

# Online Courses With Global Online Academy

## Arts, History and Social Sciences, Mathematics and Computer Science, Science, and World Languages

BB&N partners with Global Online Academy (GOA), a consortium of independent schools worldwide, to provide students in Grades 11 and 12 with the opportunity to enroll in online elective courses and earn credit. Global Online Academy courses are interactive, instructional, and experiential, with semester-long options in a wide variety of subjects, ranging from organic chemistry to poetry writing. All GOA courses have synchronous components (when students collaborate or work with their teacher at a set time, generally using video-conferencing software) and asynchronous components (when students choose at which time to participate). It is important to note that GOA courses require the same time commitment and have workloads similar to any other course students would take at BB&N. Students enrolled in these online courses are required to meet with the BB&N GOA Site Director regularly throughout the duration of the course to share what they are studying and to remain accountable to their other academic commitments.

During the 2017 – 2018 academic year, students can apply to enroll in a yearlong course, or in one-semester or two-semester electives in Art, History and Social Sciences, Mathematics and Computer Science, Science, or World Languages (or a combination of disciplines). GOA fall courses run from September through December. Spring courses run from January through May (students enrolled in a spring GOA course are required to include this course as a part of their Senior Spring Project). BB&N students receive 0.5 credit for a semester-long course and 1.0 credit for a yearlong course; the student's transcript will contain the course name with an annotation to reflect that the course was taken with GOA.

Interested students must be motivated, independent learners capable of working within established timeframes to achieve curricular goals established by the GOA instructor. Exceptional time-management skills are essential for success in this type of course. Requirements include concurrent enrollment in a BB&N-based elective of the chosen discipline (for all disciplines except Art), successful completion of the discipline's graduation requirements, and approval from the Educational Policy Committee. BB&N's Modern Global History graduation requirement may be fulfilled through a Global Online Academy course; in these special cases, students do not need to concurrently take a BB&N history course. Students will only be allowed to take a GOA course as a sixth course. Enrollment is limited, and interested students are required to complete a short application submitted in February to the GOA Site Director.

### ARTS DEPARTMENT

(Concurrent enrollment in a BB&N Arts course is not required)

#### **Graphic Design (Spring)**

This course explores the relationship between information and influence from a graphic design perspective. What makes a message persuasive and compelling? What helps audiences and viewers sort and make sense of information? Using an integrated case study and design-based approach, this course aims to deepen students' design, visual, and information literacies. Students are empowered to design and prototype communication projects about which they are passionate. Topics addressed include principles of design and visual communication; infographics; digital search skills; networks and social media; persuasion and storytelling with multimedia; and social activism on the Internet. Student work includes individual and collaborative group projects, graphic design, content curation, some analytical and creative writing, peer review and critiques, and online presentations.

#### **Music Theory and Digital Composition (Spring)**

In Music Theory and Digital Composition, students explore the structure, writing, and recording of music as a design problem, with the intention of creating and releasing a finished piece of original music. The first half of the semester is focused on the history of music, the staff, notation, scales, intervals, chords, and harmony. In conjunction with this is the use of two pieces of software called Auralia and Musition, which quickly attune to each student's individual skill level in ear training and sight-reading, respectively. This aids the student in writing an original composition, the quality and character of which is determined by personal music interests and learning more about his or her identified target audience. The Design Thinking model is used, which guides students through a process that begins with empathizing with their audience, defining their piece, iterating several design drafts, prototyping, and then releasing the finished recording for feedback and another iteration of refinement. The second half of the course is focused on performing, recording, mixing, mastering, and releasing a recording of their composition, all the while keeping key target audience members in the loop through surveys and conversations that follow the Design Thinking model.

## HISTORY AND SOCIAL SCIENCES DEPARTMENT

BB&N's Modern Global History graduation requirement may be fulfilled through completion of a Global Online Academy course; in these special cases, students do not need to concurrently take a BB&N history course.

### **9/11 in a Global Context** (Fall and Spring)

September 11, 2001, was a tragic day that changed the world in profound ways. In this course, students explore the causes of 9/11, the events of the day itself, and its aftermath locally, nationally, and around the world. In place of a standard chronological framework, students instead will view these events through a series of separate lenses. Each lens represents a different way to view the attacks and allows students to understand 9/11 as an event with complex and interrelated causes and outcomes. Using a variety of technologies and activities, students work individually and with peers to evaluate each lens. They then explore the post-9/11 world and conclude the course by planning their own 9/11 memorials.

