



Promising Practices from the Woodrow Wilson Early College Network

Scaffolding the College Transition

The senior experience
Manhattan Hunter Science High School – Hunter College

School Type: Public (New York City Department of Education)

Principal: Susan Kreisman

School Location: New York, NY

Level: 9-12

Number of Students: 406

Manhattan Hunter Science High School, in partnership with Hunter College of the City University of New York (CUNY), has devised a promising educational program that blends the senior year of high school with the first year of college in order to ease students into the challenges that college brings. The first year of college for most students requires them to make adjustments to a new environment. Traditional-age college students are free from many of the rules and regulations of high school. Students must take on greater responsibility for their own academic success and for managing the tasks of college, such as adding and dropping courses, paying tuition bills, managing their time, and studying effectively. An increased sense of freedom and responsibility is partnered with anticipation about the people students will meet, the things they will learn, and the many possible futures available to them. Although individual students react differently to the newness of college, making the transition is a difficult process for many, especially low-income, first-generation college students. At Manhattan Hunter Science, the transition is more seamless.

The best part of attending Hunter College during your senior year of high school is the experience of being in a college atmosphere. You begin to get a realization of what you really want in a college. It prepares you for a transition that you will have to make, but eases you into the process at the same time - because you've already experienced it. It doesn't get any better than that for high school students in the city.

–MHSHS senior

School context

With support from the Woodrow Wilson National Fellowship Foundation as part of the Bill & Melinda Gates Foundation's Early College High School Initiative, Manhattan Hunter Science High School opened in 2003 through a partnership between the New York City Department of Education and Hunter College. It is a public school serving a socially, economically, and racially diverse student body. About 35% of students are Hispanic/Latino(a), 25% Asian American/Pacific Islander, 21%

Black/African American, 13% White/Caucasian, 1% American Indian/Native American, and 5% multi-racial or of unknown race/ethnicity. Most of the students, 69%, participate in free or reduced lunch programs.

The school's curricula emphasize science, the scientific method, and research. At Manhattan Hunter Science, students complete the requirements for a New York State Regents Diploma and have the opportunity to earn college credits in dual enrollment and undergraduate courses offered by Hunter College. The culture of this small school is marked by high academic expectations from caring adults who also provide the support that students need to be successful in both high school and college.

The Blended Senior Year

When students begin their senior year at Manhattan Hunter Science High School (MHSHS), they walk into the buildings of Hunter College's campus rather than walking through the front door of the high school building. They take both high school and undergraduate courses at the college. They work with faculty and support services personnel from both the high school and the college. They participate in both high school and college activities. But the physical location of their schooling in the senior year – Hunter College's campus – symbolizes a real transition away from high school.

Academic Course-Taking

At Hunter College, seniors complete their high school Regents diploma requirements with courses in English and social studies. These courses follow the high school Regents curriculum and are taught by two high school faculty members. However, the courses are taught in the collegiate model that follows Hunter College's daily class schedule. Students also take math and science college courses. In the fall semester, they enroll in an undergraduate science course that they choose from a list of options. They are also placed in an undergraduate mathematics course based on their college placement test results and teacher recommendations of readiness. In the spring semester, students continue to enroll in math and science college courses, and have the

opportunity to take undergraduate electives as well. (See Appendix A for a list of college courses.) To enroll in college courses, students must meet entrance requirements of the college, which involves passing a basic skills test (or receiving an exemption based on Regents exam scores) and meeting specific course pre-requisites.

For most college courses, MHSHS students are integrated into the same courses that undergraduate students take; therefore, their specific schedules vary. In a few instances, MHSHS students may take a college course as a cohort. For example, a group of 23 students took Chemistry 100 as a cohort in fall 2006. In addition, the college offers lab sections or recitations specifically for MHSHS students who enrolled in large lecture courses, like Biology 100.

Two Worlds at Once

The seniors are high school students, yet they begin to identify as college students. They have Hunter College student ID cards, Hunter College e-mail accounts, access to the library and other academic resources and facilities like the athletic center and campus dining, and they may choose to participate in student activities and organizations at the college.

