reward yourself: go to a movie, go out to eat, or go hang out with friends. I liked to go to the campus bowling alley with other test takers under the condition that we couldn't discuss the test.

Funding Pre-MAP

Our sources of funding

Pre-Map was initially funded in 2005 for two years with a President's Diversity Appraisal Implementation Fund grant of $21,700 to the Astronomy Department. The Astronomy Department contributed a 100% match to these funds. In 2007, the National Science Foundation awarded a CAREER grant to the Pre-MAP faculty lead, Professor Eric Agol, which will support a Pre-MAP Teaching Assistant for five years.

Recently, in conjunction with Professor Tom Quinn's NASA grant, Pre-MAP received Education and Public Outreach funding, which supports paid research positions for two Pre-MAP students. Professor Suzanne Hawley's 2008 NSF award provided two years of research funding for two more Pre-Map students.

Additionally, postdoctoral NSF Fellow Jeremiah Murphy has brought funds to UW for internal evaluation of the program, and The Astronomical Society of the Pacific has financed the Spring 2009 Science Career Exploration Trip with a one-time only SEED grant for $2,500.

In the fall of 2009, Pre-Map received $16,500 of private funds from the Kenilworth Foundation to be used over three years for innovative curriculum aspects such as field trips, cohort gear, and post printing.

Key funding components needed

Staff costs: Salary percentage + tuition + benefits:
60% each quarter seminar is offered
10% one quarter for field trip coordination
10% one quarter for research poster creation/presentation coordination
10% one quarter for academic mentoring
25% one quarter for recruitment/advertising program/University Liaison
20% one quarter for evaluation of program

All other costs: $5,000 per year

Costs per year:
Fieldtrip: $2,200
Pre-MAP Seminar Events: $300
Supplies: Seminar notebooks, $100; sweatshirts, $900
Printing: posters, $900; copies, $100; recruitment/advertising material, $500

Attracting Students and Research Mentors

Pre-MAP staff have utilized four different recruitment techniques listed in chronological order:

1) Collaborate with campus Minority Affairs Office
2) Conduct public outreach
3) Send targeted recruitment email
4) Announce Pre-MAP seminar in introductory Astronomy courses

A few of the organizations we worked with

- Making Connections
- Upward Bound
- GEAR UP
- Native American Student Day
- NASA Space Grant
- MESA
- Esperanza en Educacion
- PIONEER

Pre-MAP collaboration with the Office of Minority Affairs and Diversity (OMA/D) is one of the most successful recruitment efforts. At UW underrepresented students are placed in the Educational Opportunity Program (EOP) and meet individually with academic advisers during their summer orientation. At this time the OMA/D advisers identify science-interested students and refer them to Pre-MAP.

Pre-MAP has had mixed success with public outreach as a recruitment tool for the first three years. Pre-MAP has participated in public outreach with 27 organizations conducting planetarium shows, hands-on labs and tabling. Prospective student information was collected at each event and entered in a recruitment database for future contact. This outreach helped to increase the exposure of Pre-MAP to the UW community, however the resulting Pre-MAP enrollments were low.

Pre-MAP's most successful recruitment tool has been the mass email sent to incoming students. Response to this email is followed up with personal contact through email and phone to help students register for classes that include the Pre-MAP seminar. Components of the email include: student testimonies, suggested courses, seminar structure, annual field trip. See the section entitled "Recruitment Email" for details.

Students interested in Astronomy self-select by enrolling in introductory Astronomy courses. On the first day of class, Pre-MAP staff make an announcement to recruit underrepresented students to fill remaining seats in the Pre-MAP seminar.

Recruitment Email

Pre-MAP staff works with the University of Washington's Undergraduate Admissions Data Management to target select individuals who accepted admission to UW. Below are the specific requirements and tips for generating HTML source code to embed in the content of the recruitment email. Please see our Web Templates for more information.

