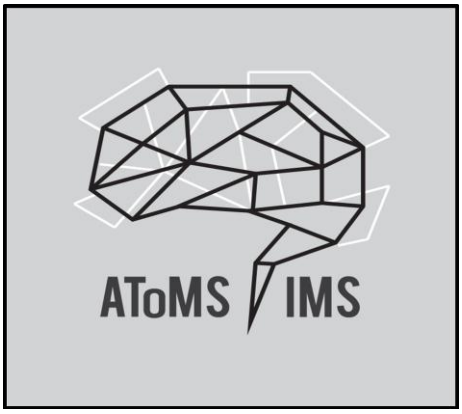
Lessons Learned

A Case Study of a STEM Learning Community

Ivy Rutledge, Brittany Lutzweiler, and Stephanie Carrino ▸ AToMS/IMS Learning Community, UNCG ▸ 6/26/2014

Abstract

How can a STEM-focused learning community help students learn how mathematics and science are useful around us? Also, how can this community then help these students achieve their goals in STEM disciplines? The AToMS (Achieving Together in Math and Science) and IMS (Innovations in Math and Science) Living Learning Community operated in search of answers to these questions during the 2012-2013 and 2013-2014 academic years at the University of North Carolina at Greensboro. During this process, the program Directors—in conjunction with the faculty and staff team—shifted and refined the team structure and program elements to best achieve the community's goals. In reflecting on the AToMS and IMS experience, our research team has identified areas where the learning community succeeded, and we've located places where future communities can learn from us. This white paper lists 10 recommendations for best practices based on our experience.



Logo by Alex Allis

History of the AToMS and IMS Learning Community

Origins

AToMS was first proposed in December 2011 by a faculty and staff team composed of individuals invested in STEM education: William Gerace, Ph.D (co-director), Physics and Astronomy; Julia Jackson-Newsom, Ph.D (co-director), Office of Research and Planning; Steve Danford, Ph.D, Physics and Astronomy; Dohyoung Ryang, Ph.D, Mathematical Sciences; Carol Seaman, Ph.D, Mathematical Sciences; Lynn Sametz, Ph.D, Center for Youth, Family, Community; Steve Tate, Ph.D, Computer Science; and Jerry Walsh, Ph.D, Chemistry and Biochemistry. Together, they proposed a new Living Learning Community that would connect UNCG's first year STEM students and dedicated faculty. The premise was that the common interest in mathematical and/or physical sciences would enhance student success.

The initial curriculum was developed during the summer of 2012 by Dr. Newsom and Ivy Rutledge, the Graduate Assistant hired by Newsom to offer supplementary instruction in writing and communication skills. Using syllabi used by other universities to teach learning communities courses, along with a standard syllabus used by UNCG's Office of Learning Communities, a specially-tailored course for AToMS was devised. Newsom and Rutledge developed a set of learning objectives for the incoming freshman centered around three focus areas: (1) transitioning from high school to college, (2) developing a professional identity, and (3) learning to be a part of a community.[1] The initial course syllabus combined offerings from the University, such as the Office of Student Success, integrated work with the students' chemistry course, and class activities designed to meet the students' immediate needs.

First Year: 2012-2013

Students self-selected into the community at SOAR (Spartan Orientation, Advising, and Registration), and the beginning population consisted of 44 students from the Chemistry and Biochemistry, Mathematics, Physics, and Computer Science departments. Students were required to enroll both in the Integrated Studies Lab (ISL) course designed for the community and also in Chemistry 111 & 112. All students were encouraged to enroll in a math course as well as the beginning course in their major sequence, and seats were reserved in these common courses. Students who chose to live with the community were housed in Reynolds Residence

[1] The full list of learning outcomes for both AToMS and IMS can be found in the appended Policies and Procedures Manual.

Hall, while other students lived elsewhere on campus or commuted to campus. Over the course of the semester, three co-curricular events were held and poorly attended. Jerry Walsh held chemistry review sessions which a core group of students took advantage of. Weekly newsletters were sent to students and faculty to inform them of upcoming events, deadlines, and opportunities. Two Peer Academic Leaders (PALs) were hired and utilized in a limited capacity.

During the fall semester, the team met weekly to develop the theoretical framework and program elements of the community. Action tasks were mainly handled by the Co-Directors and faculty team. Dr. Gerace hired Brittany Lutzweiler through the Department of Physics and Astronomy to serve as a Research Assistant. Lutzweiler spent the fall semester conducting an extensive literature review of learning community topics, and conducting and transcribing initial interviews with the beginning cohort.

During the spring semester, the team continued to meet weekly, covering both theoretical and practical topics. Dr. Newsom ceded the directorship to Dr. Gerace, who redirected Lutzweiler's work to the learning community. Together, Rutledge and Lutzweiler handled the bulk of the administrative duties required. No ISL course was offered, which limited opportunities for community-building activities. Cohort enrollment in Chemistry 114 & 115 was low, adding to the limited contact time. The English department offered a STEM-specific course, ENG 230, with seats reserved for AToMS students; however, only two or three students enrolled in this course due both to the lack of prerequisite coursework and also a lack of interest. The community lost students to (a) other majors outside of STEM, (b) disinterest in the community, and (c) illness and logistics issues that prevented participation. Several lunches were held in the Sullivan building, and roughly twelve students attended. The semester's activities concluded with a gathering of students interested in continuing the community through IMS.

In February, administrative support shifted heavily to the GAs as recruiting for the 2013-2014 academic year got underway. Students were recruited from three main sources: (a) lists of students who were admitted to the university, obtained from each participating department; (b) Destination UNCG; and (c) SOAR. Recruiting for the IMS cohort began with current AToMS students, and expanded into the Biology and Geography departments. The community reserved the third floor of Guilford Residence Hall, and as students were accepted into the community, they were assigned space in the dorm on a first-come, first-served basis.

Dr. Holly Downs led a student team from the Department of Educational Research Methodology to perform an evaluation of the learning community's first year of operations, and they provided four recommendations for future planning:

1. Use student profile characteristics as a guideline for understanding the average AToMS participant. Determine what characteristics best fit the ideal AToMS program. Have a concrete plan to evaluate and disseminate this information to various stakeholder groups.
2. Continue providing and increase opportunities for AToMS students to receive academic support (i.e., academic guidance and support, making connections to campus resources, STEM faculty, and making connections to other students in the major). Consider how to better demonstrate achieved learning objectives and growth resulting from participation.
3. Incorporate more experiential activities into AToMS that are designed to help students to form their STEM identity and gain a sense of community. Consider making activities mandatory and incorporating activities into the ISL course.
4. Attendance at AToMS activities may be improved by refining the communication strategies and increasing the academic relevance of activities to STEM and the overall community.

These findings reflected the experience of the team, so while there was no immediately useful information, there was agreement among the faculty and staff that the research provided valuable support for the program.