I [joined] the Dominican Club. It's mostly people who already are at this college so they try to help you out, encourage you to do better. You always say, 'Oh my gosh, it's so hard, I don't want to do this anymore,' and they're like, 'No, you need to try it, because you have to give it a chance. Things always seem hard at the beginning and then they get easier as you get used to them.' And then you can always go there for free time. They always have their doors open. –MHSHS senior

Students also keep connected to the high school. They spend one day each week on the high school campus. They participate in high school athletics, student government, and activities such as the yearbook and prom committees. The physical distinction between the high school campus and the college campus, however, can at times make the dual roles difficult to navigate.

When you're so used to being here, you start thinking that you're a college student. So it's like, 'Well, I don't want to go back to high school anymore.'

–MHSHS senior

And it's weird, because we go back to the high school and we feel like, 'What am I doing here?' It's so different. When we were there, the school was completely different than what it is now. So when I go, I don't want to be there. I want to leave. –MHSHS senior

Many of the students have already made the transition away from high school and are focused on their future rather than the past. But the high school campus also serves as an anchor, grounding students so that they have the strength and confidence to face the academic and social challenges of their senior year.

There are some students who go back to the high school because it feels comfortable for them. I think as long as they know that it's back there, and they have the safety of that, it's easier for them to be here [at Hunter College]. They are picking up little pieces of this, taking in as much as they can handle for a while, then go back to the high school for a little respite, and then they come back here. And that works too.

–Early College liaison

A Wealth of Supports

The two high school teachers teaching senior English and social studies are also the seniors' advisors. These teacher-advisors spend their full days at Hunter College as well. They have offices at the college and only return to the high school building for meetings and other obligations. The teacher-advisors meet with students on a regular basis to discuss academic and personal issues, and have found a particular niche in helping students with study skills, time management, and providing access to resources.

Something we've realized is that it's helpful to be able to discuss study skills with them. We feel like it's an advantage of having this program, because you don't really get that as a freshman [in college]. –MHSHS teacher

We wanted to support them with getting extra help in every way possible. And that's through the college, through the Math Center that's here, even literally walking them down and saying we'll find help for you there. Also, we have a high school calculus teacher who is going to start coming over. So, we just keep putting our feelers out and keep pressing for things to happen for them.

–MHSHS teacher

In addition, two liaisons employed by the college also help connect students to academic support services available at the college and handle scheduling, registration, monitoring progress in courses, and communicating with college faculty. The liaison office is right next door to the teachers' office on the 10th floor of the East Building. This space is a home-base for students, who often drop by between classes.

I think these two offices are like a little island for the high school.

–Early College liaison

The students rely on this island to help them when they experience the difficult parts of making the transition to college-level work. When asked what keeps them working hard when they find the work to be extremely difficult, students mention not only the benefit of earning college credits but also the support they get from the teacher-advisors.

The high school teachers, they're like, 'Don't give up, come on, try harder.'

–MHSHS senior

This type of validation – affirmation of students' belonging and of their ability to be successful – may be particularly important in helping first-generation college students and students of color make a successful transition into and through college.¹

They know they're not lost, because we listen to them. When they say they're struggling with something, we don't just say, 'Well, it's okay, it doesn't matter.' We work with them until we feel like we've at least made them feel more

¹ Rendón, L. I. (2006, October). *Reconceptualizing success for underserved students in higher education*. National Postsecondary Education Cooperative, http://nces.ed.gov/npec/pdf/resp_Rendon.pdf

comfortable. That doesn't necessarily ensure they'll pass the class, but at least they're more comfortable and they feel like they have the tools to at least try their best. And that's ultimately what we all want to do here. –MHSHS teacher

The teacher-advisors are a communication link between the high school and college and connect the students to the academic and personal support still available to them at the high school. The pupil personnel team at the high school – three school counselors and one social worker – is also heavily involved in student support for the seniors. The pupil personnel team provides academic guidance, personal and emotional support, and group mediation and conflict resolution as it does for all MHSHS students. The pupil personnel team also provides college and career counseling and writes letters of reference for the seniors. The case load of four counselors in a school of 400 students enables the pupil personnel team to attend to each student individually.

