



SCIENCE TECHNOLOGY ENGINEERING
MATHEMATICS

2017 - 2021

A Strategic Plan for the STEM Innovation Academy of the Oranges

Vision



Explore, Innovate, Share

Revised 3.27.20

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Our Narrative

The STEM INNOVATION ACADEMY of the ORANGES encompasses the dualities of rigor and collaborative working relationships, results and respect. We have one common intellectual mission--to ready students for college success via exposure to DEEPER LEARNING ENVIRONMENTS (project based, highly personalized, blended learning experiences) that are strategically focused on the individual needs of ALL students. This focus is supported by the belief in ALL students' abilities and is reflective of high expectations. This allows us to strike a seamless balance between striving and supporting-- demanding performance with purpose; systematically engaging students as scientists, authors, creators, inventors, collaborators and problem solvers. This is a complex shift in mindset in which the STEM INNOVATION ACADEMY community embraces, takes ownership of, and subscribes.

The long-range vision for The STEM Innovation Academy of the Oranges (the Academy) is to create an early college model for STEM education that unites public and private sector to provide better options for our students and that strengthens the continuum from high school to college to careers. The Academy provides a fully integrated STEM education model using engineering design, mathematical analysis, and scientific investigation to leverage the natural connections between STEM subjects

while offering multiple pathways to post-secondary study. Its mission is to provide students, underrepresented in STEM college majors and careers, with a personalized pathway towards mastery of the skills and knowledge that they will need to make the transition from secondary education to college and industry. The STEM Innovation Academy of the Oranges considers college admission and completion the goal for all students.



School Profile

The STEM Innovation Academy of the Oranges is a highly-innovative 4 year program spanning grades 9-12 resulting from the joint collaborative between The City of Orange, the Orange Public Schools, the New Jersey Institute of Technology (NJIT), , The College of New Jersey, and Montclair State University. The Academy exemplifies an early college model whereby students, from grade 9 on, navigate through a four-year scope and sequence of high school and college coursework. The school operates on an

extended school day model with students attending from 8:20am – 3:30pm; teachers, from 8:05am – 4pm. Students will earn college credits toward a degree in one of three majors - Computing Sciences, Mechanical Engineering, or Biomedical Engineering. All curricula are aligned with the Common Core State Standards or the Next Generation Science Standards as the foundation for learning in higher education institutions with strong mathematics, science and engineering programs.



The Components

The Academy provides students with a high school to college to career continuum that helps them understand the direct links between what they are learning today and the worlds of college and work. While the Academy is a comprehensive school, it embodies a few unique core components.



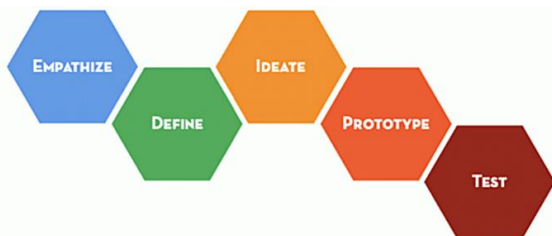
Focus on Early College: Student learning is focused from grade nine on, through a four-year scope and sequence of high school and college coursework.

In June of 2017, the Orange Public Schools district entered into a formal agreement with the New Jersey Institute of Technology (NJIT). The purpose of the agreement was to define the procedures for a non-exclusive program providing Orange's qualified high school students from the STEM Innovation Academy of the Oranges with the opportunity to take college

courses to accrue forty college credits during the regular academic year at the STEM Innovation Academy of the Oranges; pending the availability of qualified faculty at the school, and access to specialized equipment and facilities. These credits include general university requirements (GURs) and some first and second year major requirements all of which are generally transferable to most two- and four-year colleges in the U.S.

Focus on Project Based Learning

The Academy hopes to spark a transformation of teaching and learning by offering a combined Design Thinking and project-based learning approach in grades 9-12; while emphasizing the “soft-skills” necessary for today’s workplace – skills in collaboration, communication, creativity, problem-solving, and perseverance. Project-based learning is a dynamic approach to teaching in which students explore real-world problems and challenges. With this type of active and engaged learning, students are inspired to obtain a deeper knowledge of the subjects they're studying. Design thinking provides another potential form of teacher scaffolding to help craft these experiences.



Student demonstrates his team’s custom-made apparel using recycled materials; Summer 2017

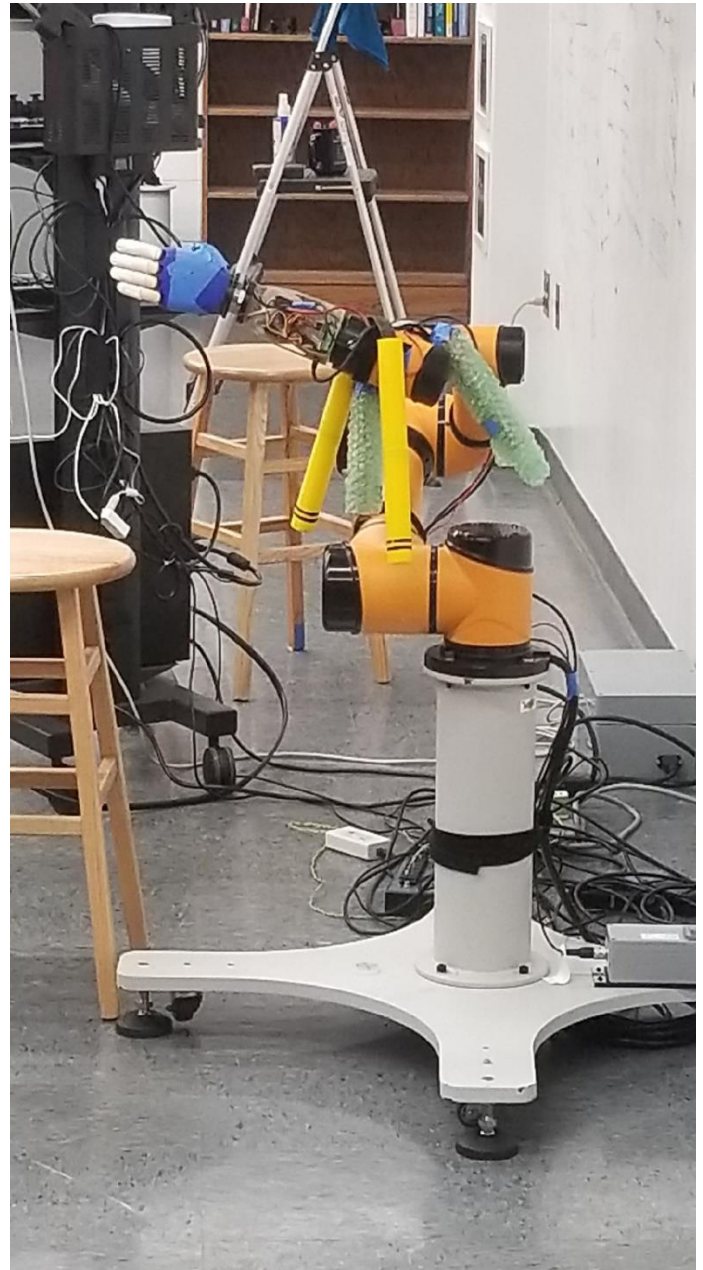


Focus on Calculus-Based Majors

Calculus serves as the foundation for many college students to help them understand complex mathematical computations. Many college STEM majors require Calculus (Calculus with Analytic Geometry, Stats, Probability, and Differential Equations) as a part of a comprehensive curriculum. In grades 9 – 11, mathematics programs are offered year-round to focus heavily on the development of mathematical literacy to help address this concentration.

Focus on Careers

Students participate in an ongoing, sequenced workplace learning curricula informed by current industry standards. The curricula include setting career goals, mentoring, guest speakers, workplace visits and internships. Minimum requirements for entry-level IT jobs, developed in collaboration with our industry partners, will be mapped to the curriculum and will serve as academic benchmarks and targets.