Over spring and summer 2008 and 2009 Pre-MAP staff sent out two emails. The first recruitment email was sent in mid-June just before summer orientations started. At UW, summer orientation is when freshmen learn the basics of the University and can register for classes. The second recruitment email was sent in mid-July to recruit the second half of summer orientations as well as remind those that have already attended orientation about Pre-MAP.

Writing the HTML

1. Don't use style sheets, email browsers may not render them.
2. Be as explicit as possible. Declare font sizes, table widths, etc.
3. Use absolute links. For example do this

   `<a href="http://www.astro.washington.edu/you/linkedfile.html">`

   instead of `<a href="./linkedfile.html">`

   the email browser will interpret the html code (hopefully), not directly link to your site.

Getting the Email Ready

Besides figuring out what should be on the actual email, you must also specify:

- Subject line
- Reply-to address
- Enrollment list (who to include or exclude in the email)

Here is an example of how to setup the recruitment email:

Subject: Incoming UW Students: Get involved in Astronomy research this fall!

Reply-to:premap@astro.washington.edu

Student list (regardless of intended majors) sent to those who self-identified as:

- Incoming freshman women
- Incoming freshman minorities
- Women transfers
- Minority transfers

Here is an example of what students received in an email

If you are having trouble reading this message, please visit http://www.astro.washington.edu/users/premap/.

Pre-MAP

A program to introduce underrepresented first-year college students at the University of Washington to astronomy research

Welcome to the University of Washington!

Curious about the cosmos??

Check out Pre-MAP:

An Astronomy program for UW first-year students!

premap@astro.washington.edu

Pre-MAP: The Pre-Major in Astronomy Program

Pre-MAP is for

- An incoming UW first year student
- A member of a traditionally underrepresented group in the sciences (women, first-generation and low-income college students, African Americans, Latinos, Native Americans, Southeast Asians and Pacific Islanders)
- Someone who is interested in math and science

- **Cutting-edge research**
  Learn astronomical techniques, experience the excitement of scientific discovery!
- **Advising and mentorship**
  Get help on choosing classes, scholarships, navigating the UW, and more!
- **Great friends**
  Be part of a small, close-knit group of exceptional students; get to know the department and the faculty!

What our students have to say

"You were a great way for freshmen like us to get involved here at the UW! Pre-MAP opened my eyes to careers in Astronomy." - Carl

Evaluation

In order to evaluate Pre-MAP's success, the graduation rates and post-graduate plans of participating students are tracked and a detailed assessment is done regarding the programmatic goals. These goals are analyzed using one-on-one interviews with participating students.

An open-ended, structured interview protocol was developed for those being interviewed for the first and second times. Interviews were conducted by four Pre-MAP staff that had little interaction with students directly for 30-45 minute sessions per student. Interviews took place during autumn quarter of 2007 and 2008. All Pre-MAP students were emailed asking to participate in the evaluation. In autumn 2007, a total of 11 students were interviewed (six men and five women). The second year of interviews includes five new students (one man, four women). At the same time, six students (three men and three women) from the first year were interviewed again. In total, Pre-MAP staff conducted 22 interviews over two years. While 22 interviews can be seen as "small-number statistics" these interviews provided some informative results and allowed Pre-MAP staff to respond with programmatic changes.

Pre-MAP keeps a dynamic database tracking student progress keeping data on declared majors, research participation, scholarships/awards, and anticipated graduation dates. This information is used to assist with evaluation, to gather notable events to mention while advertising the program and to assist the Pre-MAP staff with advising and mentoring for students based on their academic progress.

We offer several suggestions for implementing evaluation:

1) **Review the literature before developing your evaluation plan.** Using the literature as your baseline can help you identify areas to evaluate as well as benchmarks for comparing your results. "Stand on the shoulders of giants."
2) **Develop a clear evaluation plan utilizing pre-existing campus resources.** At first our primary evaluation was focused on the Pre-MAP seminar and relied on evaluation processes that the University already offers.
3) **Incorporate evaluation into the budget costs.** Evaluation can be expensive, especially when it includes qualitative data. Evaluation can help secure future funding, but if you don't have results because you don't have funding it can be an endless cycle.