They intimately know our students. They know everything about our students.

–Early College liaison

The team located at the college and the pupil personnel team at the high school talk frequently to stay updated on student issues and prevent any student from falling through the cracks.

Peer Support

MHSHS intentionally incorporates self-directed peer study groups into the senior experience design. The study groups are mandatory; students are required to meet as a group for two hours each week.

Taking classes with college students showed me how different college is from high school. I found new ways to understand the material the professors taught in class. I also started to become closer with many of my classmates because we all studied together and assisted each other. –MHSHS senior

The high school teachers also create time for students to study as a group before college course exams. Since the teachers are not subject area experts in math or science, they do not attempt to help students with content. Instead, students teach each other the material.

The great thing that happened was I spontaneously had students come up to the front of the room and begin to teach. It was completely natural. In fact, it was quite extraordinary. Each student grabbed a piece of chalk and both were writing math problems on the board. I just stepped back and let them step into a pedagogical role. –MHSHS teacher

Peer learning is an important educational tool that can facilitate the academic transition to college, especially for students who are first in their families to go to college and for students from low-income backgrounds. In *What Matters in College*, Alexander Astin relies on 25 years of research from the Cooperative Institutional Research Program to demonstrate the powerful influence of peer groups on undergraduates' learning and development.² And a study using data from the National Survey of Student Engagement found that “low-income, first-generation students tend to benefit more [in terms of cognitive development] from educational practices that...engage them in a collaborative learning process.”³ These practices include working with other students on projects during class, working with classmates outside of class to prepare class assignments, tutoring or teaching other students, and discussing ideas from readings with others outside of class.

What is most important about our student body is that they're a family. This becomes transparent when you observe them tackling various obstacles. First and foremost they support and trust one another. When you're part of a tight knit group such as this, you don't need to feign perfection. The bottom line is that students can let go of their pretenses, and ask for the help they need. –MHSHS teacher

² Astin, A. W. (1993). *What matters in college? Four critical years revisited*. San Francisco: Jossey-Bass.

³ Filkins, J. W. & Doyle, S. K. (2002, June). *First generation and low income students: Using the NSSE data to study effective educational practices and students*. Paper presented at the Annual Forum for the Association for Institutional Research, Toronto (p. 14)

College-Going

College-going was not always a given for many Manhattan Hunter Science students, but Early College has created new possibilities for them. And students aim high. Their choice between going to college or going to work has changed to a choice between many different colleges, including public and private four-year colleges in New York and out-of-state.

Honestly, I didn't think I was going to college. I always studied hard because my mom told me I was a role model for my sisters and brothers, I'm the oldest. I made sure my little sister came here [MHSHS] because I want her to go to college too. –MHSHS senior

With our group of kids you need to take the time to help them plan their futures. They have to see the big picture.... Sometimes they just need some extra encouragement, because many don't see past tomorrow. Despite this fact, all of our students have high aspirations, very high aspirations! You just need to create the space as a teacher to let them be heard. –MHSHS teacher

The school counselors are heavily involved with each student's decision-making. They work with students on identifying college options and scholarship opportunities and completing applications. The philosophy of college advising is encourage, do not dissuade, and help students make an informed decision. They direct students to information sources that provide details on different colleges in terms of size, public or private, and academic focus. They help students explore campus culture, fields of study available as majors, campus life, and tuition and financial aid options. Students and their families then use this information to make decisions about applications and acceptances.

The counselors provide support and information. They also advocate on behalf of students. In one example, a counselor contacted a college admissions office directly to discuss the student's success in college chemistry as an indicator of his readiness for college and his ability to successfully complete college level work.