### **Advocacy** (Spring)

This skills-based course explores the creativity, effort, and diversity of techniques required to change people's minds and motivate them to act. Students learn how to craft persuasive arguments in a variety of formats (written, oral, and multimedia) by developing a campaign for change around an issue about which they care deeply. Students explore a number of relevant case studies and examples as they craft their campaigns. Units include persuasive writing, social media, public speaking, informational graphics, and more. The culminating project is a multimedia presentation delivered and recorded before a live audience.

### **Applying Philosophy to Modern Global Issues** (Fall)

This is an applied philosophy course that connects pressing contemporary issues with broad-range philosophical ideas and controversies, drawn from multiple traditions and many centuries. Students use ideas from influential philosophers to shed light on recent political events such as the global economic downturn and the sweeping revolutions of the Arab Spring, as well as new developments in fields as diverse as biology, cognitive science, and political theory. In addition to introducing students to the work of philosophers as diverse as Confucius and Martin Heidegger, this course also aims to be richly interdisciplinary, incorporating models and methods from diverse fields including history, journalism, literary criticism, and media studies. This course fulfills BB&N's Modern Global History requirement.

### **Gender Studies** (Spring)

This course uses the concept of gender to examine a range of topics and disciplines that might include feminism, gay and lesbian studies, women's studies, popular culture, and politics. Throughout the course, students examine the intersection of gender with other social identifiers: class, race, sexual orientation, culture, and ethnicity. Students read about, write about, and discuss gender issues as they simultaneously reflect on the ways that gender has manifested in and impacted their lives.

### **Genocide & Human Rights** (Fall)

Students in this course study several of the major genocides of the twentieth century (Armenian, the Holocaust, Cambodian, and Rwandan), analyze the role of the international community in responding to and preventing further genocides (with particular attention to the Nuremberg tribunals), and examine current human rights crises around the world. Students read primary and secondary sources, participate in both synchronous and asynchronous discussions with classmates, write brief papers, read short novels, watch documentaries and develop a human rights report card website about a nation of their choice. This course fulfills BB&N's Modern Global History requirement.

### **Introduction to Investments** (Fall)

In this course, students simulate the work of investors by working with the tools, theories, and decision-making practices that define smart investment. The course explores concepts in finance and asks students to apply them to investment decisions in three primary contexts: portfolio management, venture capital, and social investing. After an introduction to theories about valuation and risk management, students simulate scenarios in which they must make decisions to grow an investment portfolio. They manage investments in stocks, bonds, and options to learn a range of strategies for increasing the value of their portfolios. In the second unit, they take the perspective of venture capital investors, analyzing startup companies and predicting their value before they become public. In the third unit, students examine case studies of investment funds that apply the tools of finance to power social change. Throughout the course, students learn from experts who have experience in identifying value and managing risk in global markets. They develop their own ideas about methods for taking calculated financial risks and leave this course not just with a simulated portfolio of investments, but the skills necessary to manage portfolios in the future.

### **Power: Redressing Inequity With Data** (Fall)

Students utilize research, data, their own sense of social justice, and the application of all three to right wrongs in our world. A collaborative track and an independent track run concurrently throughout the semester. Collaboratively, the

full class works through a unit on Power Frameworks (Nietzsche, Foucault, Weber, and French & Raven), followed by a series of inequality case studies that provide insight into and practice with all six steps of the Power and Inequality Assessment (PIA) approach: (1) identify specific inequality; (2) provide and analyze data to substantiate the inequality; (3) identify type(s) of power that created and are maintaining the inequality; (4) provide and analyze data to substantiate power claim; (5) present and explain specific action steps to redress inequality; (6) identify type(s) of power necessary to implement action plan. Independently, all students apply the PIA approach to a specific local, national, or global inequality of their choosing. Past PIA projects have explored gender inequality in NCAA collegiate coaching; racial inequality in the American police force; and economic inequality in the treatment of immigrants, to name only a few. Regular, guided peer review will help students to hone their final products. Final PIA products are presented in multimedia formats asynchronously online. Invited audience members include GOA classmates, Site Directors and other members of home school communities, and experts from relevant fields.

## MATHEMATICS AND COMPUTER SCIENCE DEPARTMENT

### **Computer Science II: Analyzing Data with Python (Spring)**

In this course, students utilize the Python programming language to read, manipulate, and analyze data. The course emphasizes using real-world datasets, which are often large, messy, and inconsistent. The prerequisite for this course is familiarity with and hands-on experience using some high-order programming language, such as Java, C++, VisualBasic, or Python itself. Because of the powerful data structures and clear syntax of Python, it is one of the most widely used programming languages in scientific computing. There are a multitude of practical applications of Python in fields like biology, engineering, and statistics.

