

968 Honors Robotics 3**H 10-12 full year 4 periods 5 credits***Pre-requisite- Students must have successfully passed Robotics 1 and 2 with a C or better, or permission of the instructor.*

In this course students will develop a strong understanding of industrial robotic automation. They will learn mechanical design, electrical and electric circuit fabrication, electronic control systems, motor control systems and programming in multiple languages including, Python, C++, Arduino, and Lab View. U - on completion of this course the students will be able to design, build, program, and trouble shoot custom made robots.

976 Fashioning 1**no level 9-10-11-12 F 2 periods 1.25 credits**

Fashion Engineering "Fashioning" will be taught as a hands-on project based course where students will apply scientific and engineering principles to the design and production of all aspects of fiber, textile and apparel processes, products and machinery. The use of systematic problem solving engineering principles within the fashion design process will be used extensively throughout the entire course. The students will be creating 3D models, jewelry and accessories.

977 Fashioning 2**no level 9-10-11-12 S 2 periods 1.25 credits**

This course is a continuation of Fashioning 1. In this course, students will be learning about the design and production of all aspects of fiber, textile and apparel processes, products and machinery. The students will be learning about clothing and footwear fabrication. This will include the design, assembly and large-scale production of such products.

969 Engineering Research Project 1-2 -Major 1**ACP 10-11-12 F or S 2 periods 1.25 credits****971 Engineering Research Project 3-4 -Major 2****ACP 10-11-12 F or S 2 periods 1.25 credits***Pre-Requisite: Permission of the instructor*

This course is designed for the self-motivated student who has a strong interest in science and technology /engineering and who has already passed 5 credits of a technology /engineering course.

The students, working in the technology laboratory, will perform a cursory investigation of the many forms of technologies such as, Robotics, Computer Aided Design and Manufacturing, Desktop Publishing, Plastics Technology, Multimedia Design, Electrical and Electronics Technology, Structural Technology and Transportation Technology. Each student will then choose an area of technology /engineering of particular interest to him /her and investigate it in depth. The students, under the direction of the instructor, will design, develop and complete a semester project in their chosen technology.

972 Computer Repair and Support**ACP 9-10-11-12 full year 4 periods 5 credits**

This is an intensive full year course that will instruct students on the basics of computer hardware and operating systems. Through the use of lecture and hands on activities the students will learn about all aspects of the personal computer (P.C.). Some of the topics include:

Hardware Basics: Basic electronics, mother boards, computer cases/ power supplies, battery backups, system settings: BIOS, IRQ, I/O, and DMA, CPUs, expansion bus architecture, physical memory, data storage, I/O ports and connectors, I/O devices, printers and scanners, system startup sequences, and portable computers. The operating systems that will be covered are DOS, Windows XP, Vista, Windows 7, and Linux.

973 Honors Computer Repair and Support**H 9-10-11-12 full year 4 periods 5 credits****(A+ Certification)**

The Honors level course prepares students to sit for the CompTIA A+ computer certification exams. Students who take this class must be highly motivated and already possess a strong computer background. The course moves at an accelerated pace with emphasis on preparation for the rigorous A+ examination.

GREENGINEERING

WWW.GREENENGINEERS.WIKISPACES.COM**924 Xplore Greengineering****no level 9*-10-11-12 2 blocks F 1.25 credits****925 Xplore Greengineering****no level 9*-10-11-12 2 blocks S 1.25 credits**

Xplore GNRG is a wonderful introduction to our award-winning STEM programs. Xplore GNRG is designed around focused workshops that introduce students to cutting edge green engineering and design. The workshop model provides the balance between weekly guided seminars on 'green' topics with hands-on projects utilizing the Engineering - Design Process (EDP). The semester split below provides a proper introduction and exploration of GNRG topics and allows students to take both semesters without overlap. Students will earn an Exploratory Safety Training Certificate.

Fall Semester

1. GNRG Bootcamp - shop/lab safety protocols, materials/equipment, GNRG philosophy
2. Basic biodiesel (chemistry, engineering, physics)
3. Basic bags (fused plastics, material re-engineering, cradle to cradle philosophy)

Spring Semester

4. GNRG Bootcamp - shop/lab safety protocols, materials/equipment, GNRG philosophy
5. Basic bio-engineering (Algae - as fuel, Mycelium - biomaterial engineering, Aquaponics-urban agriculture)
6. Basic Green Technology (solar, wind, micro-hydro, peddle-power, electrical/mechanical systems)

927 Greengineering 101**no level 10-11-12 4 blocks full year 5 credits**

Imagine running your car and heating your house with vegetable oil. Imagine creating and distributing energy from sunlight, water, and wind. Imagine designing new products made from recycled materials. In this dynamic 'green-tech' course, students will design and build biodiesel processors, along with photovoltaic, micro-hydro, and wind power systems. Students will also create new products from recycled materials. The goal of Greengineering 101 is for students to engineer new and sustainable solutions through research and project-based learning. Greengineering is an integrated and interdisciplinary class that combines Science, Engineering, and Economics. This course offers students remarkable hands-on opportunities for intellectual problem solving, social change, and industry collaboration. Students will earn their 101 Safety Training Certificate. Participation/Leadership in the Greengineering Club is strongly encouraged.