Focus on Personal Pathways

Each student moves through a personalized academic pathway that is closely monitored by his or her teachers and advisors, and based on individual needs and performance. While the school meets all state mandates for graduation, the pace at which the student moves through the high school and college requirements is personalized, and the requirements' sequences are intricately intertwined. While all students are expected to meet high school requirements and earn their respective credits, some may proceed at an accelerated pace. The Accuplacer, the PARCC, the Eng10 PARCC exam, or the PSAT offered in 9th and/or 10th grade will be used to determine whether a student is ready to begin college level coursework.

Extended Learning Time

In addition to extending college level coursework into what has conventionally been the high school years, the school day and year (via summer planning) also are extended beyond the traditional schedule to include even more individual support for students.

Specialized Staffing

In order to ensure that the model is adequately supported, the Academy includes the full-time

position of an Industry Engagement Officer to work directly with the leadership, staff and students. In this way the model is continually monitored to ensure effective practice. Additionally, industry experts will be recruited to work with the school's lead teachers and subject teachers through programs such as TEALS (Technology Education and Literacy in Schools), Real World Connections (RWC), etc.

Inclusive Admissions Process

Application to the Academy is open to all grade eight students. The Academy is specifically dedicated to providing college and industry access to historically underserved students. Admissions criteria include PARCC performance, portfolios, multi-year transcripts, references (teacher/parent/student), panel interviews, and individual and group performance tasks.

No Cost to Families

Because the Academy is public and is designed to serve students from historically underrepresented backgrounds, access to no-cost postsecondary credits helps remove a critical financial stumbling block and helps students focus solely on learning.



Active Learning Spaces

The shift from passive to active learning creates a need to support the integration of pedagogy, technology, and space. Our classrooms reflect an active learning ecosystem that offers a range of settings and the choice and control to select the best environment for the learning; while considering options for adjacency, visual and acoustic privacy, and collaboration. This includes 3 instructional modes: computer work (focused work environments), talk with others (collaborative environments), making something (hands-on project work environments). Collectively, these environments offer

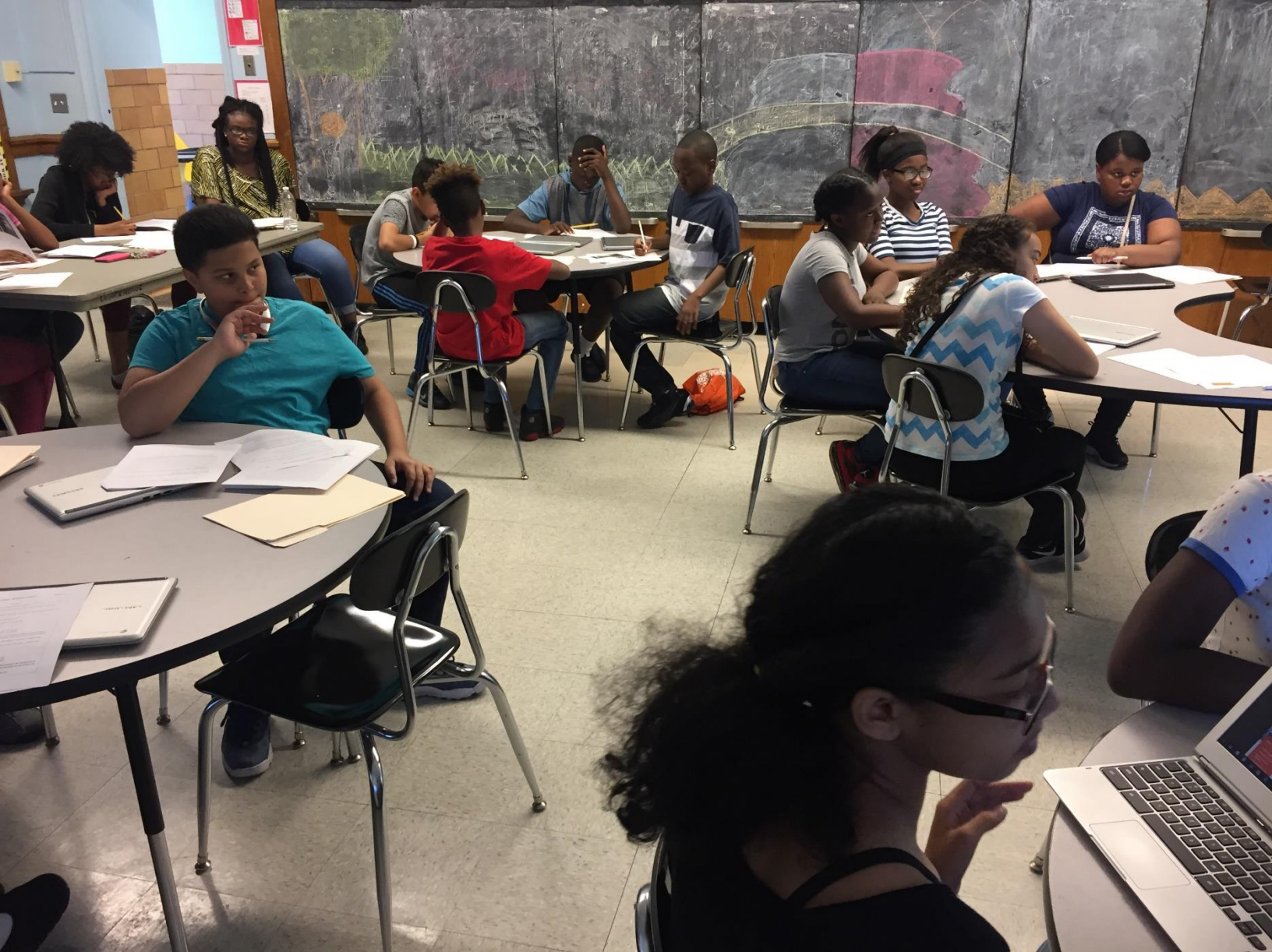
- Dynamic movement
- Interchangeable configurations
- A mixture of specialized spaces: makers' spaces, engineering, digital design, etc.
- And zero distance design
- Height-adjustable worktables and rolling chairs
- Furnished alcoves, and corridors
- White board walls



The Society
STEM Incorporated
The Intersection of Science, Technology, Engineering, and Mathematics

My name is: Tiff

STRATEGIES



Priority One

Supports for Students

Once enrolled at the STEM Innovation Academy of the Oranges, students will receive the highest level of academic and social support to enable them to persevere through a rigorous curriculum. This includes summer bridge programs, Advisory periods, tutoring programs, extended school day, and an extended school year to strengthen student transitions to STEM coursework, college-level coursework, and careers.

Benchmarks

- Implement focused outreach efforts to identify and recruit prospective students.
- Establish a viable feeder program through the Scholars Program.
- Increase use of software tools such as Naviance and NWEA MAP for analysis; tracking student progress and offering more effective advising.
- Analyze student data to identify at-risk students to make possible timely intervention before, during, and after school.
- Coordinate tutoring, mentoring, adaptive learning and student support via
 - Structured advisory resulting from quarter-cycle progress
 - Post secondary tutoring formats
 - Structured use of teachers' office hours
- Intensify first year of advisement for the purpose of keeping students on-track and helping students identify their major of study.
- Celebrate the successes of students meeting and exceeding performance expectations and those showing noteworthy growth within and between Marking Periods.

