

176 Television & Video Production Major 2 **ACP** **10-11-12** **full year** **4 periods** **5 credits**
(Advanced TV Production)

Prerequisite: Successful completion of Intermediate TV & Video Production Major 1 or approval from instructor.

Students in the advanced course are responsible, independent, self-motivated, organized and able to work within structured deadlines. They will solidify skills obtained in the earlier levels of TV and video production, as they produce the video magazine style program, *Tiger Vision*, which will air on NewTV and our youtube channel, @NewtonNorthTV. Students will pitch ideas, write scripts, cast films, conduct interviews, manage crews, direct live studio productions, and serve as the school's production company. The most successful projects will be entered into local and national film festivals. Students will also film after-school functions, sports, and events for air on NewTV. At the completion of this course, students will have gained the skills and knowledge needed to advance into a college level program or seek gainful employment in this rapidly growing field.

TECHNOLOGY/ENGINEERING

959 Engineering 1 **ACP** **10-11-12** **F** **4 periods** **2.5 credits**

Pre-requisite: Students must have passed or currently be enrolled in SIMMS, Math 501, Math 511, Math 517, or Math 543.

This course is designed to expose students to some of the many forms of engineering. In this class the students will learn extensively about Electrical Engineering and other forms of Power Technology. The students will design and develop working electronic circuits and be able to calculate resistance, voltage and current using Ohm's law and Kirchhoff's current and voltage laws. The students will build and test circuits that contain resistors, capacitors, diodes, transistors, and small integrated circuits. The students will use and understand certain test equipment such as multi-meters and oscilloscopes. High voltage residential wiring techniques will also be covered.

This course, along with "Engineering 2," is ideal for students exploring the field of engineering as a career pathway.

960 Engineering 2 **ACP** **10-11-12** **S** **4 periods** **2.5 credits**

Pre-requisite: Students must have passed or currently be enrolled in SIMMS, Math 501, Math 511, Math 517, or Math 543.

This course is designed to expose students to some of the many forms of engineering. In this class the students will explore Mechanical and Structural engineering concepts in some depth. In the Mechanical Engineering portion of this class the students will learn about gearing, pulleys, and lever systems. Students will be using SolidWorks and C.N.C. machinery to manufacture individual projects that they themselves have engineered to meet certain criteria. In the Structural Engineering portion of this class the students will learn about the many processes of design construction. The students will learn about the various techniques of engineering roof trusses, and floor beams to be able to carry dead and live loads. Using a variety of materials the students will be able to build and test scale model trusses and beams to determine the amount of loads they can handle.

961 Honors Engineering 3 **H** **10-12** **full year** **4 periods** **5 credits**

Pre-Requisite - Students must have successfully passed Engineering 1 and 2. Students who complete this course will learn the engineering methods and skills involved in the production of consumer grade goods. The students will build upon and increase their knowledge of Physics, Chemistry, Electrical, Mechanical and Manufacturing Engineering to design various projects throughout the year. They will be working as members of cooperating engineering teams to design, engineer, and produce products that could be mass manufactured. The students will learn engineering design techniques such as the Axiomatic Design Process, methods of mass production, and safe handling of production equipment, i.e., lathe, mill, CNC equipment, robotics, vacuum forming, and injection molding. A large portion of this class will also focus on the methods of project management.

636 Engineering Technology **ACP** **9-10-11-12** **full year** **4 periods** **5 credits**



Students will learn important technological and engineering related skills and concepts. These concepts cover Engineering Design, Construction Technologies, Communication Technologies, and Energy and Power Technologies (Fluid, Thermal and Electrical systems). Students will be designing, building and testing prototype models that cover these concepts. Students will learn product design, accurate measurements using a variety of instruments and technologies, application of algebra to engineering problems, and application of physics concepts to the real world. This course is aligned with the MA State Frameworks for Science and Technology/Engineering and will allow the students to choose to take the MCAS for Technology/Engineering if they wish. Successful completion will meet the physical science requirement.

963 Exploring Technology 1 **no level** **9-10-11-12** **F** **2 periods** **1.25 credits**



This course will be taught as a hands-on project-based course where the students will learn about Electrical/Power Technology, Mechanical Technology, and Manufacturing Technology. Through the building and testing of projects, students will learn the concepts behind these technologies.

964 Exploring Technology 2 **no level** **9-10-11-12** **S** **2 periods** **1.25 credits**



This course will be taught using a hands-on approach similar to Exploring Technology I. The students will learn about Transportation Technology, Communications Technology, and Structural Technology by designing, building and testing small projects.

965 Robotics 1 **no level** **9-10-11-12** **F or S** **2 periods** **1.25 credits**

967 Robotics 2 **no level** **9-10-11-12** **F or S** **2 periods** **1.25 credits**



Prerequisite: 965 is a prerequisite for 967


Robotics is a hands-on building and demonstration course. In small groups the students design, build and program robots to perform specific tasks. The tasks start simple and progressively get more complicated throughout the course. Some of the topics that will be covered are: Simple machines, Gear and Pulley Systems, Transmission Systems, and Computer Programming. We will be using Lab View programming language. Robotics 2 is a continuation of Robotics 1. The projects will get more complicated with the addition of new sensors and programming techniques.

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 Fashioneering 1 **no level** **9-10-11-12** **F** **2 periods** **1.25 credits**
 Fashion Engineering "Fashioneering" 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 Fashioneering 2 **no level** **9-10-11-12** **S** **2 periods** **1.25 credits**
 This course is a continuation of Fashioneering 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.

GREENENGINEERING

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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.

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
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Prerequisite – Greengengineering 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: 1 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
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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

965	Robotics 1	1.25 Credits
967	Robotics 2	1.25 Credits
959	Engineering 1	2.5 Credits
960	Engineering 2	2.5 Credits
911	Drafting	2.5 Credits

Science – Must choose one – Sub Total 5 Credits

614, 670, 644	Introductory Physics	5 Credits
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Math – Sub Total 15 Credits

501, 511, 516	Math	5 Credits
502, 512, 517	Math	5 Credits
503, 513, 518	Math	5 Credits
581, 582, 583	Math	5 Credits

Science Electives – Choose 15 Credits from the following

601, 611, 621, 641	Biology	5 Credits
602, 608, 612, 622	Chemistry	5 Credits
605	Advanced Placement Biology	5 Credits
606	Advanced Placement Chemistry	5 Credits
607	Advanced Placement Physics	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
636	Modern Physics	2.5 Credits
633	Engineering Technology	5 Credits
961	Engineering 3	5 Credits

General Technology Electives – Choose 5 Electives

972	Honors Computer Repair & Support	5 Credits
973	Computer Repair and Support	5 Credits
927	Greengineering 101	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.