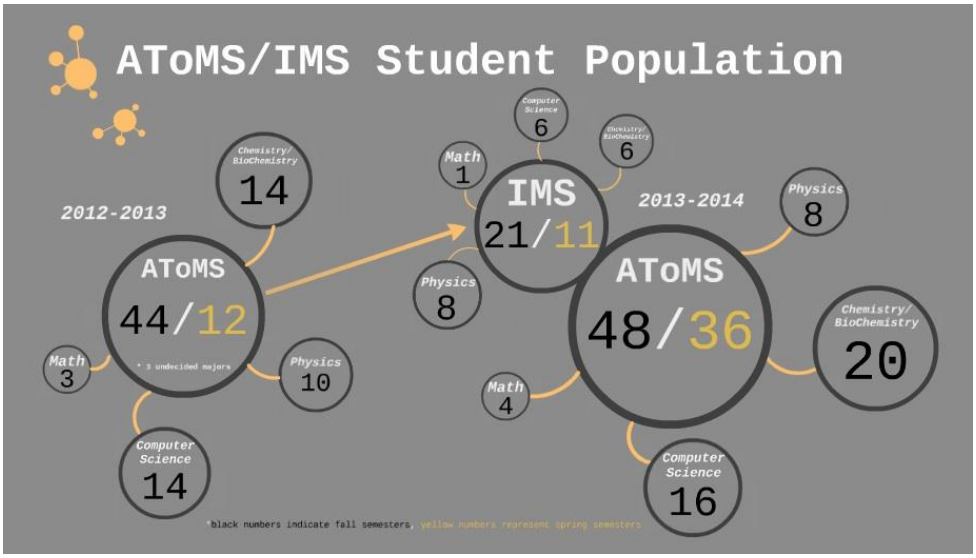


Figure 1: Student Populations for 2012-2013 and 2013-2014 Academic Years

Second Year: 2013-2014

Planning for the second year of the program began early in 2013, as the faculty proposed adding a second-year cohort and refined the plans for the incoming freshmen. The IMS component was approved and added to the AToMS Learning Community. Recruiting during the summer focused on students attending SOAR, and all of the spots in the community were filled by the end of June, before all of the SOAR sessions occurred. All of the reserved spaces in Guilford Residence Hall were assigned to AToMS and IMS students, and a waiting list for both the community and the dorm was created. The GAs made sure that each student understood the expectations of the community. Throughout the summer, students were advised regarding math placement exams, course registration, and other preparations. Students took advantage of the reserved seats in common courses, seen below in Figure 2.

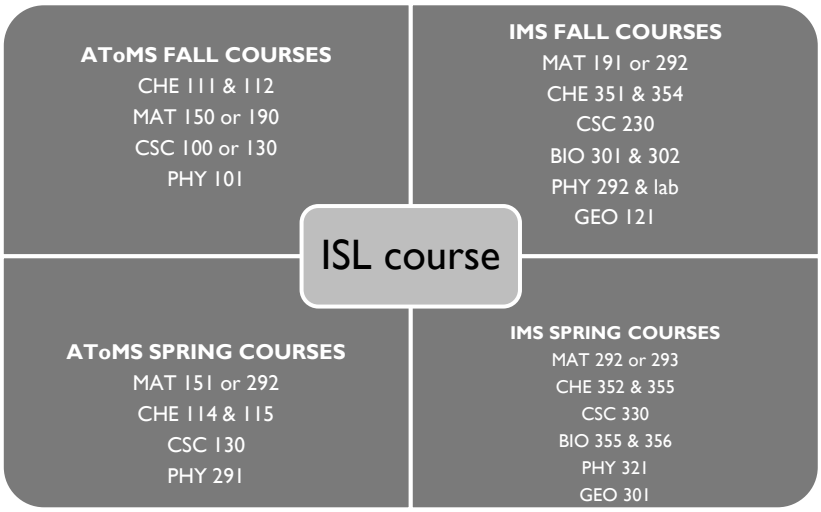


Figure 2: Four-Semester Course Sequence

Once the new cohort was recruited, efforts turned to community-building and instructional planning. The faculty met on an as-needed basis, and the daily operations were handled by the Director and two GAs. The GAs developed ISL course syllabi for both the AToMS and IMS students for the fall and spring semesters, revising the existing curriculum from Fall 2012 to discard elements that weren't useful to students and adding new elements based on student feedback, Lutzweiler's research, and input from the faculty team. The ISL courses were each one credit hour and required three hours of attendance: one hour of class time; one hour of independent professional development, called flex hours; and one hour of community time each week in the form of Friday lunch. It was decided that the PALs would be replaced with

Discussion Leaders, who were recruited and hired. Space was reserved in the Guilford Residence Hall for the ISL classes, the Discussion Sections, and the Friday lunches.

Efforts were made to build the community through a new logo and branded materials, including t-shirts that were well-received by the students. A Policies and Procedures Manual was developed to capture the details of the community's operations, and a Student Handbook was generated from this manual. Once the semester got underway, weekly emailed newsletters—and later, a community blog—offered students suggestions for personal and professional development, as well as offering encouragement and reminders regarding course assignments.

http://atomsandims.wordpress.com/

Spring and Summer 2014: Reflection and Research

As the second academic year approached a conclusion, the decision was made to follow up on—and add to—the research done by Dr. Downs' team. Stephanie Carrino was brought on board as a Research Assistant to assist in the final research on the community, joined by two additional graduate students and the existing GAs. The team identified written assignments that could yield useful information—such as the students' written journals and reflective essays—and each data set was coded and analyzed. In addition to these data sets, Rutledge and Lutzweiler each provided a narrative of her experience in the community. Data was also derived from student interviews and surveys. Carrino, Lutzweiler, and Rutledge worked to locate patterns in the student data, and the team was able to reflect on the learning community's two years of operation. This work yielded rich insight into AToMS and IMS, and the team was able to match their thematic findings to the pedagogical theories at work. In addition to this white paper, intended for practical use by the university, a scholarly article is planned to report the additional findings of the research team.

Learning Community Goal #1: Retain students in the STEM disciplines

The challenge

The STEM education community has repeatedly called for the reform of undergraduate teaching, often focusing on developing and disseminating specific instructional ideas and practices. A recent Microsoft/Harris poll[2] indicates that only 20% of STEM students enter college feeling that high school prepared them "extremely well" for science and math study in college. Understanding this is the first step toward repairing the situation we face in retaining math and science students at UNCG: in STEM disciplines the number of declared majors steadily declines through four years of college. In addition, STEM majors often encounter challenging and sometimes confusing course requirements in the major. For example, a prospective physics major must take not only introductory physics but also chemistry, computer science, and a daunting array of mathematics courses almost sufficient for a second major.

Our solution

Once students have joined AToMS, they enter an academic support system that includes in-depth advising, reserved seats in high-demand courses, a curriculum tailored to their developmental needs, discussion sections led by high-achieving upperclassmen, and rich co-curricular activities with peers and faculty. In addition, IMS students have leadership opportunities through noticing the community's needs and providing solutions.