In addition to the high level of support from the school counselors, everyone involved in the senior experience takes responsibility for educating students about the college-going process. The twelfth grade English teacher-

One student's story

When Marcos* started at Manhattan Hunter Science High School, he was not invested in school. He did not take classes or homework very seriously. He was aggressive: he taunted teachers and harassed other students. Out of school, he belonged to a gang. Once, he got in a fistfight with his father. One teacher who really liked Marcos – thought he was very charming and funny – also felt he could have ended up in jail.

Something changed for Marcos during the senior experience. Marcos loved being a Hunter College student in his senior year. He felt a strong sense of belonging. He saw that there was a lot of support for him at the college and knew that he needed that level of help to be successful. Even though his motivation changed and his grades improved, the first three years of high school were not erased from his academic record. But Marcos wanted more than a high school graduation.

Towards the end of the fall semester of his senior year, he saw his poor grade in the science course he was taking and thought he could do better. He wanted to do better. In the spring semester, he decided to focus more on his schoolwork and put more time and effort to studying. He completed every homework assignment. He had a high B average in both his English and social studies high school courses. He dutifully sat in on a college course even though he knew he wasn't able to receive college credit for it. He just wanted to learn. He enjoyed it.

One teacher commented, "Something has changed in him. I guess he saw the possibility. He saw a different future."

Marcos is now attending the College of Staten Island, a four year college in the CUNY system, with the goal of transferring to Hunter College.

* This student's name has been changed.

advisor and the school principal review drafts of the students' college essays. The teacher-advisors and Early College liaisons also discuss students' plans with them. Together, they look at differences between scholarships, loans, and work-study financial aid awards; investigate the economics of the real costs of college versus tuition and fees; think through the pros and cons of living at home and living on-campus; and explore the type of learning environment students want.

Students have the option to continue their studies at Hunter College as well. They must meet all the requirements for admission to the college, but their first full year of tuition is covered and all credits earned while in high school are already on their transcript and apply towards their degree. Twenty-one students from the class of 2007 took advantage of this option.

Preparation for Senior Year

The senior year is a capstone experience that builds on the high school curriculum in all subject areas to prepare students for college. Hunter College faculty work with high school faculty to weave college readiness content and habits into the high school curriculum. The goal is to prepare them for success in introductory courses at Hunter. The school's four phase educational program advances the level of intensity of academic challenge while systematically changing the scaffolds to address students' needs. The four phases help students grow into learners who are self-regulated, self-directed, and comfortable with ambiguity.⁴ In twelfth grade, seniors put their learning into practice within a supportive environment.

In the first phase, courses are taught at the high school by high school faculty. The teachers emphasize procedural understanding, problem posing, inquiry, and creative thinking. They help students move from middle-school preparation to an understanding of high school work.

The middle school is way different from high school. The transition from eighth grade to ninth grade is a big transition right there, because eighth grade is all

simple and stuff, and when you go to high school, everything changes. They actually expect: the minimum is like the maximum basically. Sometimes it'll be really arduous, so [teachers] will give you their [phone] number and they'll help you after school. –MHSHS junior

In the second phase, students enroll in a dual credit course in chemistry in tenth grade and physics in eleventh grade. Students also may take dual credit courses in Spanish as well. This phase introduces college course curriculum and assessment in a format and environment consistent with traditional high school courses. The courses are taught at the high school, high school and college instructors collaborate on the syllabi and instruction, and science courses are stretched over a full academic year.

The third and fourth phases occur during the senior year. In phase three, cohorts of students take high school courses and college credit courses taught at the college. In this phase, the courses adopt a college-style format to foster the habits of mind and self-regulatory behaviors needed to be successful in college. Even though students are in a new, unfamiliar environment, they have the support of their peers as well as their high school teacher-advisors.