Prerequisite: Computer Programming or Advanced Placement Computer Science A

### **Computer Science II: Game Design and Development (Spring)**

In this course, students practice designing and developing games through hands-on practice. Comprised of a series of “game jams,” the course asks students to solve problems and create content, developing the design and technical skills necessary to build their own games. The first month of the course is dedicated to understanding game design through game designer Jesse Schell’s “lenses”: different ways of looking at the same problem and answering questions that provide direction and refinement of a game’s theme and structure. During this time, students also learn how to use Unity, the professional game development tool they use throughout the class. They become familiar with the methodologies of constructing a game using such assets as graphics, sounds, and effects, and controlling events and behavior within the game using the C# programming language. Throughout the remainder of the course, students work in teams to brainstorm and develop new games in response to a theme or challenge. Students develop their skills in communication, project- and time-management, and creative problem-solving while focusing on different aspects of asset creation, design, and coding.

Prerequisites: Computer Programming or Advanced Placement Computer Science A

### **Game Theory (Spring)**

Do you play games? Do you wonder if you’re using “the right” strategy? What makes one strategy better than another? In this course, students explore a branch of mathematics known as game theory, which answers these questions and many more. Game theory is widely applicable in the real world as we face dilemmas and challenges every day, most of which we can mathematically treat as games! Students consider significant global events like the Cuban Missile Crisis, Mandela’s rise in South Africa, or the rise of Nobel Peace Prize winner Sirleaf in Liberia from a math perspective. Specific mathematical ideas that are discussed include two-person zero-sum games, utility theory, two-person non-zero-sum games, multi-player games, game trees, matrix algebra, linear optimization, and applications of game-theory techniques to a plethora of real-world problems.

### **Number Theory (Fall)**

Once thought of as the purest but least applicable part of mathematics, number theory is now by far the most commonly applied: every one of the millions of secure Internet transmissions occurring each second is encrypted using ideas from number theory. This course covers the fundamentals of this classical, elegant, yet supremely relevant subject. It provides a foundation for further study of number theory, but even more, it develops the skills of mathematical reasoning and proof in a concrete and intuitive way, good preparation for any future course in upper-level college mathematics or theoretical computer science. Students progressively develop the tools needed to understand the RSA algorithm, the most common encryption scheme used worldwide. Along the way, they invent some encryption schemes of their own and discover how to play games using number theory. Students also get a taste of the history of the subject, which involves the most famous mathematicians from antiquity to the present day, and see parts of the story of Fermat’s Last Theorem, a 350-year-old statement that was fully proved only twenty years ago. While most calculations are simple enough to do by hand, students sometimes use the computer to see how the fundamental ideas can be applied to the huge numbers needed for modern applications. Students must have a desire to do rigorous mathematics and proofs.

Prerequisite: Precalculus, Honors Precalculus AB, or Honors Precalculus BC

## SCIENCE DEPARTMENT

### **Bioethics** (Fall and Spring)

Ethics is the study of what one should do as an individual and as a member of society. In this course, students evaluate ethical issues related to medicine and the life sciences. During the semester, students explore real-life ethical issues, including vaccination policies, organ transplantation, genetic testing, human experimentation, and animal research. Through reading, writing, and discussion, students are introduced to basic concepts and skills in the field of bioethics, deepen their understanding of biological concepts, strengthen their critical-reasoning skills, and learn to engage in respectful dialogue with people whose views may differ from their own. In addition to journal articles and position papers, students are required to read Rebecca Skloot's *The Immortal Life of Henrietta Lacks*.

### **Global Health** (Fall)

What makes people sick? What social and political factors lead to the health disparities we see both within our own community and on a global scale? What are the biggest challenges in global health and how might they be met? Using an interdisciplinary approach to address these two questions, this course hopes to improve students' health literacy through an examination of the most significant public-health challenges facing today's global population. Topics addressed include the biology of infectious disease (specifically HIV and malaria); the statistics and quantitative measures associated with health issues; the social determinants of health; and the role of organizations (public and private) in shaping the landscape of global health policy. Students use illness as a lens through which to examine critically such social issues as poverty, gender, and race. Student work includes analytical and creative writing; research, and peer collaboration; reading and discussions of nonfiction; and online presentations.

### **Medical Problem Solving I** (Fall and Spring)

In this course students collaboratively solve medical mystery cases, which is similar to the approach used in many medical schools. Students enhance their critical-thinking skills as they examine data, draw conclusions, diagnose, and treat patients. Students use problem-solving techniques in order to understand and appreciate relevant medical/biological facts as they confront the principles and practices of medicine. Students explore anatomy and physiology pertaining to medical scenarios and gain an understanding of the disease process, demographics of disease, and pharmacology. Additional learning experiences include studying current issues in health and medicine, building a community-service action plan, interviewing a patient, and creating a new mystery case.