Lessons Learned

- Discussion sections were not cost effective. Students prefer to form their own study groups with peers or mentors on an as-needed basis, rather than attending the scheduled sessions.

> "I don't go to them …they mainly conflict with my night classes. I have a big schedule … when I do have a question either I find a peer or I go to an SIP or PLP section to help me figure out what it is I don't understand. For me, the discussion sections are just not convenient."

[2] Harris Interactive, "STEM Perceptions: Student & Parent Study: Parents and Students Weigh in on How to Inspire the Next Generation of Doctors, Scientists, Software Developers and Engineers." Commissioned by Microsoft Corp., 2011.

- Students want to see value for their time. While they enjoyed the Friday lunches and flex hour opportunities, they craved more structure and more interaction with the faculty and upperclassmen.

> "IMS thus far has been a great place to meet new people interested in science. My expectations in the beginning of the semester were to meet with and network with those in science majors and faculty of the science departments. So far those expectations have been met during Friday lunches and through obtaining flex hours. This process could be improved by allowing students more access to IMS-related faculty to build a network for future endeavors. Overall I am pleased with the program, and the only area that I think needs improvement is the networking between students and professors."

- Students who met with a faculty member for a 30-minute advising session once per semester were more likely to develop and follow their academic plan.

> "Dr. Gerace has helped me develop a lot in my understanding of what I want to do through our discussions in his office. By going to Dr. Beatty and Dr. Gerace to discuss my future, I have observed from their experience in choosing their career. I really learned a lot about the two when I carried out the assignment of speaking with a member of our department and learning about their background and current status. Without that assignment, I would not have had such a huge change in the way I perceive my future and the way in which I will go about getting there."

- Freshmen who were able to get appropriate, degree-specific advising and who were able to register easily for the courses they needed were more able to complete their degree program.

> "[My advisor] didn't give me the placement test. And, ya know, now I'm here 5 years, I just wish that could get fixed and I would have more classes with [other AToMS students]."
>
> *(Note: this student dropped AToMS after the first semester and changed to a major outside of STEM.)*

> "At lunch on Thursday my mentoring group and I discussed the advising process and how to check the degree evaluation to decide which classes to take next. We also discussed the importance of minors and how easy they are to obtain. The latter topic is something that I would have liked to have known a year ago. Perhaps my classes would have been more focused had I decided to minor in a few other areas of science. Hopefully through mentoring, my AToMS mentees will decide to minor in a few additional stem fields."

- Students appreciated the opportunities for professional development, both in the form of ISL assignments and guest speakers, and in the form of flex hours.

> "The past couple of guest speakers have talked about being a life-long learner, and how learning about things you are interested in makes you a well-rounded person. I believe this is good advice, and will follow it throughout the course of my life. I want to be a lifelong learner because there are so many interesting things in the world that I don't know about, as well as what hasn't been discovered yet. I don't want to stop learning about the universe and everything in it, because if I did life would be more boring to me."

> "The flex hours seemed at first a tedious exercise but, along with exercises like the job shadowing, have proven quite useful. I have met people who have taught me things I never would have learned before. I was interested and informed by a speech by a Nobel Laureate for Physics with the STAMPS program. He was talking about exploring the beginnings of the universe by some manner of radioactivity. I was also able to have a tour of the Joint School of Nanoscience and Nanoengineering by Dr. Herr. These experiences and many others have helped me understand just a bit about where I want to go with my career, what I want to do, and how I want to get there."

- IMS students craved more leadership opportunities, and they found the mentoring relationships they developed with their AToMS mentees to be meaningful.

> "I spent my flex hour this week eating breakfast with my mentoring group. It was a great opportunity to discuss classes, transitioning to college, campus resources, etc. We were able to get to know each other a little more, and I think being a mentor will be a rewarding experience."

Learning Community Goal #2: Provide a supportive structure for students

The challenge

Cognitive psychologists suggest that a person learns more efficiently when he or she, as a member of a group, is placed in situations in which he or she is comfortable and can offer and receive critiques of his or her work. First-year STEM students frequently feel isolated, and they need the solid foundation of a peer group that shares both academics and co-curricular experiences.

Our solution

Both the self-selected and selectively recruited populations were diverse in race, ethnicity, major, and gender, leading to a broader experience for all of the students. Shared living space allowed students to form ad-hoc study groups, as well as enhancing their social bonds. Since classes and Friday lunches were also in the dorm, students enjoyed the stability of the common space. Shared coursework, extensive personal support, informal mentoring, Friday lunches, and flex hour opportunities helped build the community.

Lessons learned

- AToMS students were likely to bond mainly with other students in their major, while IMS students were more open to STEM majors as a whole and able to see connections across disciplines.

"When I sit there in class and stuff, they be like 'oh chemistry majors.' That's all they focus on ..."

"Our guest speaker spoke on the topic of GIS (Geographic Information Systems) and how it relates to STEM majors. I took from his speech that even in today's world, we see an improved focus on STEM in education but we fail to see geography is absolutely overlooked as a section of STEM. He explained to us how GIS is connected to STEM as a whole. STEM stands for science, technology, engineering, and mathematics. Geography relates greatly on all of these majors, and the application of geographic technology helps us get a better understanding of occurrences and solve significant difficulties."

- Students were grateful for the individual case management provided by the Graduate Assistants.

"Ivy and Brittany were easy to access and very approachable. I was pleased that I could get one-on-one with them any time I needed and get my questions answered quickly."

"AToMS has been a very helpful guide through my first year at UNCG. The faculty and students that compose it stop at no lengths to provide any aid that may be needed ... Having the AToMS learning community at my disposal was very influential during my first year at UNCG. It was comforting to know that they were there."

- Collaboration with multiple offices across campus required time-intensive coordination and communication.

"We spent most of our summer after SOAR following up with students, making sure that their schedules were set and making changes as needed or finding them an advisor, getting students access to the math placement test, getting their space in the dorm assigned, and generally making sure they had everything ready for the beginning of the semester. We spent our days emailing, calling, and walking the campus getting ready, because we also had to get our syllabi created and approved, our classroom spaces reserved, and the Friday lunches—those took quite a bit of planning and coordination too. It was a lot of work to get this program up and running for the second year." –Graduate Assistant

- Students enjoyed the ease of living in Guilford Residence Hall with their peers, and they benefited from the diversity within the community.

"If I have a problem with some of the homework I'm working on, I can just walk next door and get help and have the solution explained to me and be shown how to solve the problems on my homework."

"AToMS has connected me to the people who I need in my life, people who are a lot more like me than I thought. We all go together to complete one big puzzle, we all contribute our uniqueness like individual puzzles pieces—no one is the same, but we fit together as a community perfectly."

- Faculty members had low rates of participation in the community, due to limited access points to students, lack of structure at Friday lunches, and infrequent team meetings. However, faculty members commented on the value of time spent together, and they enjoyed the interactions that they *were* able to have with the students.