CheckPoints

- Establish 40-minute structured advisory periods in each student's day (4 days per week). Advisory periods combine mandatory and voluntary formats based upon the ongoing assessment of student performance.
- Utilize teachers' office hours to provide support (mandatory and voluntary) to students falling below the 80% standard.
- Provide 1-on-1 tutoring support in partnership with NJIT, MSU, etc.
- Review student progress mid-quarter to assess progress and to determine intervention plans.
- IR1 – MP1 comparison of gains and losses
- Instituted TenMarks/Khan Academy to support acquisition of skills in Algebra, Geometry, Statistics, and other topics.
- Teachers are to update iSAPs periodically throughout the year; iSAPs will provide details regarding Trimester 3 supports

- Students, at the end of grade 11, will take the NJ State Assessment which is a comprehensive assessment of their knowledge of the 3 sciences, therefore
 - Biology as a formal course of study will be offered in the 1st year. Trimester 3 (6 weeks) of freshman year will be used to address topics of Ecology and Evolution to support the standards required for Biology as a formal course of study.
 - Chemistry will be a full year Science offering for all 10th grade students
 - Physics (College Level) * will be a full year Science offering for 11th or 12th grade students
*Is this Alg- or Calc-based
 - By junior year, all students will have taken 3 years of science in the areas assessed

- All students (class of 2021 and beyond) must take the Algebra I PARCC to graduate, therefore
 - All Integrated Mathematics I students take the Alg I PARCC;
 - All Integrated Mathematics II students take the Geometry PARCC
 - CPM I and II will be used to align both curricula to meet PARCC expectations
 - Educere will be used as a strategy for acceleration for students wishing to participate in independent studies (Algebra I or Geometry)

- Mathematics foundation skills need to be aggressively developed in students 9th grade year, therefore
 - Offer Math daily for all 9th grade students to build a strong foundation
 - Offer IED 120 minutes every other day or daily for 80 minutes
 - Offer Math daily for all IM I, II, and III classes

- A viable Computer Science Curriculum is needed beginning in grade 9 as an exploratory course; therefore, introduce, as an extension of the Advanced Computer Science Grant awarded in the 2018-2019 school year,
 - Computing Ideas in Grade 9
 - Intro to Computer Science in Grade 10
 - AP Computer Science A in Grade 11

- Revise the Scholars Feeder Program (Scholars Middle) to focus on Mathematics & Science, Humanities, and STEM Education (See Appendix)

- Establish Trimester III as a viable option each year to provide a during-school, within school model that allows for specialized accommodations for implementing opportunities resulting from data-based decisions:
 - Block for Credit Recovery
 - Blocks for Project Development
 - Block for Ending the current year/beginning the next year
 - Considerations for the chosen track
 - Scholars
 - NJIT Summer I Coursework

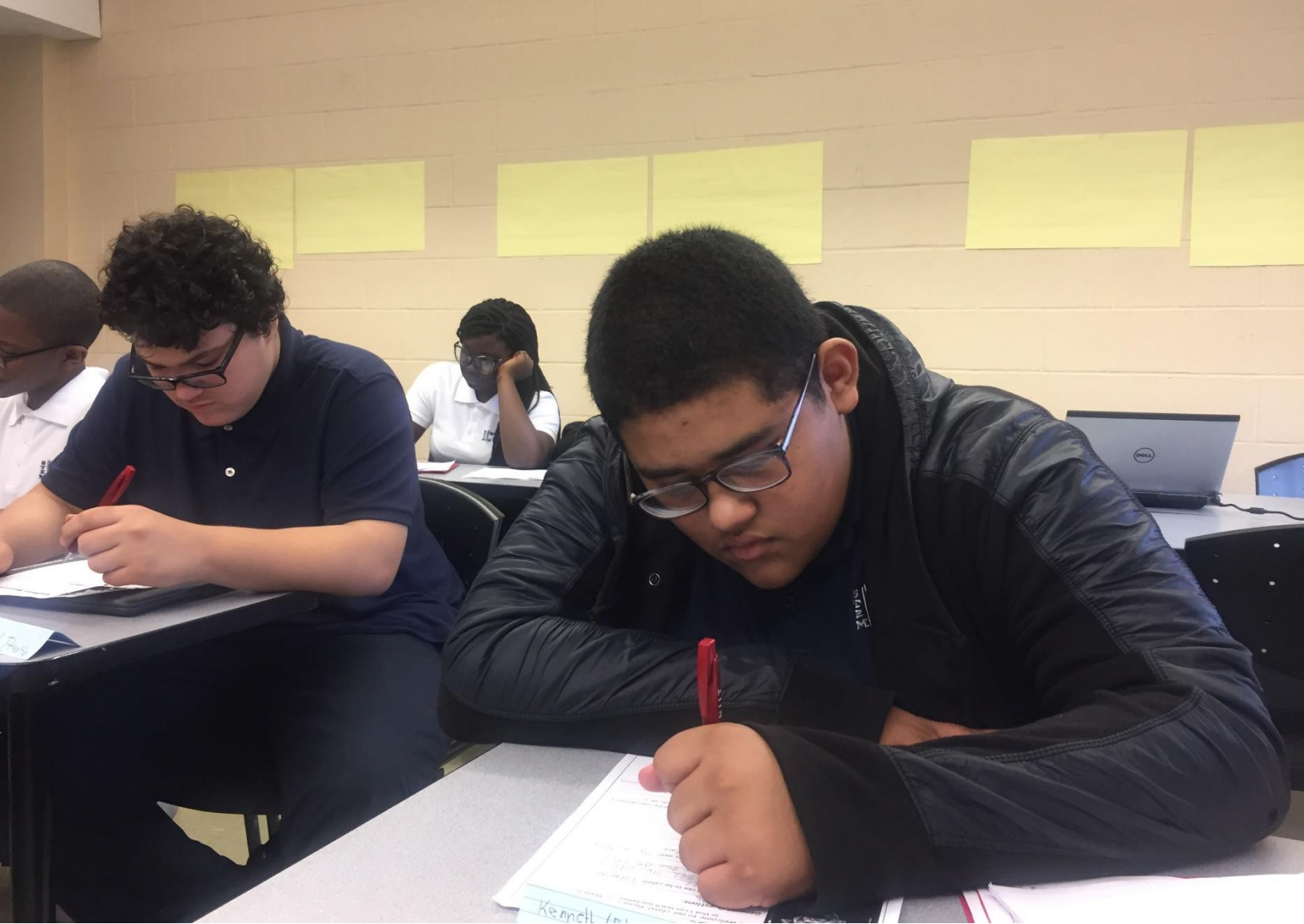
- A Students not successful on the Alg I PARCC
 - as Gr 8 students: Automatically retake Alg I course as entering 9th graders
 - as Gr 9 students: Must take a Summer Refresher and will be enrolled in the 10D course as 10th grade students if not passing the summer PARCC; if there an end of semester PARCC option, students retake; if not, then portfolio process. This allows the 2nd semester course to focus on Geometry (whereas the first semester focuses on a combination of geometry and Alg I.

- Use Option II as a vehicle for acceleration in Mathematics

<p>Offer OPTION II Geometry (Honors) for 10th grade GROUP C/D* students demonstrating the ability to accelerate. A math-certified teacher will be the Option II mentor.</p> <p>*GROUP C/D students were enrolled in Algebra I as 9th graders (did not take Grade 8 Alg I honors).</p> <p>Testing: NJSLA testing is required for all Option II students for each NJSLA content area. Students take the NJSLA for Algebra II in their sophomore year and NJSLA for Geometry during the Summer.</p>	
<p>Normal Pathway: 9: Integrated Math I (Alg I) 10: Integrated Math II (Geo) 11: Integrated Math III (Alg II)/PreCalc 12: NJIT Calculus I</p>	<p>Option II Pathway (Accelerated): 9: Integrated Math I (Alg I) 10: Integrated Math III & Honors Geometry (Independent Study & PreCalculus 11: NJIT Calculus I 12: NJIT Calculus II</p>

- Use Early Dismissal Mondays as follows:

COLLABORATIVE PLANNING FOR CORE COURSES	DATA INFORMED DECISIONS & PERSONALIZED LEARNING	SEL SUPPORTS & PARENT ENGAGEMENT	PROJECT BASED LEARNING	EXTENDED LEARNING PLANNING
Alignment of curricular expectations	Survey of cross-content data	School Counselor Advisement	PBL Development and Refinement	Scholars Planning (joint planning year round)
Collaborative Unit Planning for Shared Courses (ex: Integrated Math II)	Advisory Strategies to improve Advisory support	Parent Conferences with Staff and Student		Developing Student Clubs



Priority Two

STEM Academy students will encounter a course of study that is under continual scrutiny in order to ensure that it meets current academic standards, provides a core education to produce the most highly prepared students and is delivered by enthusiastic instructors using innovative and effective methods. Digital learning is an integral part of every student's experience, with instructors engaging students through blended pedagogies that promote anytime and any place learning. Students are given opportunities to learn at their own pace and to explore their own path to achieve their learning goals.