In some ways it's an advantage to take the cohort class the first semester. It helps some of our students ease into the experience. The classes are smaller and more focused, with the guidance of a college professor. You have the opportunity to ask the instructor a lot of questions. It may be more demanding than the average high school class, but you still get special attention. This was tremendously beneficial. –MHSHS teacher

The final phase moves students into college courses alongside undergraduates. They have access to the full support services of both the high school and the college, as described above, they are encouraged to utilize peer support through study groups, and their progress is monitored by the school. Many students struggled in their college courses, but they have intense academic and social-emotional support from people they trust. Ultimately, students see the struggle as valuable.

⁴ Kreisman, S. (2005). *Creating an early college high school: Pathways to promising futures*. MHSHS school document.

It's worth it, because we're getting prepared for the future. I mean when we go on to 'real' college they're [college admissions officers] going to see that we took the classes and [think], 'Oh, they made a good effort.' They're going to see that we tried. We had the chance and we took it. It's not like we ran away from the class... We tried. –MHSHS senior

Design Features

Learning the culture of college

In addition to academic changes, some of the more difficult transitions in the first year are knowing and adapting to academic expectations, interacting with faculty, time management and effective study skills, and keeping pace with reading and other assignments. MHSHS seniors find their way through the transition by *directly experiencing it*. The school guides students, providing strategies to help them adjust to the new demands. Students continue to adjust as they learn first-hand what is expected of them.

So the more gently we move them into this environment, the more seamless it is, the more likely it is that beyond this grand experiment we wind up with youngsters who truly are successful and navigate their ways into places they never believed they were going to make it. –MHSHS principal

As students better understand the expectations of college, they also develop a stronger sense of belonging. The physical setting of the senior experience at Hunter College and away from the high school building combined with full membership in the campus community signals an important change in students' academic identity. Students become confident in their ability to "do" college because they have already succeeded in the college environment. This self-efficacy has as strong an influence on a students' future achievement as does their prior achievement.⁵

⁵ Robbins, S. B., Lauver, K., Le, H., Davis, D., Langley, R., & Carlstrom, A. (2004). Do psychosocial and study skill factors predict college outcomes? A meta-analysis. *Psychological Bulletin*, 130, 261-288.

School culture

The first year of college is a critical time for students. Many first year college students are academically under-prepared for the demands of college-level work. The impact is serious: almost 25% of students at four-year colleges don't return for a second year, and the rate is just under 50% at two-year colleges.⁶ MHSHS attempts to prepare **all** of its students to a college readiness standard, and **all** students enrolled in the school participate in the senior experience.

I think it's great that the program serves everyone and that the entire senior class comes here, but you need to know each student and what they can handle coming in. –MHSHS teacher

A full participatory model is the foundation of the school culture, which can be described as high expectations with strong support for all students.

Our design begins with three simple statements:

- *This is important*
- *You can do it*
- *We won't give up on you*

–MHSHS principal

The academic press – combined with intense support – from teachers, counselors, and peers moves all students to higher levels of accomplishments.

It's those kids that are in the middle of the path that are really having to fight for the grades that I think are gaining the most from the program.

–Early College liaison

One of the more difficult challenges during the first year of implementing the senior experience was finding the right balance between structured support and student freedom/responsibility. Because the school takes a flexible approach, it was able to make adjustments throughout the first year to meet the needs of students.

It's going well. I guess it's a day-to-day learning experience, because it's brand new. We're still trying to figure everything out and figure out what kind of support the students need. I feel like

⁶ 2005 IPEDS data from <http://www.higheredinfo.org>

we're constantly revamping our ideas about things. But as a team we work pretty well. –MHSHS teacher

We are now at the point where we can quickly adjust our design. I remember that in the first week of school our study group structure was falling apart. In less than 24 hours we changed the entire system. In this job you need to be malleable and constantly have to 'roll with the punches.' –MHSHS teacher

To effectively make some changes requires the team at the college to communicate the immediate needs of the seniors to those at the high school, a process that was difficult to navigate at first. The senior experience requires not just flexibility in working with students but flexibility and openness in working with colleagues as well. The principal, teacher-advisors, liaisons, the pupil personnel team, college faculty, and Hunter College support services needed to learn to share information and work together within a new structure.