> "The ISL semester project for AToMS students was an oral presentation based on research, given to a small group facilitated by a faculty member. The faculty team was warmly receptive to this and enjoyed the experience. It was like a conversation, and good for the students to talk about something intellectual in such a casual, low-pressure situation. We did this after our last Friday lunch, the groups split up and found space in the dorm parlor and classrooms." –Graduate Assistant

- The workload carried by the GAs needed to be spread out over the team, making better use of the invested IMS students, upperclassmen, and faculty.

> "We split case management, I helped IMS students, and she focused on AToMS. With her having a heavier student load, I tried to focus on the Friday lunch management and food ordering. We graded, read journals, and managed the instruction for our courses. In addition, we reported to faculty, planned social events, kept up with the supply stock, and communicated with other departments on campus. At this point in my own graduate program, I was exhausted, over worked, and couldn't quite see the light at the end of the tunnel." –Graduate Assistant

Budget

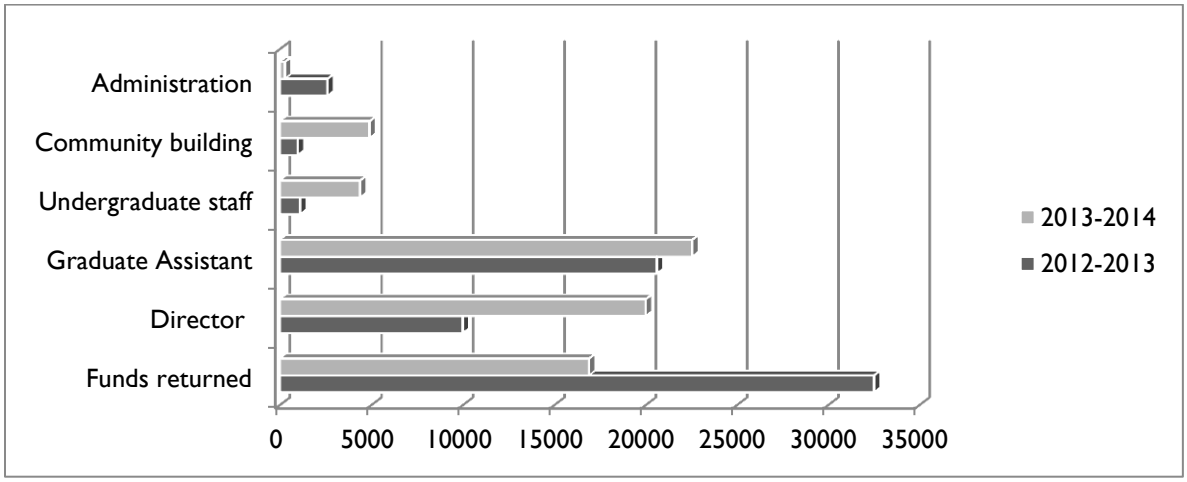


Figure 3 Budget

2012-2013

- Total funding for the 2012-2013 academic year was $67,800.
- Of these funds, about a half (approximately $33,000) was returned to the Office of Learning Communities.
- This budget *does not include* the cost of Brittany Lutzweiler, who was hired through the Department of Physics and Astronomy.
- Julia Jackson-Newsom did not receive compensation for her semester served as Director of the program.
- Per capita spending was $802 per student.

2013-2014

- Total funding for the 2013-2014 academic year was $69,000.
- Of these funds, nearly a fourth (approximately $17,000) was returned to the Office of Learning Communities.
- The AToMS & IMS Learning Community served a larger student population in its second year of operation than in its first. (See Figure 2 on page 3 for details regarding our student population.)
- This budget *does not include* the cost of Brittany Lutzweiler or Stephanie Carrino, who were hired through the Department of Physics and Astronomy.
- Per capita spending was $755 per student.

RECOMMENDATIONS

ONE

Maintain a team structure that fully utilizes each faculty and staff member in supporting students. Provide structured activities, such as the Friday lunches, that allow all members of the team—faculty, GAs, invested upperclassmen, IMS leaders, and other mentors—to interact regularly with the students and build relationships.

TWO

Actively build relationships between the team members and the rest of the university. Keep the faculty team and staff actively involved through regular meetings. Balance team activity so that both theory and practice are considered. Also, spread the administrative workload across the team so that the coordination among shared stakeholders on campus is a collaborative endeavor.

THREE

Keep the community informed with weekly emails outlining events, deadlines, and opportunities. Limit communications to one email per week, if possible, to avoid reader fatigue, or consider a website or blog.

FOUR

Reserve space for students in a residence hall near the math and science buildings on campus. Use this space, if possible, for co-curricular activities. Use the space flexibly, remaining inclusive to all members of the community, including commuters and members that live in other dorms.

FIVE

Recruit a population balanced by gender, race, ethnicity, and major area of study.

SIX

Assign faculty mentors to students within departments for both advising and co-curricular activities. Coordinate with instructional staff of common courses to provide study sessions.

SEVEN

Recognize the developmental importance of the second year of the program. Emphasize the leadership role of IMS students, and form a plan early in the fall semester for both mentoring and Friday lunch structure.

EIGHT

Provide examples of successful STEM majors in the form of highly-invested upperclassmen, guest speakers from both STEM and related fields, and faculty members.

NINE

Offer multiple opportunities for professional development through ISL coursework, Friday lunch networking, flex hours, and co-curricular activities.

TEN

Support students in planning their own study groups and community-wide social activities. Teach them to have the agency to use campus resources, as well as their own material and time resources.

Conclusion

Creating and maintaining a learning community designed to support STEM students is a shared venture across the entire campus. What we have learned from our experience with AToMS and IMS matches what more experienced universities have also learned: properly supporting STEM students is a labor-intensive, collaborative activity. For example, at Western Carolina University, where living/learning communities have been thriving for over a decade, students enjoy an integrated experience that connects university staff across offices, involving academics, administration, and residence life. Here at UNCG, this integration requires coordination in the form of dedicated Graduate Assistants supporting the Director and faculty team. The result of this level of support for students translates into a high-quality experience for students, who in turn remain within STEM fields and thrive.

For example, one student who enrolled in our first cohort in the fall of 2012 has shown immense growth and development. This student enrolled as a computer science major and quickly became a student of concern. There are documented reports of poor attendance and meager assignment completion within the first semester. In addition, the student's fall 2012 grades were mediocre and not indicative of an invested computer science major. By the spring of 2013, the student was somewhat engaged with the community and agreed to live in the community dorm, Guilford, and attend the second year community, IMS, for fall 2013. During the fall semester of IMS it became clear that this student had grown in regards to class behavior, and leadership skills. This student became a point person for the learning community mentoring program, and showed a growing passion for computer science.

During the second year, this student began to connect to our computer science faculty member, Dr. Tate, and several upperclassmen within the physics and computer science departments. By the second semester of the sophomore year, this student started to display more concrete skills with computer science, a passion for STEM, and a knack for leadership. In fact, several students within this same friend group began to follow suit and step up to the academic plate. By the end of the two years, this student was selected to serve as an upperclassmen leader for another campus computer science endeavor. From an instructor's eyes, this student and many others like this have, without a doubt, been a great return on the university's investment.