STEM-Focused Curriculum

Benchmarks

- ■ Assure uniformity of academic standards via shared development and peer-reviews of unit plans that include
 - Standards and Assessment Alignment
 - Authentic and Project-Based Learning experiences
 - Presentation Expectations
 - Supports for below-, at-, and above-level learners

- ■ Implement an independent evaluation for student support programs to guide resource allocation.

- ■ Use student and parent satisfaction as indicators of success to guide programs toward promoting an academically supportive and nurturing climate.

- ■ Develop assessment plans with learning targets for all programs to establish clear standards and measures for success and improvement.

- ■ Align curricula to NJIT's General University Requirements (GUR) and other post-secondary offerings.

- ■ Implement a progressive schedule that addresses curriculum expectations and student needs
 - 240 minutes per week of mathematics; with up to 160 additional minutes weekly of intervention or enrichment support
 - 240 minutes per week of applied science
 - 400 minutes per week of ELA, SS, research, and current events
 - 400 minutes per week of Major

- ■ Use the freshman year as an exploratory year that will provide students with a working knowledge of their pathway-- Biomedical Engineering, Mechanical Engineering, or the Computing Sciences.

- ■ Continue the partnership with NJIT's Real World Connections (RWC) to provide exposure to tracks offered within the Computing Sciences pathway.

- ■ Establish partnerships with Project Lead the Way, Creative Learning Systems, RWC, and others to support the implementation of their respective program modules (PLTW: Engineering and Design, Principles of Biomedical Science, SmartLab: circuitry, computer graphics, digital communications, mechanics and structures, robots and control technology, software engineering, etc.; RWC: Animation, Web Development, Android App Development, Game Design, Crime Scene Investigation, CyberSecurity, Coding).

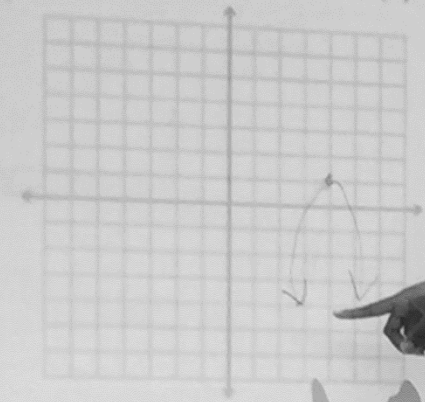
CheckPoints

- Integrated Math I students take the Alg I PARCC Assessment
- Integrated Math II students take the Geo PARCC Assessment¹
- Establish partnerships with Sylvan Learning Center in Caldwell to provide more intensive supports to students via the Algebra Edge option (973)228-8693.

¹ Independent Study in Algebra I for Int Math II students who need to take the PARCC for the 1st time

Home Insert Design Transitions Animations Slide Show Review View

1) Graph the function $f(x) = -2(x - 4)^2 + 1$.



2) What is the connection between the graph and the equation?

3) Expand the function and arrange it in standard form.

Click to add notes

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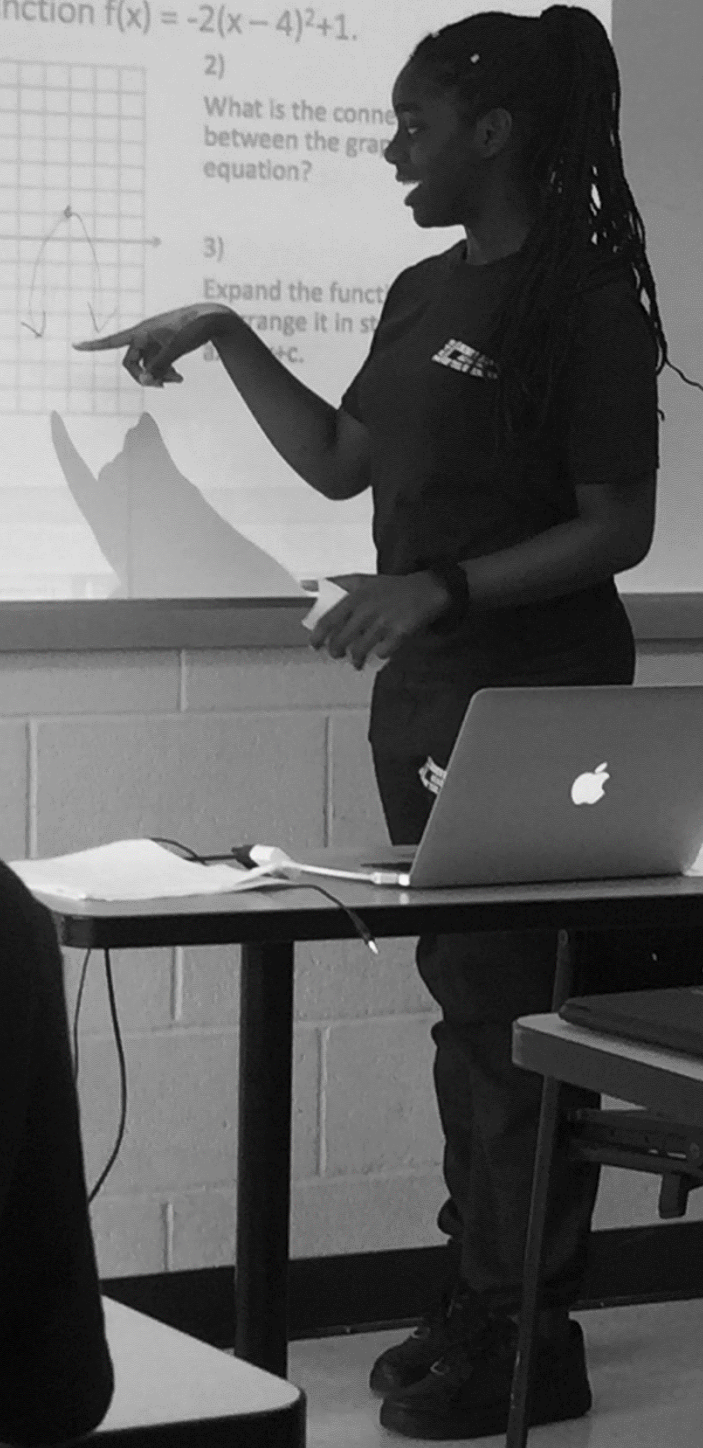
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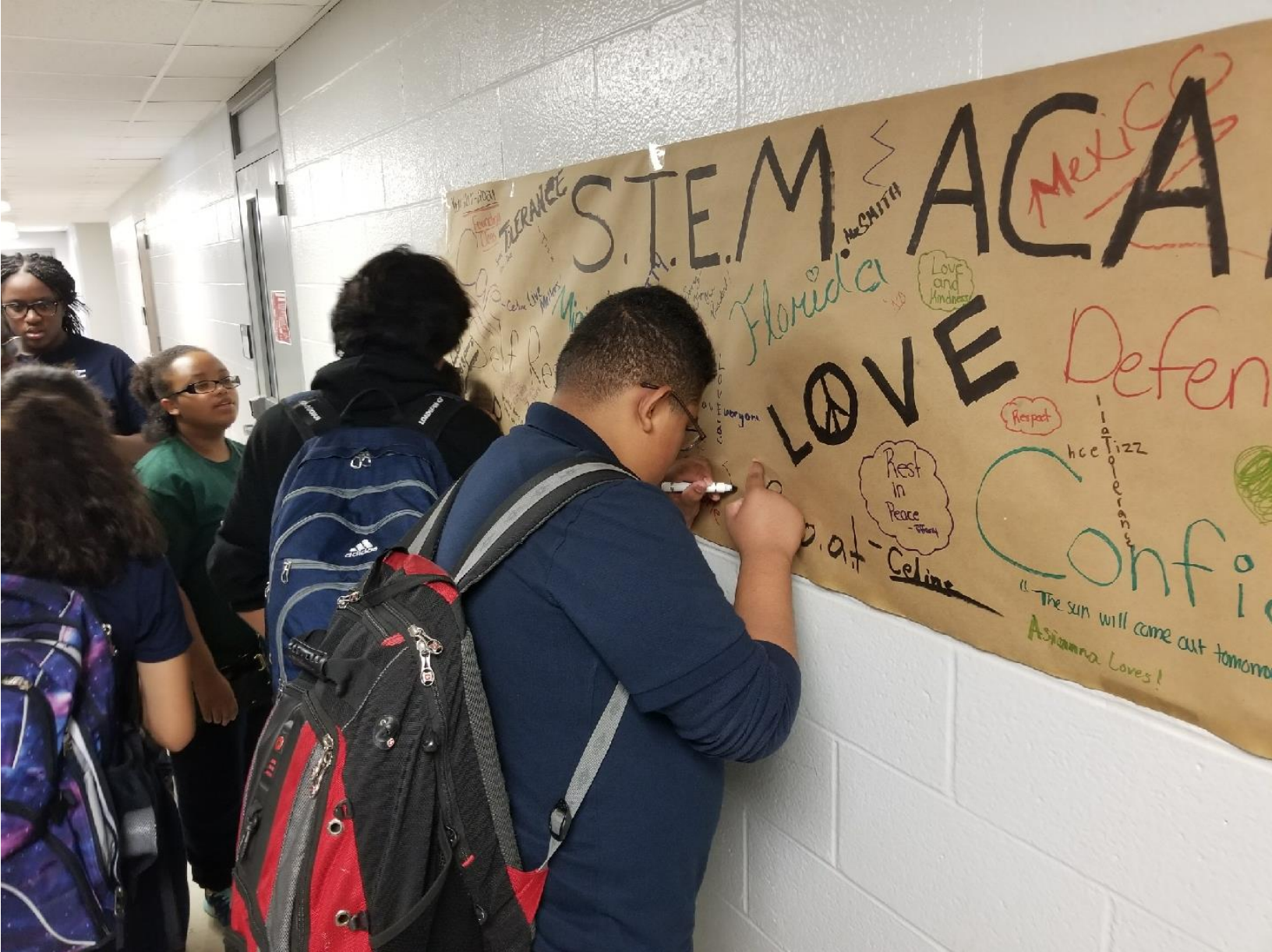
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Priority Three