College Engagement

The full participation of Hunter College is essential to the success of the senior experience. The college is an equal partner in the Early College design and contributes substantial financial, personnel, and other resources. College faculty members work with high school faculty to incorporate college readiness standards into the high school curricula. College faculty members instruct college courses. Campus space is allocated for the liaison and teacher-advisors' offices and the classrooms for seniors' high school courses. The college employs two dedicated Early College liaisons and makes learning support services available to MHSHS students.

The president of Hunter College has been an active supporter of the Early College partnership and has been critical to its success.

*The president of Hunter's commitment to the school helps us realize this program. It does me a world of good.
–MHSHS principal*

The president nurtures the commitment and participation of the college to ensure the Early College partnership's sustainability.

Outcomes

There were many positive immediate outcomes for the first graduating class of Manhattan Hunter Science High School. The long-term outcomes for the class of 2007 are yet unknown, but the indicators suggest that students are on their way to continued success in college, work, and life. First, the school's graduation rate was 97%. All seniors in the Class of 2007 met or exceeded the assessment standards required for a New York State Regents diploma – they passed at least five Regents exams (English, Mathematics A, Global History, US History, and Living Environment) with a score of 65 or higher. Also, 32% of seniors graduated with an Advanced Regents Diploma; these students passed eight Regents exams with a score of 65 or higher.

More than three quarters (77%) of the class of 2007 earned 10 or more college credits during high school, and 22% earned 19 or more college credits. That is, a majority of seniors graduated with nearly a semester or more of credits on their transcript, giving them a solid foundation for future college work.

Hunter College staff observed that the grade distribution in college math and science courses for MHSHS students in 2006-07 was similar to that of Hunter College undergraduates. In science courses, which included astronomy, biology, chemistry, geography, and physics, 44% of the grades were an A, B, or C. Students took math courses such as basic structures, college algebra, precalculus, calculus I & II, and statistics I & II; 31% of grades were an A, B, or C.

A total of 71 colleges and universities offered admission to MHSHS students in the class of 2007, including seven CUNY colleges and 17 colleges in the State University of New York (SUNY) system. The list included small private liberal arts colleges, large research universities – both public and private – and state colleges outside of New York. Historically Black colleges and Ivy League institutions also offered admission to students. All graduates of the class of 2007 had college plans after graduation, with 87% planning to go to a four-year college or university and 13% planning to enroll in a two-year college. Almost two-thirds of the graduates, 50 students, were going to a

SUNY or a CUNY institution. Appendix B provides a list of the colleges where students planned to attend.

Many MSHS graduates would not have had a college choice if they did not receive strong financial aid packages. Several institutions granting admission offered full and partial tuition scholarships as well as room and board scholarships to reduce the cost of attendance. In addition, a handful of students were awarded competitive scholarships and grants such as the Posse Foundation Scholarship, NY Association of Distinguished

Americans: Horatio Alger Scholarship, Nara Bank Scholarship, UFT Scholarship, and the NYC Public Schools Chancellor's Honors Scholarship.

It is not yet known how well prepared students from the class of 2007 are for the next step in the transition: their first college experiences after high school graduation. Although the ultimate effectiveness of this practice cannot be understood at this time, the MSHS senior year experience has already demonstrated its power to transform.

Appendix A Hunter College Courses in the Senior Experience

ASTRO 100 Basic Concepts in Astronomy 3 hrs, 3 cr.
An introductory 1-semester astronomy course designed for non-science majors. Core credit awarded for a science course with lab only if ASTRO 100 and ASTRO 107 are completed.