The AToMS and IMS Living Learning Community has been an outstanding learning experience for the GAs about what it takes to support students as they develop academically, socially, and professionally in STEM fields. **We have learned that this is a labor-intensive process which requires administrative and financial support from all stakeholders across campus**: Academic Departments, Housing and Residence Life, Admissions, Registration and Advising, and the Office of Learning Communities. While a costly enterprise when concentrated in one academic unit, it is reduced significantly when distributed across the university. There is no doubt that the return on investment in STEM learning communities is substantial, though often difficult to quantify. We hope that our successes these past two years, and the lessons we've learned, will serve as inspiration for future investment in STEM students. They are worth it.

AToMS/IMS Learning Community, UNCG

Policies & Procedures

Ivy Rutledge
6/26/2014

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I. Community Goals

The AToMS and IMS Learning Community and Living Learning Community aims to support freshman and sophomore STEM students in their personal, professional, and academic development in order to increase students' retention rates in the STEM fields at UNCG.

These goals will be accomplished through:

- Custom-designed ISL courses with learning outcomes developed to meet the needs of our specific population
- Shared sections of the following core courses: CHE 111 & 112, MAT 150, MAT 190, MAT 191, PHY 101, CSC 100, and CSC 130.
- Discussion sections to support academic coursework, especially during the first semester.
- Shared living and learning space in the Guilford Residence Hall
- Regularly scheduled time together:
    - Weekly lunches on Fridays that include all students, related faculty, and team members
    - Monthly socials for students
    - Shared opportunities for service learning
    - Shared academic events such as lectures and other campus events.
- Regular communication of news and opportunities through email newsletters and other appropriate media

In addition, the AToMS and IMS community will aim to fulfill the UNCG General Education Learning Goal 5, which is a common goal for learning communities across campus.

LG5 Personal Civic, and Professional Development:
Develop a capacity for active citizenship, ethics, social responsibility, personal growth, and skills for lifelong learning in a global society. In so doing, students will engage in free and open inquiry that fosters mutual respect across multiple cultures and perspectives.

II. Team Roles and Responsibilities

A. Director:

- Responsible for communicating with all team members, outside university offices, and for speaking on behalf of the community.
- Responsible for submitting a proposed budget and for operating the community within the received budget.
- Responsible for the course design and implementation of the ISL courses.
- Responsible for the hiring of graduate assistants and discussion leaders
- Responsible for providing direction and oversight to team members regarding community operations: both day-to-day operations as well as periodic operations such as research and evaluation endeavors and recruiting efforts.
- The director will also serve as a faculty team member on an individual level.

B. Faculty Team Member:

- Faculty team members are invested faculty members who are willing to attend regular meetings, class functions, content courses, and other community activities.
- Faculty team members are expected to make themselves available to students on a regular basis in order to facilitate faculty-to-student connection. This should be done through regular, organized events for students from AToMS/IMS and also through posted office hours.
- Faculty Team members are expected to offer assistance in conceptualizing the operations of the community, especially with regard to their own disciplines.

C. Graduate Assistants:

- Student case management: GAs should be available to students by phone and email to help resolve university-related issues.
- Daily operations: GAs should offer administrative support to the community on an as-needed basis.
- Planning: GAs should maintain a detailed timeline of action tasks, activities, and deadlines throughout the year.
- Teaching assistance: GAs function as teaching assistants in the ISL courses.

- Communications: GAs will send out newsletters (weekly during the semester and monthly during the summer). GAs will also communicate regularly with team members and other campus offices to conduct the business of the community.

D. Discussion Leaders:

- Leaders are to host weekly discussion sections for AToMS students in which course material from AToMS courses will be covered in unique and helpful ways.
- DLs will discuss new material from the week's class and help students diagnose the areas where their difficulties lie.

E. Undergraduate staff:

Undergraduates can be utilized to support the Friday lunches and perform other basic tasks.

III. Integrated Studies Lab Courses

A. Four-semester overview

Fall	**Spring**
AToMS I (ISL 101): Formal Report, Study Support, Adjustment/transition	**AToMS II (ISL 103):** Chemistry Integration/Mars Rover, lab experiment, Grand Challenges
IMS III (ISL 102): Grand Challenge as Problem-Based Learning, Website creation, Begin Research	**IMS IV (ISL 104):** CSC 330-Data Structures, Undergraduate Research Expo

B. Learning outcomes:

AToMS ISL Student Learning Outcomes

Core traits to develop: professionalism, resourcefulness, critical thinking, and organization.

AToMS students' progress will be assessed via weekly journals written to prompts, formal and informal classroom discussions and activities, and capstone experiences such as research presentations and reflective essays that demonstrate progress both in communication skills and development of the core traits. Assessments will be performed in a multiplicity of modes: generative and receptive, oral, written, and experiential.

1. Transition from high school to college.

1.1 Develop the behaviors and skills expected of a college level student.
1.2 Demonstrate appropriate communication techniques with faculty and peers.
1.3 Understand campus resources.
1.4 Understand how to manage financial resources.
1.5 Show a shift towards self-advocacy.
1.6 Demonstrate critical thinking strategies.
1.7 Develop an understanding of how he/she learns.
1.8 Demonstrate an ability to evaluate sources of information.
1.9 Understand the implications of appropriate time management.

2. Develop a professional identity.
2.1 Understand the concept of professional identity in the student's chosen field.
2.2 Identify and demonstrate the behaviors and skills appropriate to the student's stage of professional development.
2.3 Identify sources of information about careers and professional development.
2.4 Identify his/her own interests, strengths, needs, and preferences in both professional and personal settings.
2.5 Connect classroom learning to personal experience.
2.6 Understand the registration process and its correspondence to academic goal setting.

3. Learn to be part of a community.
3.1 Identify the communities that he/she belongs to and the role that they play in his/her life.
3.2 Understand the interdependence among members of a community.
3.3 Demonstrate respectful communication skills.
3.4 Understand how to allocate human resources to best use each member's personal strengths.
3.5 Understand what his/her personality, strengths, and preferences can contribute to a community effort.
3.6 Understand how to set up an appropriate division of labor.
3.7 Understand how to structure tasks, ideas, and resources in order to produce a successful outcome.

IMS ISL Student Learning Outcomes

Core traits to develop: professionalism, leadership, and critical thinking.

IMS will be assessed through several modes of protocol. These assessment measures will seek to grasp the student's development as a STEM major, satisfaction with the IMS program, as well as capsulate the learning community experience. Assessment measures will take place throughout the year via weekly journaling, semester meetings with faculty, semester self-report of progress/growth, and conclude with end of year surveys and reflective essays.

1. STEM Leadership
1.1 Participate in a service project related to their discipline.
1.2 Develop an appreciation for the value of student diversity in interests, opinions, and demographics through the (L)LC environment created.
1.3 Display social skills required to work together across diverse demographic and/or disciplinary groups.