Campus Life: Formal and Informal Settings

Beyond the typical school day, week, or year, STEM Academy students are involved in apprenticeships, mentoring, social networking and doing STEM in locations off of the school site, in the community, museums and STEM centers, and business and industry.

Benchmarks

- Provide every student with unique, possibly credit-bearing learning opportunities outside of the classroom (summer, yearlong, during breaks).
- Expand opportunities to promote collaboration and connect knowledge acquired in the classroom to applied research problems.
- Cultivate a courteous and welcoming campus climate. This will enhance student satisfaction and success.
- Develop a service-focused message for all faculty and staff.
- Pair STEM Academy students with Scholars students during Advisory periods to assist in the SmartLab.
- Facilitate sustainable and supported Academy events and experiences such as interest clubs, and academically oriented teams, such as debating and robotics, that will engage the entire Academy community and enhance campus life.

CheckPoints

- Planning Committee to look into membership with ITEEA: <https://www.iteea.org>
- Coordinate with the STEM Supervisor to explore summer opportunities and internships that includes all STEM students at OHS, STEM, CIAO, OPA, HEY, RPCS
- Establish a small committee of the committed (5-6) to assist with screening and promoting summer opportunities (Pettit, Stewart, Alcantara, Teachers, OHS, etc.)
- Introduction of Student Interest Clubs -- Examples based upon Interest Surveys include:
 - A. Basketball
 - B. Art & Digital Design
 - C. Culinary
 - D. Soccer
 - E. Dance
 - F. Running
 - G. Volleyball
 - H. Videogame/Game Development
 - I. Creative Writing (part of the writing center)

APPROVED ANNUAL FIELD EXPERIENCES

Program	Approx. # of Students	Program Coordinator	DATES RANGE	Description
BLACKS ON WALLS STREET	4	City University of New York Dorthe M. Eisele 617-866-9189 eisele@eiselegroup.com		
GENERATION TECH	6	Lisa Valle Lescroart 201-209-4234 lisa.v.lescroart@jpmorgan.com		
NJIT TAP	10-15	Reema Panjwani 908-655-4520 panjwa1@its.jnj.com		
TRANSPORTATION YOU	7 - 10	Sutapa Bandyopadhyay, Ph.D. 973.639.8428 sband@njtpa.org		
RWC	30	Dr. Osama Eljabiri 732-456-0249 osama.eljabiri@njit.edu		
TSA-TEAMS COMPETITION	12	Suzanne Berlier Heyman 973-596-3550		
NAACP-ACTSO				
DORSEN				

STUDENTS2SCIENCE				
CORNELL				
MINI MED				



Students visit the J.P. Morgan Chase Technology Center; September 2017

Priority Four

STEM Academy students connect to business, industry, and the world of work via mentorships, internships, or projects that occur within or outside the normal school day/year.

STEM-Focused Partnerships

Benchmarks

- Identify industry-alliances to provide curriculum mapping support and entry-level career opportunities.
- Increase the number of industry-support field trips, job shadowing experiences, mentoring opportunities, research experiences and internships. This will enhance student opportunities for early industry experience.

CheckPoints

- Open invitation to the other surrounding Orange school districts (South Orange, West Orange, East Orange)



Priority Five

Early College Level Coursework

Partner with local universities to provide opportunities for students to take classes at institutions of higher education or online.

Benchmarks

- Continue to execute the Options for Advanced Academic Achievement Secondary School Partnership Program Agreement between NJIT and the Orange Public Schools district.
- Continue to pursue summer STEM-focused pre-college programs for all students (e.g. NJIT's Center for Pre College Program's Summer STEM Camp).
- Identify additional opportunities for students to engage in college level coursework.

Checkpoints

- All students will be expected to take College Level Calculus I (MTH 111) in either their Junior or Senior year, therefore •Math III will focus on topics in Alg 2 and Trig and students will be required to take MTH 110: PreCalculus² in advance of MTH 111.
- Transition to College Level Courses:

Course	Requirements
MTH 110 PreCalculus (3 cr)	Successful completion of Integrated Math III through May 15 with a 72 or better.
MTH 111 Calculus (4 cr)	Successful completion of Integrated Math III; Pre-Calculus; NJSLA Algebra II
HUM 101 English Composition I (3 cr)	Successful completion of the Political Studies (ELA) with a 72 or better; Meeting expectations on the NJSLA-10 (scoring 750 or better: An Action Plan is required for students not successfully passing NJSLA ELA-10)
HUM 102 English Composition I (3 cr)	Successful completion of HUM 101 with a 72 or better;
EVSC 125 Environment Science (3 cr)	Successful completion of Chemistry
CHEM 125/A	Successful completion of Chemistry with a 72 or better;

To earn College Credit via Paid Tuition, students must successfully complete the prerequisite requirement(s). Students not satisfying prerequisite requirements...