BIOL 100 Principles of Biology I 7 hrs (3 lec, 3 lab, 1 disc), 4.5 cr.
The chemical basis of life; basic structure and function of pro- and eucaryotic cells; bioenergetics; Mendelian and molecular genetics; development and mechanisms of control of gene expression at all levels; population genetics and evolution. \$5 materials fee required. PD credit awarded only upon completion of BIOL 100 and 102. *prereq:* MATH 101 or equivalent

BIOL 102 Principles of Biology II 7 hrs (3 lec, 3 lab, 1 disc), 4.5 cr.
Taxonomy; homeostasis; internal transport and gas exchange in plants and animals; plant hormones; osmoregulation; mechanisms of action in the muscular, nervous and neuroendocrine systems; the senses, behavior; ecology. \$5 materials fee required. PD credit awarded only upon completion of BIOL 100 and 102. *prereqs:* BIOL 100 or perm instr, MATH 101 or equiv.

CHEM 100 Essentials of General Chemistry Lecture 4 hrs (3 lec, 1 rec), 3 cr.
Essential facts, laws, and theories of general chemistry. Note: Core credit awarded only if CHEM 100 and CHEM 101 are completed. *Primarily for nursing, nutrition and food science and community health education students.*

CHEM 102 General Chemistry I 4 hrs (3 lec, 1 rec), 3 cr.
In-depth introduction to stoichiometric calculations, atomic and molecular structure and chemical bonding. Note: Core credit awarded only if CHEM 102 and CHEM 103 are completed. *Primarily for pre-med, medical laboratory sciences and science majors.*
pre- or coreq: MATH 125, 126 or equiv.

CHEM 103 General Chemistry Laboratory I 4 hrs (3 lab, 1 rec), 1.5 cr.
Study of experiments designed to illustrate fundamental laws and techniques of chemistry. Note: Core credit awarded only if CHEM 102 and CHEM 103 are completed. *Primarily for pre-med, medical laboratory sciences and science majors.* *pre- or coreq:* CHEM 102

CHEM 104 General Chemistry II 4 hrs (3 lec, 1 rec), 3 cr.
In-depth introduction to thermodynamics, redox reactions, electrochemistry and chemical equilibrium. Note: Core credit awarded only if CHEM 104 and CHEM 105 are completed. *Primarily for premed, medical laboratory sciences and science majors.* *prereqs:* CHEM 102 and 103 or CHEM 100 with perm chair

CHEM 105 General Chemistry Laboratory II 3 hrs, 1.5 cr.
Laboratory experiments illustrating and applying theory of solutions to qualitative analysis. Note: Core credit awarded only if CHEM 104 and CHEM 105 are completed. *Primarily for pre-med, medical laboratory sciences and science majors.* *prereq:* CHEM 103 *pre- or coreq:* CHEM 104

CHEM 115 Introductory Chemistry 4 hrs (3 lec, 1 rec), 3 cr.
An introduction to the fundamental concepts in chemistry including atomic and molecular structure, chemical bonding, stoichiometry, and solution chemistry. This course is appropriate for students who have had no prior coursework in chemistry. *pre- or coreq:* MATH 125

GEOG 101 People and Their Environment 3 hrs, 3 cr.
Survey of earth environment (atmosphere, land, water); how it varies spatially and how people interact with it. Contemporary economic, political and social patterns and problems are discussed.

PHYS 110 General Physics: Introductory Course in Mechanics, Heat, and Sound 7 hrs (3 lec, 3 lab, 1 rec), 4.5 cr.
First semester of two-semester introductory physics course using algebra. *prereqs:* MATH 125; *pre-calculus or equiv. by math dept. exam.*

PHYS 120 General Physics: Introductory Course in Electricity and Magnetism, Light, and Atomic Physics 7 hrs (3 lec, 3 lab, 1 rec), 4.5 cr.
Second semester of PHYS 110, a two-semester introductory physics course using algebra. *prereq:* PHYS 110 or 111

MATH Pre-101 Workshop no credit
The Pre-101 workshop is required of students who do not score high enough on the Algebra portion of the COMPASS MATH test in order to take MATH 101. The Pre-101 workshop is NOT a prerequisite for MATH 100.