2. Professionalism

2. 1 Demonstrate the ability to practice the concepts learned in a controlled environment through the successful completion of assignments.
2.2 Improve communication skills to be able to convey concepts in science and mathematics to each other and to those in the outside community.
2.3 Develop a foundation understanding of disciplinary and professional ethics through review of real-world problems and challenges.
2.4 Develop knowledge of a broad range of career opportunities within the mathematical, physical, and life sciences.

3. Critical Thinking

3.1 Demonstrate the ability to use design concepts to create strategies for problem-solving processes that advance the development of new ideas and implementation within the context of a scientific and/or mathematical model.
3.2 Comprehend the "language of mathematics and science" to assist in the development and implementation of scientific and/or mathematical concepts and their applications.
3.3 Use critical inquiry and varied research methodologies within problem-based learning.
3.4 Integrate concepts, information, and insights to analyze current real-world problems and challenges within the mathematical, physical, and life sciences.
3.5 Gather and critically evaluate information from different sources (i.e., information literacy).
3.6 Demonstrate how to solve a problem or settle a problematic situation using science and/or mathematical ideas, concepts, and models through the use of mathematical and/or scientific analysis.
3.7 Strengthen their scientific and/or mathematical knowledge through the use of student-oriented teaching methods.
3.8 Apply examples, facts, or theories gained in major coursework to real-world problems and challenges through research and service.
3.9 Identify and perform key steps and strategies of the academic research process within the mathematical, physical, and life sciences.

C. Community building

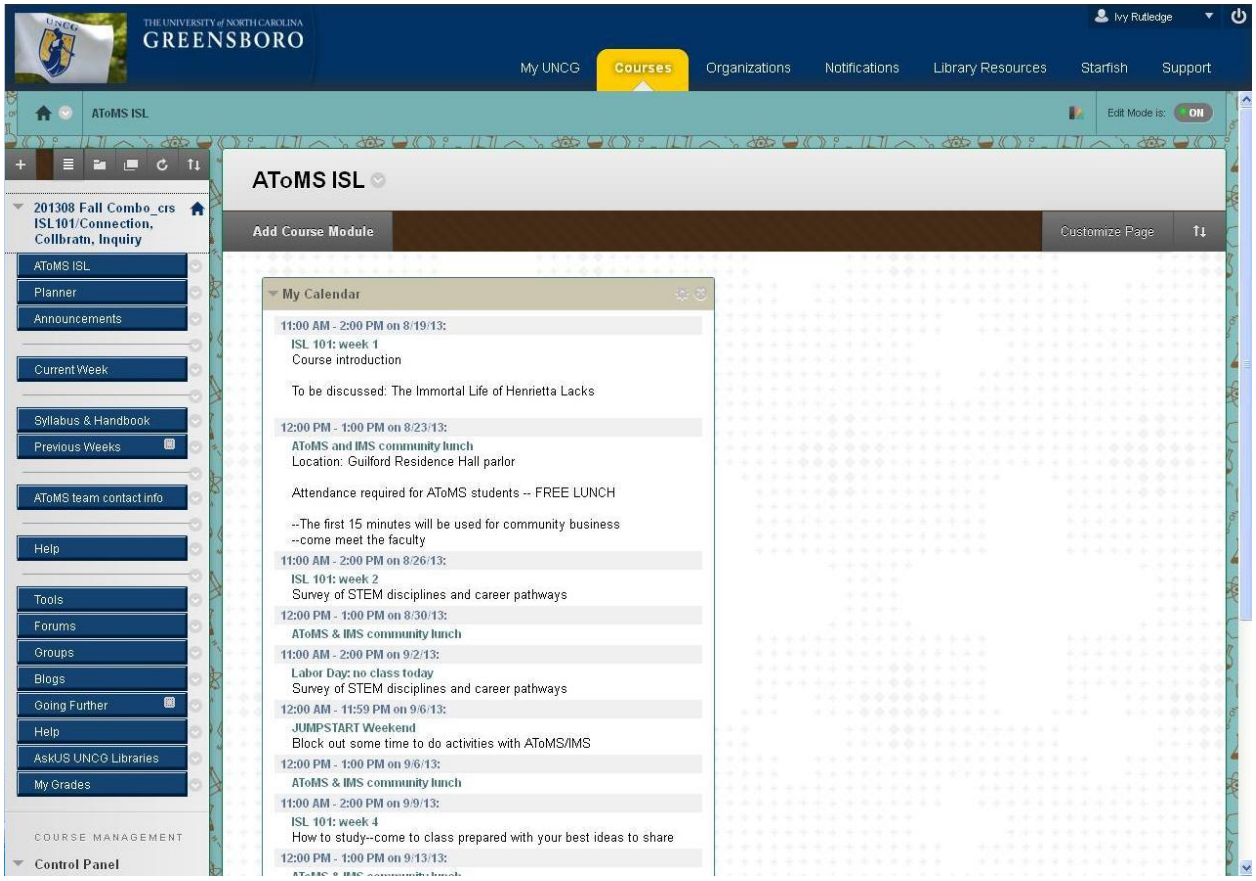
Learning community students are expected to attend their ISL course, and all other courses on a consistent, regular basis. Students are required to fulfill 1 hour lab credit through the ISL course. This translates into three hours a week of time devoted to the community. One hour will be spent in the ISL class, one hour will be spent at the Friday Community Lunches (optional for IMS students), and the final hour for is left up to student choice.

This may be fulfilled through community socials, UNCG STEM events, campus lectures, STAMPS events, group work, and other approved outlets. Students will record these hours on an

hour log (outlined in the ISL course). Failure to attend activities will not only cause student grades to suffer, but will also limit the student's ability to connect with community peers. Community building activities are meant to allow members to bond, and benefit each other in STEM identity development. Therefore presence, cooperation, and enthusiasm are essential.

D. Blackboard setup for ISL courses

- Home page with calendar and announcements
- Weekly configuration: each week becomes available the day of class, and the previous week's folder gets moved into the "previous weeks" section
- Within each week's folder:
    - resources for further learning—links, documents, and other types of resources
    - a weekly "test" renamed as "weekly journal
        - Question 1: File response question that asks for a file upload. Students are asked to upload a log that records and describes their extra hours
        - Question 2: Essay question that gives a writing prompt for the weekly journal.
    - assignments



IV. AToMS and IMS available courses

Courses Available to AToMS

Discipline	Fall 2013	Spring 2014
English	ISL101	ENG 230
Mathematics	MAT 150, 190, 191	MAT 151, 292
Chemistry	CHM 111 w/ 112 (lab)	CHM 114 w/ 115 (lab)
Computer Science	CSC 100 or CSC 130	CSC 130
Physics	PHY 101	PHY 291

Fall:

- ISL 101 (Collaboration, Communication, and Inquiry)
- CHE 111 (General Chemistry I) with 112 (lab), to be integrated with ISL 101
- Choice of MAT 150, MAT 190, or MAT 191
- For Physics and Computer Science majors: PHY 101, CSC 100 or CSC 130
- ENG 101