MTH 110: Students take the PreCalculus course following the same syllabus, but WILL NOT BE FORMALLY ENROLLED in the course for NJIT credit.

MTH 111: Students take the Calculus course following the same syllabus, but WILL NOT BE FORMALLY ENROLLED in the course for NJIT credit. Students successfully passing the course will have the opportunity to sit for the AP Calculus AB exam (district-funded).

HUM 101 & 102: Students take the English Literature course following the same syllabus, but WILL NOT BE FORMALLY ENROLLED in the course for NJIT credit.

² In Summer 2019, all students advancing to Calc I had to take a Summer PreCalc Class (an extension to the Integrated Math III.) This was a 2-week mathematics Summer program open to students who were currently enrolled in the STEM Innovation Academy of the Oranges. It was designed to reinforce the skills that students need to be successful in the formal, credit-bearing Calculus course. A homework packet was provided to support this course. Students who met the attendance requirement and passed the course with a final score of 65 or above earned 5 high school mathematics credits to apply towards high school graduation.

CHEM 125/A: Students take the Chemistry course following the same syllabus, but WILL NOT BE FORMALLY ENROLLED in the course for NJIT credit.

EVSC 125: Students take the Environmental Science course following the same syllabus, but WILL NOT BE FORMALLY ENROLLED in the course for NJIT credit. Students successfully passing the course will have the opportunity to sit for the AP Environmental Science exam (district-funded).

- Provide opportunities for students to earn college credits through PLTW

Conditions:

- Rochester Institute of Tech offers college credits for PLTW engineering courses
- Requirements:
 - Apply (check the application window)
 - End of Course – Must take and pass with a 6 or higher (4 or higher to pass the PLTW course as a HS requirement)
 - Payment is \$225 for 3 credits
 -
 - Note: PBS is not eligible for credits
 - Note: All PLTW engineering course are Algebra based vs Calculus based
- Provide opportunities for students to sit early for the PSAT’s/ACT’s/or SAT’s to allow early application/enrollment
- Students will take both the ACTs and SATs due to the content focus (SAT’s: Reading/Writing) & (ACT’s: Science and Math focus)
- Offer Juniors SAT’s during Fall (October/or November) and Spring (March/or April) at the school level such to give students 2 valid scores prior to commencing the formal college application process.
- Offer the ACT during the Spring (June)
- Consider placement for merit scholars. Continue to offer PSAT’s to 9th and 10th graders.

2019-2020

- Juniors take the PSATs in October
- Juniors take the SATs in March (3.25.2020) in house; \$44.50 or \$69.50 per student; with fee waiver; \$8 or \$15
- Possibly offer SATs during the summer (August)

SAT vs ACT

<p>SAT 600 – 2400 3 sections (scores are added) 3hrs 45 min</p> <p>Logic and Reasoning based within context (Reading, Math w/calc, Math/no Calc, Writing, & optional essay)</p>	<p>ACT 1 - 36 4 sections (scores are averaged) 2hrs 55min</p> <p>Content Test (English, Math, Reading, Science, & optional Science)</p>
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Math Tested: Alg I, Alg II, Geo, & Trig (w/formula sheet)

No Penalty for incorrect answers or blanks

Math Tested: Alg I, Alg II, Geo, & Trig (w/no formula sheet)

No Penalty for incorrect answers or blanks

Most Competitive Colleges

Admission criteria generally fall into the following categories:

Top 10% of graduating class; A to B+ GPA; Average 1310 - 1600 SAT (Critical Reading and Math Only); 29+ ACT (Composite); 18-22 Carnegie Units
Colleges include:

Boston College, Brown University, Bucknell University, Colgate University, The College of New Jersey, Columbia University, Dartmouth College, Harvard University, New York University, Princeton University, Stanford University, Tulane University and Yale University.

Freshman	Sophomore	Junior	Senior
English 1 Honors	English 2 Honors	English 3 Honors	AP English Literature
Biology Honors	AP English Language	AP Biology OR AP Chemistry OR AP Environmental	AP Biology OR AP Chemistry OR AP Environmental OR AP Physics
Geometry Honors	Chemistry Honors	Physics Honors	Academic Elective *
Algebra 2 Trigonometry Honors	Pre-Calculus Honors	AP Calculus AB	AP Statistics OR AP Micro/Macro Economics OR Equivalent Math Elective
AP US History Part 1	AP US History Part 2	AP World History	AP Government and Politics OR AP Psychology
Spanish 2 OR Italian 2	Spanish 3 Honors OR Italian 3 Honors	Spanish 4 Honors OR Italian 4 Honors	AP Spanish Language OR Italian 5 Honors
Physical Education/Health	Physical Education/Health	Physical Education/Health	Physical Education/Health
PSLP	PSLP	PSLP	PSLP
Information Processing AND Personal Finance	AP Music Theory OR AP Art History OR Equivalent Fine and Performing Art Elective	AP Computer Science OR Equivalent 21 st Century Life & Career Elective	Carnegie Unit Electives*

Highly Competitive Colleges

Admission criteria generally fall into the following categories:

Top 20% of graduating class; B+ to B GPA; Average 1240 - 1308 SAT (Critical Reading and Math Only); 27-28 ACT (Composite); 17-20 Carnegie Units
Colleges include:

Boston University, Cornell College, Fordham University, Ramapo College of New Jersey, Rutgers (New Brunswick), Stevens Institute of Technology, University of Maryland

Freshman	Sophomore	Junior	Senior
English 1 Honors	English 2 Honors	English 3 Honors OR AP English Language	AP English Literature
Environmental Science Honors	Biology Honors	Chemistry Honors	Physics Honors OR AP Biology, AP Chemistry, AP Environmental
Geometry Honors	Algebra 2 Trigonometry Honors	Pre-Calculus Honors	AP Calculus
US History 1 Honors	US History 2 Honors	Global Studies Honors	AP Elective (World, Government and Politics, Micro/Macro Economics)
Spanish 2 OR Italian 2	Spanish 3 Honors OR Italian 3 Honors	Spanish 4 Honors OR Italian 4 Honors	AP Spanish Language OR Italian 5 Honors
Physical Education/Health	Physical Education/Health	Physical Education/Health	Physical Education/Health
PSLP	PSLP	PSLP	PSLP
Information Processing AND Personal Finance	21 st Century Life & Careers Elective	Carnegie Unit Electives*	Carnegie Unit Electives*
Fine OR Performing Art Elective	Carnegie Unit Electives*	Carnegie Unit Electives*	Carnegie Unit Electives*

Very Competitive Colleges

Admission criteria generally fall into the following categories:

Top 35% of graduating class; B GPA; Average 1140 - 1238 SAT (Critical Reading and Math Only); 24-26 ACT (Composite); 17-20 Carnegie Units
Colleges include:

Drew University, Drexel University, Michigan State, Monmouth University, NJIT, Penn State (College Park), Purdue University, Richard Stockton College of New Jersey, Rowan University, Rutgers (Camden), Rutgers (Newark), Temple University, Towson University, University of Delaware

Freshman	Sophomore	Junior	Senior
English 1 Honors	English 2 Honors	English 3 Honors OR AP English Language	AP English Literature
Environmental Science Honors	Biology Honors	Chemistry Honors	Physics Honors OR AP Biology, AP Chemistry, AP Environmental
Geometry Honors	Algebra 2 Trigonometry Honors	Pre-Calculus Honors	AP Calculus
US History 1 Honors	US History 2 Honors	Global Studies Honors	AP Elective (World, Government and Politics, Micro/Macro Economics)
Spanish 2 OR Italian 2	Spanish 3 Honors OR Italian 3 Honors	Spanish 4 Honors OR Italian 4 Honors	AP Spanish Language OR Italian 5 Honors
Physical Education/Health	Physical Education/Health	Physical Education/Health	Physical Education/Health
PSLP	PSLP	PSLP	PSLP
Information Processing AND Personal Finance	21 st Century Life & Careers Elective	Carnegie Unit Electives*	Carnegie Unit Electives*
Fine OR Performing Art Elective	Carnegie Unit Electives*	Carnegie Unit Electives*	Carnegie Unit Electives*