### **Medical Problem Solving II** (Spring)

This course is an extension of the problem-based learning done in Medical Problem Solving I. While collaborative examination of medical case studies remains the core work of the course, students tackle more complex cases and explore new topics in medical science, such as the growing field of bioinformatics. Students in MPS II also have opportunities to design cases based on personal interests, discuss current topics in medicine, and apply their learning to issues in their local communities.

Prerequisite: Medical Problem Solving I

### **Organic Chemistry** (Spring)

This course is designed with two goals in mind, one pragmatic and one philosophical. Pragmatically, this course provides an absolutely invaluable foundation for further studies in the organic chemistry field, giving students a significant advantage at the beginning of any future course. Philosophically, this course aims to open an infinite world of discovery of complex molecules—their properties and reactions and applications—which hold the keys to confronting and solving the world's most challenging, future scientific problems. The emphasis of the course is on stimulating interest in organic chemistry through an exploration of the molecules relevant to modern life. Students can use this course as a springboard for further learning and the beginning of a longer journey.

### **Practical Astronomy** (Fall)

This course serves as a model of how modern astronomy has benefited from the digital revolution and advances in imaging technology. In the past two decades, the amount of information about our place in the universe has seen an explosive expansion. Our understanding of our own solar system has become fundamentally different in that short time. Students learn the modern techniques used by professional astronomers to gather and analyze data. The course reviews coordinate systems used in locating astronomical objects and the basics of spherical trigonometry. Students then are given practical problems such as determining the orbits of newly discovered solar system objects such as minor planets and comets. Data from professional observatories is used to analyze the light curves of binary star systems and variable stars as well as to search for supernovae. These projects, given the global nature of the course, could include timing of occultations of stars by the Moon and asteroids, providing information vital to professional researchers. The Cranbrook Observatory at the Cranbrook Institute of Science in Bloomfield Hills, Michigan, is used as a source of data along with other international sources specific to each student for individual projects.

Prerequisite: Precalculus, Honors Precalculus AB, or Honors Precalculus BC

## WORLD LANGUAGES DEPARTMENT

### **Japanese I: Language Through Culture** (Yearlong)

This full-year course is a unique combination of Japanese culture and language, weaving cultural comparison with the study of basic Japanese language and grammar. While examining various cultural topics such as literature, art, lifestyle, and economy, students learn the basics of the Japanese writing system (Hiragana and Katakana), grammar, and vocabulary. Through varied synchronous and asynchronous assignments, including hands-on projects and face-to-face communications, students develop their speaking, listening, reading, and writing skills. The cultural study and discussion is conducted in English, with topics alternating every two to three weeks. The ultimate goal of this course is to raise awareness and appreciation of different cultures through learning the basics of the Japanese language. The focus of this course is 60 percent on language and 40 percent on culture. This course is appropriate for beginner-level students.

## INTERDISCIPLINARY COURSES

### **Energy** (Spring, History/Science, must be concurrently enrolled in a BB&N History or Science course)

In this course, students develop a keen ability to analyze global energy issues. A historical and scientific exploration of fossil fuels gives students the foundation to tackle economic and environmental concerns related to traditional and alternative energy. Students do technical analyses of the rates of depletion of the reserves of major oil-producing countries, and investigate the motivations for an oil-producing nation to become a member of OPEC. Students take sides in major energy debates on topics like “fracking” or the international movement of energy supplies. In their final project, students present to their peers on all key aspects of an alternative energy source, including technical and economic viability and environmental sustainability.

### **Water: From Inquiry to Action** (Fall, History/Science, must be concurrently enrolled in a BB&N History or Science course)

The second most common compound in the world, water, is essential to life. It is also a cause of quick death. It sculpts mountains and reshapes coastlines. It gives rise to conflicts among neighbors and nations, yet it brings peace and pleasure to many. Characteristics of water can be studied in disciplines from art to zoology, and this course touches on many of them, especially their interconnectedness, through a set of case studies in the first five weeks. Those case studies introduce a process of converting curiosity into researchable questions that lead to new ways of thinking about water. The next five-week section of the course begins with a study of question development and a competition to create the most mind-expanding question about water. Following a group brainstorming process, individual students define a single research question and break it down into components that can be pursued through multiple disciplines. The plan must include a local component, either a hands-on activity or an interview with a relevant professional. Students share their findings in a collaborative online environment and tag the connections among the different areas of inquiry. In addition, students give and receive weekly critiques of each other’s work, developing the skills to generate meaningful, substantive feedback and to receive and evaluate the same from others. In the final month, individuals or groups design and complete projects that apply a multidisciplinary understanding of water to a specific, real-world issue of their choice. Interaction with officials, advocates, or the public is a key element of these projects, and the products are submitted to relevant audiences in the public or private sector.