Spring:

- ISL 103 (Service, Reflection, and Inquiry)
- ENG 230 (English Composition II)
- CHE 114 (General Chemistry II) with 115 (lab)
- Next math course in sequence
- For Physics and Computer Science majors: PHY 291 (General Physics I with Calculus), CSC 130 (Introduction to Computer Science)

Courses Available to IMS

Discipline	Fall 2013	Spring 2014
Mathematics	MAT 191, 292	MAT 292, 293
Chemistry	CHM 351 w/ 354 (lab)	CHM 352 w/ 355 (lab)
Computer Science	CSC 230	CSC 330
Biology	BIO 301, 302	BIO 355, 356
Physics	PHY 292/292L	PHY 321
Geography	GEO 121	GEO 301

Fall:

- ISL 102 (Research, Discovery, and Inquiry)
- BIO 301,302 (Principles of Ecology & Ecology Lab)
- CHE 351,354 (Organic Chemistry I & Organic Lab)
- CSC 230 (Elementary Data Structures & Algorithms)
- GEO 121 (Intro to Geographic Information Science)
- MAT 292 (Calculus II)
- PHY 292/292L (General Physics II with Calculus)

Spring:

- ISL 104 (Service, Reflection, and Inquiry)
- BIO 355,356 (Cell Biology & Cell Biology Lab)
- CHE 352,355 (Organic Chemistry II & Organic Lab)
- CSC 330 (Advanced Data Structures)
- GEO 301 (Urban Geography: Global Patterns)
- MAT 293 (Calculus III)
- PHY 321 (Modern Physics)

Math Placement Test

The Department of Mathematics offers placement tests in order to help students decide where to begin their math sequence. Typical beginning courses are:
MAT 150 Precalculus 1

MAT 151 Precalculus 2 (Students considering this course may be better served by 190)
MAT 190 Precalculus 1&2 combo course
MAT 191 Calculus

Many AToMS students begin with MAT 150; any student can enroll in MAT 150 without taking a placement test. Students who would like to begin their sequence with MAT 190 or higher will need to take a placement test. The test is given online through Blackboard. In order to access the test, students will need to request a code. There are 2 different tests: one for MAT 190 and one for MAT 151/191. Students should decide where their mathematical skills are situated and request the code for the appropriate test.

MAT 190 test → email address is mat190place@uncg.edu
MAT 151/191 test → email address is matplace@uncg.edu

There are more detailed instructions on the Math Department page:
http://www.uncg.edu/math/undergraduate/mathplacetest.html

You'll need to send an email requesting the access code to mat190place@uncg.edu and identify yourself as an incoming ___ major and member of AToMS. Also give your student ID#. Once you've requested the access code and receive it, you should be able to open up the test on Blackboard. It will take you about an hour.

Once you've taken the test, please email your test score to the Office of Learning Communities.

Computer Science Placement Test

Interested CSC students can take the placement test to enroll in CSC 130 while enrolled in MAT 150.

V. Discussion Sections

A. Discussion Leaders are recruited in the spring and summer and hired for the entire academic year.

B. Description: Prepare and lead a weekly discussion section for a small group of students to answer questions, review old material, present new content, and provide an intimate, small classroom experience for students in a large university class

Recruiting text:

The AToMS (Achieving Together in Math and Science) Learning Community is looking for several discussion leaders to serve as academic support to a group of freshmen math and science majors.

Candidates would serve as discussion leaders within the Math and Chemistry majors. Leaders would host weekly sections for AToMS students in which course material would be covered in unique and helpful ways.

Discipline	**Fall 2012**	**Spring 2013**
Mathematics	MAT 150, 191,	MAT 151, 292
Chemistry	CHM 111 w/ 112 (lab)	CHM 114 w/ 115 (lab)
Computer Science	CSC 100 or CSC 130	CSC 130
Physics	PHY 101	PHY 291

Candidates must:
- Have majored in or be currently studying the major they will serve
- Be able to serve 3-5 hours a week- hours vary
- Have an interest in instruction and student interaction
- Be able to communicate with course instructors, obtain texts, and obtain syllabi
- Be able to provide creative and unique instruction

Candidates may be:
- Undergraduate or graduate level

For more information please contact your department representative.

VI. Guilford Residence Hall

A. The Living and Learning Community is housed on the 3rd floor of Guilford Residence Hall. This floor has space for 48 students, both freshmen and sophomores.

In order to live in the LLC, students must:

- Meet all housing application and payment deadlines
- Demonstrate an eagerness and ability to contribute to the well-being of other students in the community and to the community as a whole.

B. Guilford Smart Parlor

- Used for teaching ISL classes and for social gatherings
- Open 24/7

C. Storage space is available for community use.

D. Classrooms are available and should be reserved in April for the following academic year.

E. Parking: Loading and unloading space is available on the corner of North Drive and College Avenue and along North Drive, behind Guilford.

F. Access to commuter students and non-Guilford campus residences is available through Housing and Residence Life.

VII. Community Events

A. Friday Lunches are held weekly during the semester in the Guilford Parlor.

- All AToMS students are required to attend
- All IMS students are encouraged to attend
- Faculty team members are encouraged to attend.

B. Monthly Socials

- Social events will typically be held in Guilford or Petty
- Events will include mixers, movie nights, etc.

C. Service Opportunities

A. Mentoring

B. Service Learning Activities: Students will be informed about opportunities for service learning throughout each semester. ISL courses will include a requirement to fulfill a loose hours requirement (14 for AToMS and 28 for IMS), some of which may be fulfilled with service learning activities.

VIII. Communications

- Contact information is available in Appendices A and B
- Students should receive a limited number of emails. Subject headings should be specific and begin with "AToMS:"
- Community communication should be contained within the community blog whenever possible, directing attention to that source as a primary means of dissemination:
    - http://atomsandims.wordpress.com/
- GAs should use their own UNCG address when communicating with team members and other campus contacts
- GAs should use the ims@uncg.edu and atoms@uncg.edu addresses when communicating with students.
- GAs should have access to an office phone to communicate with students and campus offices.
- GAs will need to build positive professional relationships with a number of other stakeholders in the university, including:
    - Office of Learning Communities
    - Housing and Residence Life
    - Registration and Advising
    - Admissions
    - Department of Educational Research Methodology
    - Instructional Technology
    - Department of English
    - Department of Chemistry and Biochemistry
    - Department of Computer Science
    - Department of Mathematics and Statistics
    - Department of Physics and Astronomy

IX. Recruiting

A. Criteria: Students must show two of the following three traits:

1. Investment in their academic career
2. Knowledge and competency in STEM disciplines
3. Enthusiasm for the AToMS LC

B. Application process

1. Student completes an online or paper application through the Office of Learning Communities. The application is emailed to the Director and GAs.
2. If practical, a team member interviews the student, either in person or by phone.
3. Applications are tracked on a spreadsheet to collect contact information and other relevant data.
4. Dorm assignments are made ongoing through the end of SOAR.
5. A waiting list will be maintained.