EXPLORATORY		CONCENTRATED GENERAL EDUCATION	
9	10	11	12
FALL (Unifying Theme) American Experiences English I + PBL/RWC American Experiences US History I + PBL/RWC Integrated Math I + PBL/RWC or Integrated Math II + PBL/RWC PLTW Principles of Biomed + PBL/RWC PLTW Intro to Engineering & Design + PBL/RWC Graphic Design & Digital Art I Explorations in CS (Computing Ideas)	FALL (Unifying Theme) Political Studies English II + PBL/RWC Political Studies US History II+ PBL/RWC Integrated II (Geometry Focus)+ PBL/RWC or Integrated III (Algebra II focus) + PBL/RWC Chemistry + PBL/RWC ⁵ TEALS Introduction to Computer Science or Computer Integrated Manufacturing or Human Body Graphic Design & Digital Art I or II	FALL (Unifying Theme) HUM 101 English Composition: Writing, Thinking, Speaking I World History I Integrated III (Algebra II focus) + PBL/RWC or MTH 111 Calculus I ⁴ AP Environmental Science or EVSC 125 Environmental Science AP Computer Science A or Principals of Engineering or Medical Interventions World Language I SPRING (Unifying Theme) World Language II	FALL SENIOR PROJECT CAPSTONE COURSE ³ TBD MTH 111 Calculus I or MTH 112 Calculus II CHEM 125/A General Chem I & Lab or PHY 121/A Physics II & Lab NJIT Engineering or CS Offerings CS 113 Roadmap to Computing MET 103 Engineering Graphics & Intro to CAD MET 105 Applied CAD FED 101 Fundamentals of Engineering Design IT 101 Introduction to Information Technology World Language III SPRING World Language IV
SUMMER I (May/Jun) Science: Include Biology Topics Ecology/Evolution Intensives; Comprehensive Projects that combine all subjects	SUMMER I (May/Jun) Intensives; Comprehensive Projects that combine all subjects	SUMMER I (May/Jun) Social Science Requirement I	SUMMER I (May/Jun) Social Science Requirement II

³ Consider combining CS students with ME students to co-develop their Senior Capstone Projects in Engineering, Design, and Development

⁴ The curriculum will have to imitate NJIT's MTH 110 curriculum

⁵ Physics is not a required pre-req for PHYS 111/A

Updated: 9.14.19	9	10	11	12	Potential Total	Required ⁶
English	American Experiences (5)	Political Studies (5)	HUM 101 English Composition: Writing, Thinking, Speaking I (5)	HUM 102 English Composition: Writing, Thinking, Speaking II (5)	20	4 years/ 20 credits
History	American Experiences (5)	Political Studies (5)	World History (5)	Option	15	3 years/ 15 credits ⁷
Math	Integrated I (10)	Integrated II (5)	Integrated III (10)	MATH 111 Calculus I (10) or MATH 112 Calculus II (10)	25	3 years/ 15 credits ⁸
Science	Biomedical Science (5)	HS Chemistry (5)	AP Environmental Science	Chem 125/A Chem I & Lab (5) Chem 126/A Chem I & Lab (5) or PHY 111/A Physics I & Lab (5) PHY 121/A Physics II & Lab (5)	25	3 years/ 15 credits ⁹
21st Century Life and Careers (Engineering Courses)	Introduction to Engineering/Design (10)	Biomed, Engineering or Computer Science I (10)	Biomed, Engineering or Computer Science I (10)	Senior Capstone (10)	40	1 year/ 5 credits To take the place of 21 st century life and Careers
			<ul style="list-style-type: none"> • CS 113 Roadmap to Computing • MET 103 Engineering Graphics & Intro to CAD • MET 105 Applied CAD • FED 101 Fundamentals of Engineering Design • IT 101 Introduction to Information Technology 			
Health/Physical Education	Health Phys Ed (5)	Health Phys Ed (5)	Health Phys Ed (5)	Health Phys Ed (5)	20	4 years/3.75 credits 4 years/1.25 credits
World Language			WL 1 (5) WL 2 (5)	WL3 (option) WL4 (option)	10	1 year/ 5 credits
Financial Literacy	Career Readiness (2.5)	Career Readiness (2.5)		Financial Literacy Econ 265 Microeconomics Econ 266 Macroeconomics Mgmt 190 Intro to Business SS 201 Economics	2.5	1 semester/2.5 credits
Visual/ Performing Arts	Art 1 (5)	Art 2 (5)			10	1 year/ 5 credits
Electives					(40)	Total: 12.5
TOTAL		175	120 cr		175	120 cr

⁶ Starting with the Class of 2021, students will only have two pathways to meet the high school graduation assessments requirements: (1) Pass the ELA 10 and Algebra 1 assessments; or (2) The submission by the district of a student portfolio through the Department's portfolio appeals process, assuming the student has taken all PARCC assessments associated with the high-school level courses for which they were eligible and receives valid scores.

⁷ To include World History, US I, and US II

⁸ To include Algebra I and Geometry and a third year that builds upon both

⁹ To include Biology



Teachers take part in a 3-day Project Based Learning institute; Summer 2017

Priority Six

STEM Academy teachers are qualified and have advanced STEM content knowledge and/or practical experience in STEM careers.