MATH 100 Basic Structures of Mathematics 3 hrs, 3 cr.
Not open to students who have completed MATH 104 or 155. Not recommended for students majoring in mathematics, statistics, computer science, or natural sciences. Symbolic logic, sets, number systems, relations and operations and topics in probability and statistics. This is a terminal course and does not serve as a prerequisite to any other course in the department.

MATH 101 Algebra for College Students 4 hrs (2 lec, 2 lab), 3 cr.

Topics in algebra, graphing and functions. Includes: algebraic and graphical solutions to systems of equations and inequalities; absolute value, polynomial, rational and radical expressions and equations; complex numbers; the function concept; introduction to polynomial, rational and exponential functions and their graphs. *prereq: appropriate score on placement exam*

MATH 125 Precalculus 4 hrs, 4 cr.

Functions and their graphs: polynomial, rational, exponential, logarithmic and trigonometric functions; conic sections; topics in trigonometry; graphical and analytical solutions to systems of equations and inequalities. Not credited to students who have completed MATH 150 or its equivalent. *prereq: grade of C or better in MATH 101 or appropriate score on placement exam*

MATH 150 Calculus with Analytic Geometry I 4 hrs, 4 cr.

Limits, continuity, differentiation and integration of elementary functions and trigonometric functions, applications. It is strongly recommended that students who have not taken MATH 126 register for MATH 154 simultaneously with MATH 150. For majors in mathematics, MATH 154 may be used to satisfy the departmental graduation requirement of proficiency in symbolic computation. *prereq: grade of C or better in MATH 125 or appropriate score on placement exam*

MATH 155 Calculus with Analytic Geometry II 4 hrs, 4 cr.

Differentiation and integration of transcendental functions, integration techniques, infinite sequences and series, improper integrals, polar coordinates. *prereq: MATH 150*

STAT 113 Elementary Probability and Statistics 3 hrs, 3 cr.

Not open to students who have completed STAT 213, ECO 221, PSYCH 248, or SOC 241. Not credited for majors in statistics or mathematics unless collateral major is elementary education. Discrete probability; descriptive, inferential statistics. Estimation and hypothesis testing for normal and binomial means. Students who have taken calculus or place into calculus by the placement exam should take STAT 213 instead of STAT 113. *prereq: MATH 101 or appropriate score on placement exam*

STAT 213 Introduction to Applied Statistics 3 hrs, 3 cr.

Not open to students who have completed ECO 221, PSYCH 248, or SOC 241. Familiarity with the Windows computing environment encouraged. Sampling, estimation, tests of hypotheses, including one- and two-sample t-tests, two- and three-way tables for nominal and ordinal data, linear regression, analysis of variance through two-way with interaction, appropriate statistical software. *prereq: MATH 125 or appropriate score on placement exam*

Excerpted from the Hunter College catalog, available at http://registrar.hunter.cuny.edu/pdf_folders/HunterUndergrad.v3.pdf

Appendix B
College Going Plans of Manhattan Hunter Science Graduates

Cheyney University of Pennsylvania	Quinnipiac University (CT)
Columbia University (NY)	St. John's University (NY) (3)
CUNY Borough of Manhattan Community College (8*)	SUNY Albany (2)
CUNY Honors College - Hunter	SUNY Binghamton (2)
CUNY Hunter College (18)	SUNY Buffalo
CUNY Lehman College	SUNY Buffalo State
CUNY Teacher Academy - Hunter College (2)	SUNY Cobleskill
Earlham College (IN)	SUNY Cortland
Florida A&M University	SUNY Environmental Science & Forestry
Franklin & Marshall College (PA)	SUNY Purchase (4)
Hofstra University (NY)	SUNY Stonybrook (5)
Johnson & Wales University (RI) (2)	SUNY Sullivan CC
New York University (2)	SUNY Tompkins Cortland CC
New York Institute of Technology	Syracuse University (NY) (2)
Ohio Wesleyan University	Trinity University (DC)
Pennsylvania State University (3)	University of California Los Angeles
Polytechnic University (NY)	University of Michigan
	Virginia Union University

*Number of students attending, if more than one.