C. Timeline

- Recruiting begins before winter break for IMS and at Destination UNCG in the spring semester (DUNCG) for AToMS.
- IMS: recruitment will start with the current AToMS students. This will occur via posters in Guilford Hall, a fall information session, sending fliers to Grogan, and the STEM department heads: Math, Physics, Computer Science, Chemistry, Geography, and Biology. GAs need to keep in mind the February housing deadline. Forty to fifty percent of slots should be filled with IMS students. IMS students should be leaders from AToMS/Grogan, and should be enthusiastic about the program. Also, seek out transferring students through the admitted lists that the Undergraduate Office provides to department heads.
- AToMS: GAs need to begin recruitment at Destination UNCG. GAs will receive admitted lists of students from department heads, and then email information to such students. The Senior Associate Director of Admissions should be contacted to see if AToMS can receive a list of students who have signed up for DUNCG. At DUNCG AToMS faculty will pass around an interest sheet, and discuss the benefits of AToMS. There is also an information fair at DUNCG. The Director of AToMS will be present for the fair, get student information, and direct students to current AToMS students in the EUC. After DUNCG all students who signed the information sheet will be emailed information and an application. Decisions will not be made until May.

- AToMS (SOAR): The GAs will split up SOARs and attend in order to interview applying students, share information, and answered admitted students questions. GAs look for enthusiasm, STEM understanding, and good communication skills. GAs will report in the afternoon to the OLC who will be admitted, wait listed, or denied. GAs will communicate to the Room Assignments Coordinator about the dorm slots. GAs should aim to keep a 50/50 gender balance, and a fairly even balance between majors.

X. Research and Evaluations

A. Pilot year study: For the 2012-2013, an evaluation team of graduate students in ERM 643 (Aundrea Carter, Christine Meyer, and Lindsey Varner), led by Dr. Holly Downs, conducted a semester-long evaluation of the AToMS learning community. The results of this study are available through the Director and team members.

B. 2013-2014

1. Fall Semester
    - Pre-test of expectations: first class of fall semester. Students will be given an index card and asked to write a paragraph describing their expectations for the AToMS community in general and the ISL course in particular.
    - Mid-semester: students will revisit their expectations through the writing of a journal entry.
    - End of semester evaluations will follow the protocol established in the pilot study.
2. Spring Semester: TBD

APPENDIX: Timeline of tasks, important dates, and deadlines

JANUARY

- Plan a welcome-back social in early January.
- January 1st = Earliest date to file a FAFSA
- IMS recruiting:
    - Interview IMS candidates from existing AToMS population
    - Plan IMS recruiting sessions in Guilford for end of January
    - Post IMS informational fliers in each department: Mathematics and Statistics, Physics, Computer Science, Chemistry and Biochemistry, Geography, and Biology.
    - Contact the head of each department to acquire contact information for rising sophomores.
    - Contact the coordinator of the STAMPS program for a list of Geography students.
    - Contact the coordinators of other learning communities for a list of STEM students.
    - Communicate housing deadlines to IMS candidates and begin placing in Guilford spaces as appropriate.
    - Set application date for IMS LLC as the application date for housing.
- AToMS recruiting:
    - Contact NC high school guidance departments with information about AToMS to pass along to their students.
- Research: Interview IMS students that also participated in AToMS.

FEBRUARY

- Review all PR materials: brochures, fliers, web copy. Make corrections with Office of Learning Communities in early February. (Check with OLC for exact deadline.)
- Continue IMS recruiting efforts.
- Continue to communicate housing deadlines and to place students in Guilford.
- AToMS recruiting:
    - UNCG Phone-a-Thon: Department heads should request a list of the UNCG-admitted students that have indicated their department as an intended major.
    - Request a list of students attending Destination UNCG from an Assistant Director in Admissions
    - Request a list of admitted students from each department head.
    - Create AToMS branding initiative for DUNCG.
- Communicate housing deadlines.

MARCH

- Application Due Date for current AToMS members who want to join the IMS LLC.
- AToMS recruiting:
    - Develop interview protocol for DUNCG, and plan for faculty involvement. Get details from OLC.
    - Contact students a week or two before DUNCG.
- Financial Aid dates:
    - March 1: deadline for "priority" processing. Also, summer applications are available.
    - Mid-March: awards begin.

APRIL

- Begin looking for GAs and plan for training.
- Application deadline for non-AToMS students who want to join IMS LLC.
- Destination UNCG:
    - Create a sign-up sheet for students at Academic Advantage
    - Push the AToMS brand
    - Get faculty involved
- Reserve classroom and common area space for fall semester.
- Deadline for summer session financial aid application.
- Plan for SOAR packets: save-the-date or other branding items; AToMS registration information sheet

MAY

- Care packages for exams
- IMS housing assignments due.
- Deadline for SOAR packets.
- AToMS students must apply for housing. Distribute online application link in emails.
- Late May: call and welcome new AToMS students and explain the math placement test.
- GA training.
- Recruit discussion leaders for fall. Obtain schedules and reserve classroom space.
- Plan SOAR protocol and schedule staffing. Provide registration info sheets to OLC.

JUNE

- Send monthly newsletters to IMS and AToMS students in early June
- SOAR
    - AToMS students register for classes.
    - Interview AToMS candidates and collect contact information
    - Assign housing spaces as needed
    - Document all SOAR contact in a log

- Maintain waiting list for LC and LLC

JULY

- Send monthly newsletters to IMS and AToMS students in early July
- Read and assess research results
- Revise ISL syllabi
- Revise and update Policies & Procedures handbook
- Prepare welcome packets for move-in day
- Plan Jumpstart weekend
- Set up Blackboard
- Generate list of loose hour options

AUGUST

- Tuition due in early August
- Confirm dates, timelines, reservations, resources, and other details
- Get STAMPS schedule
- Move-in day:
  - Welcome packet
  - Photos of each student
- Aug 19-23 = First week of classes
  - Photos
  - Create a PowerPoint slide for introduction
  - Course adjustment
  - Research: Pre-test of community expectations--distribute an index card for a short paragraph and collect, then discuss.

SEPTEMBER

- Take pictures of dorm space
- Jumpstart weekend

OCTOBER

- Take photos of students
- Oct 16 to Nov 19: Students are advised for spring semester
- Oct 11: Last day to drop class without penalty
- Research: Touch base on student expectations via journal prompt

NOVEMBER

- Submit photos to OLC for PR materials
- Begin IMS recruiting
  - Contact Meg Horton to pass along info to Grogan Bio students

    - Pass on flier to OLC
    - Dorm assignments: Begin to Push/Check new 2014 deadlines
- Oct 28-Nov 19: Registration
- Research: plan for final evaluations using pilot year evaluations

DECEMBER

- IMS recruiting:
    - Post in Guilford Hall: Include key housing and application dates
    - Current AToMS students' peers: circulate an info sheet via email and in the dorm
- Care packages for exams