Well-Prepared STEM Teaching Staff

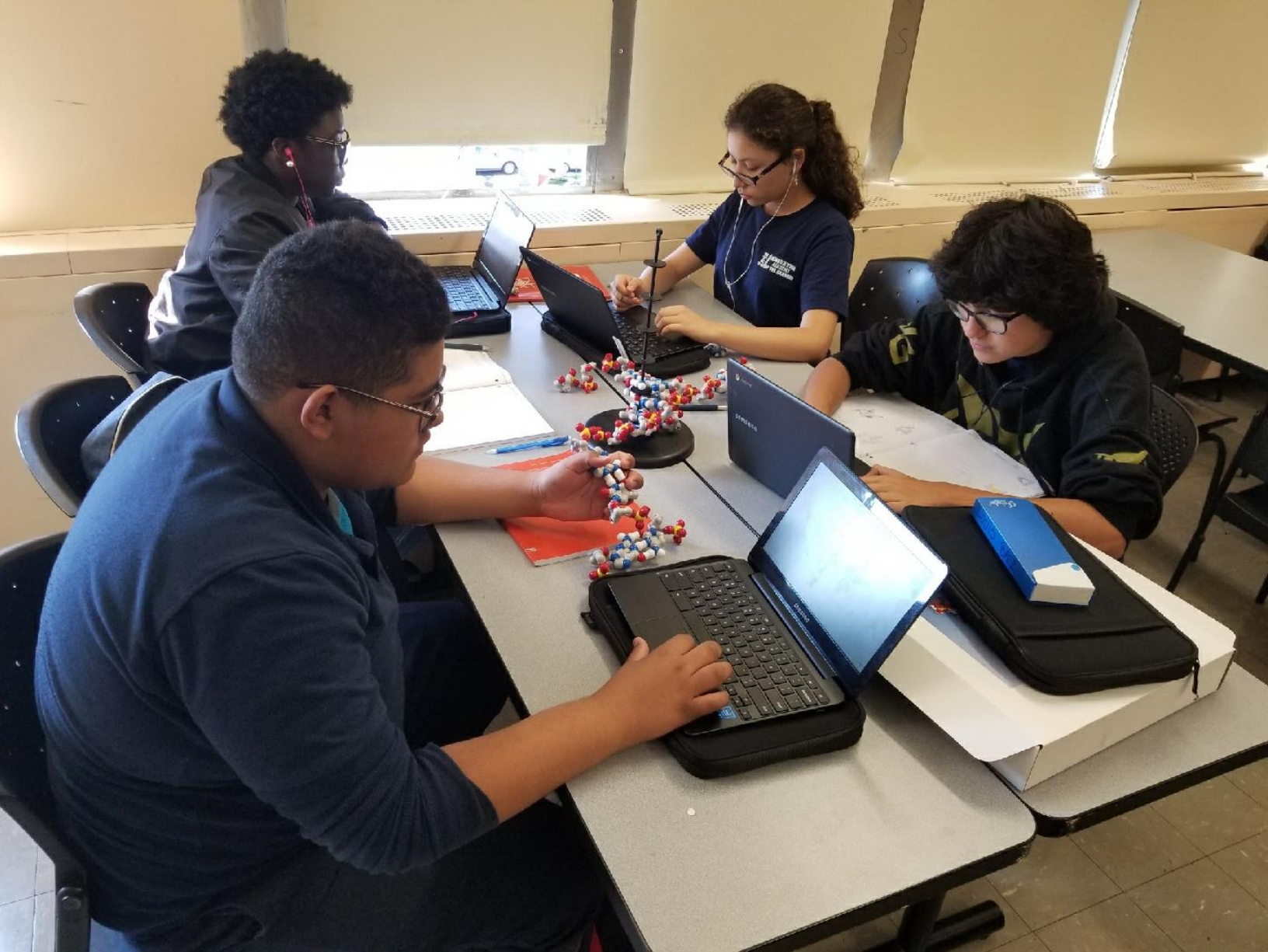
Benchmarks

- Engage in strategic hiring, development, and retention of staff; beginning recruitment efforts at least one year in advance.
- Develop a Teacher Village Fellowship within the partnership with NJIT and Montclair State University to train and prepare pre-service and in-service teachers for teaching and leadership roles within the district.
- Develop a four-year hiring plan to build strength in areas that address the Academy's needs while considering projected enrollment growth. Consider Option II staffing, recruitment of Options teachers with MA/MS degrees and higher in support of specialized programming, e.g. computer science, manufacturing, etc.
- Develop a mentoring plan for both faculty and instructional staff.

Hiring Strategy (4 years)*; Updated: 9.15.19

Yr	#	Teacher	Subject	Location	Size
1	1	HS Math	Grade 9 Focus Integrated Mathematics I Integrated Mathematics II/III	Math Lab 1	Single
2	1	HS Math	Grade 10 Focus Integrated Mathematics I Integrated Mathematics II/III	Math Lab 2	Single
3	1	HS Math	Grade 11 Focus Integrated Mathematics III College Calculus I & II Scholars I & II	Math Lab 1 & 2	Singles
1	1	HS Bio	Biomedical Science Human Body Systems	Bio Lab 1	Mid
3	1	HS Bio	Medical Interventions Biomedical Innovation	Bio Lab 2	Mid
2	1	HS Chem	Chemistry College Chem I & II <i>Scholars I & II</i>	Chem/Physics Lab 1	Mid
4	1	HS Physics	<i>Physics</i>	<i>Chem/Physics Lab 1</i>	<i>Mid</i>
1	1	HS Engineering	Intro to Engineering & Design PLTW Engineering Design & Develop <i>Scholars I & II</i>	Engineering Lab 1	Double
2	1	Mechanical Engineering	Computer Integrated Manufacturing Principles of Engineering (yr.3)	Engineering Lab 2	Double
2	2	HS Computer Science	App Creators Intro to CS (TEALS) Computer Science A	Computer Science Lab 1	Double
1	1	HS English	American Experience	Humanities Studio 1 (lower)	Mid
1	1	HS History	Political Studies	Humanities Studio 2 (lower)	Mid
3	1	HS English	College English Comp	Humanities Studio 1 (upper)	Double
3	1	HS History	World History		Double
3	.5	World Language	To Be Determined	World Language Studio	Mid
1	.5	Physical Education	Physical Education/Health	Gymnasium	Gym
2	1	Physical Education (Full Time)	Physical Education/Health	Gymnasium	Gym
2	na	na	Research and Development	Media/Research Center	Mid

* Consider staffing for all college-level pathways and offerings



Priority Seven

Integrated, Innovative Technology Use

Use the power of technology to connect students with information systems, models, databases, STEM research, teachers, mentors, and, social networking resources for STEM ideas during and outside the school day.

Benchmarks

- ■ Enhance the Academy's web presence via the development of a high-impact website to improve recruitment, promote the Academy's identity and highlight successes, and better serve the needs of the community through increased two-way communication channels.

- ■ Improve the use of online modes of course delivery to lessen the boundaries between the physical and virtual classrooms, improve timely access to resources and information, and underscore personalized learning formats.

- ■ Progress toward online textbooks and other digital platforms to enhance the teaching and learning environment.

- ■ Incorporate high quality adaptive learning systems to provide additional supports to students via personalized web-based responsive platforms that provide anytime any place learning.

CheckPoints

- All students use Google Classroom to manage, complete, and submit most assignments.
- The Genesis Parent Portal is used to monitor student grades, assignments, due dates, etc.
- Ten Marks, iReady, Reading Plus are used to provide additional supports to students

Four-Year College

Students planning to apply to four-year colleges will want to develop the strongest possible academic record. There is not one program that is right for everyone, but you should keep the following information in mind:

Admission to college is based on a picture of the applicant obtained from the examination of:

- The scholastic record (rigor of courses taken, final grades earned, grade point average and number of Carnegie units accrued)
- Results on college admissions tests, such as the ACT, SAT, and SAT II (Subject Area Tests)
- Recommendations written on behalf of the student
- The quality, not quantity of participation in extra-curricular school and community activities
- Personal interviews
- Content and presentation of the written application, including any required essays

As part of the high school record, colleges look for courses that are COLLEGE PREPARATORY in content and level of work required. Such courses are considered CARNEGIE UNITS. A total of sixteen units taken from grades 9-12 are generally the minimum required for college entrance. While each college prescribes the number and character of the academic units it will accept, the following are the usual requirements for entrance to four-year colleges:

English: 4 units

Mathematics: 3-5 units

Science: 2-5 units (at least 2 lab sciences)

Social Studies: 3-5 units

World Language: 2-5 units (of the same language)

Suggested Programs of Study for College Planning

The following is a chart of suggested patterns of college-preparatory study and can be used to help in developing a four-year plan of courses. The content areas outlined are those in which colleges are looking for specific preparation. Colleges considered to be most competitive generally look for students to take several Advanced Placement courses. It is recommended that students select from the wide array of offerings in the Art, Business, Family and Consumer Sciences, and Performing Arts areas. These courses will provide a well-rounded background for possible career and vocational interests.

Number of Years Recommended¹

	Community Colleges / Junior Colleges	Less Competitive Colleges	Competitive Colleges	Highly and Very Competitive Colleges	Most Competitive Colleges
ENGLISH	4	4	4	4	5-6
SOCIAL STUDIES	3	3	3	3-5	5-6
MATHEMATICS	2-4	3-4	3-4	4-5	5-6
LAB SCIENCE	2	2-3	2-3	3-4	4-5
WORLD LANGUAGE	0-2	1-2	2-4	3-4	4-5
CARNEGIE UNITS	12-15	16	16-18	17-20	18-22

Carnegie Units

Student's post-secondary school plans will determine to a great extent which courses they will take in high school. Students who are planning to go to a four-year college should accrue a minimum of sixteen Carnegie units before graduation. A Carnegie unit is earned for completion of study in a year-long college preparatory course. Students will want to present as strong an academic record as possible to prospective colleges. To help with planning, the courses, which are generally accepted by colleges as Carnegie units, are indicated by a †.

Suggested Course Sequences

The following sample course sequences are offered as a guideline for course selection. A student's ability level, interests and goals may alter these sequences. Students are encouraged to consult with their counselor to select elective courses that offer a challenging learning experience and are aligned to the students' post-graduation plans.