- 928 Greengineering Work Study** **no level** **10-11-12** **4 blocks** **full year** **5 credits**
 This is a school-supervised work experience for students in the Greengineering courses 927, 929, 930. To be eligible the student must be registered in one of these two courses, have good attendance, and be passing an 80% or better. See Cooperative Education and Work Study Coordinator to sign up.
- 929 Greengineering 201** **no level** **11-12** **4 blocks** **full year** **5 credits**
 Prerequisite – Greengineering 101, or Advanced Design 981, or Engineering Tech 636 or Instructor Recommendation
 In GNRG 201, students will immerse themselves in design thinking protocols to tackle local and global issues with greengineers inspired solutions. Monthly green-thematic design challenges include: Students apply design, engineering, and consulting skills to create comprehensive solutions for challenges faced by communities far and wide. Multi-disciplinary student teams collaboratively design products and process prototypes, implementation plans, and user experiences as solutions.
 In this advanced 'green-design' course, students will build on the experience, skills, and projects covered throughout our Engineering and Design courses. They will be expected to work independently on design solutions and take more responsibility as chief engineers and business leaders. Students will develop new skills in project management, balancing problem variables with constraints, challenges, building business partnerships while learning working with clients, as well as advanced engineering design, ISO 9000: I 4000, and Total Quality Management (TQM) standards and techniques. Students will research, study, and control all the aspects of a 'real-world' green-design think tank and prepare a major green innovation project collaboratively with an industry or community partner. Students will earn their 201 Safety Training Certificate. Greengineering 201, is a 21st century classroom that offers students project-based, research driven, collaborative learning.
- 930 Greengineering 301** **no level** **11-12** **8 blocks** **full year** **10 credits**
 Note: GNRG 301 is run concurrently with Xplore GNRG
 Prerequisites: either GNRG 101 or 201
 GNRG 301 is a collaborative-service based curriculum. Students split time between co-teaching the Xplore GNRG and working with community groups on green issues. Students engage local businesses and environmental groups and work on making the Newton community as sustainable as possible. Leadership, collaboration and professional project management will become critical tools in tackling complex problem with green-designed solutions, such as building-based energy audits with the Green Decade Coalition, Newton's High Performance Building Coalition, and BU engineering; Students also contribute to green product/process design engineering with partnering companies and universities, such as MIT, Ecovative Design, Save That Stuff, Legal SeaFood, Whole Foods Market, Preserve, The Earth Day Network, UPS, Boston Tree Service, Newton Community Farm, Newton Conservators, etc. Students will earn their 301 Safety Training Certificate.

ENGINEERING CERTIFICATE – Total 50 Credits for Certificate

Engineering Certificate Electives – Sub Total 10 Credits			Science Electives – Choose 15 Credits from the following		
965	Robotics 1	1.25 Credits	601, 611, 621, 641	Biology	5 Credits
967	Robotics 2	1.25 Credits	602, 608, 612, 622	Chemistry	5 Credits
			605	Advanced Placement Biology	5 Credits
959	Engineering 1	2.5 Credits	606	Advanced Placement Chemistry	5 Credits
960	Engineering 2	2.5 Credits	607	Advanced Placement Physics	5 Credits
911	Drafting	2.5 Credits	613, 603, 623	Physics	5 Credits
			631	Meteorology	2.5 Credits
			632	Astronomy	2.5 Credits
			637	Forensics	5 Credits
			635	Oceanography	5 Credits
Science – Must choose one – Sub Total 5 Credits			633	Modern Physics	2.5 Credits
614, 670, 644	Introductory Physics	5 Credits	636	Engineering Technology	5 Credits
			961	Engineering 3	5 Credits
Math – Sub Total 15 Credits			General Technology Electives – Choose 5 Electives		
501, 511, 516	Math	5 Credits	972	Honors Computer Repair & Support	5 Credits
502, 512, 517	Math	5 Credits	973	Computer Repair and Support	5 Credits
503, 512, 517	Math	5 Credits	927	Greengineering 101	5 Credits
581, 582, 583	Math	5 Credits	929	Greengineering 201	5 Credits
			930	Greengineering 301	10 Credits
			969, 971	Engineering Research Projects	
			550, 551	Computers 1	5 Credits
			919, 920, 921	Engineering Drafting	5 Credits
			725	Web Site Development	5 Credits

975 Honors Computer Repair and Support and 976 Computer Repair and Support are A+ Certification preparatory classes.