SCHI 14
Summer Academic and Honors Institute

June 15-20
June 22-27

Astronomy and Physics
Biochemistry, Biotechnology
Chemistry
Cryptography
Design: Think. Know. Do.
Engineering Pathways
Environmental Science
Exercise Physiology and Sports Science
Forensic Science (Basic)
Forensic Science (Advanced)
Human Anatomy Exploration with Histological Techniques
Medicinal Herbs
Mock Trial
Multimedia
Pharmacy
Technology
Theatre
DEEPER LEARNING FOCUS of the SAHI Courses at ONU

This summer, Ohio Northern University will host its 10th Summer Academic and Honors Institute for gifted high school students who will be freshmen, sophomores, juniors or seniors in 2014-15. This year’s institute includes 17 challenging courses scheduled over the month of June.

Each weeklong course provides a great way to investigate potential career choices or college majors. Plus, this is the perfect opportunity to interact with other gifted students with instruction provided by ONU professors and special guest lecturers.

Eligibility: To be eligible to attend the Summer Academic and Honors Institute at ONU, you must: Be entering the ninth, 10th, 11th or 12th grade in fall 2014-15 AND Be identified as “gifted” by a school district (Ohio gifted identification criteria as described in Ohio Administrative Code 3301-51-15). OR Be able to obtain a written recommendation from your high school counselor.

Contact: Dr. Dennis De Luca at 419-772-2331 or 419-204-3361 (cell) Fax: 419-772-2330 Email: summerinstitute@onu.edu

Department of Biological and Allied Health Sciences Mathile Building Room 128 Ohio Northern University 525 S. Main St. Ada, OH 45810

Cost: $460 per week
*The following camps require an additional fee for travel and/or supplies: Environmental Science, Medicinal Herbs, Physics, Pharmacy, Engineering: $50. Forensics (Basic and Advanced): $35

Registration deadline: May 6, 2014
Bring a friend, and you’ll both save $50. Students may sign up for more than one week.

Space is limited, so reserve your spot today!

For detailed information and registration forms, visit onu.edu/sahi

Students completing each course will receive one transferable college credit hour. Requests for transcripts can be made by contacting the ONU registrar at registrar@onu.edu.

SAHI courses utilize four areas of the Ohio Revised Science Standards and Model Curriculum: Life Sciences, Physical Sciences, Chemistry and Physics. The program utilizes advances in forensic science as the stage and focal point for the integration of the sciences of biology, chemistry and biochemistry as well as math and physics. These courses address specific areas of the standards and use guiding principles such as Definition of Science, Scientific Inquiry, 21st Century Skills, Technological Design, and Depth of Content, all while implementing assessment tools developed especially to be congruent with the standards. Faculty expertise includes subject areas such as cell, molecular, genetics, general chemistry, biochemistry, and organic and analytical chemistry and a thorough understanding of contextual analysis. These subjects utilize specific scientific content to bolster the goal of the integration of an extended curriculum using the scientific inquiry/learning cycle to develop skillsets for the application of specific science content of multiple disciplines for problem-solving and deeper, lifelong learning. The idea of knowledge transfer in context is one found in a July 2012 report from the National Research Council, “Assessing 21st Century Skills: Summary of a Workshop.”

CAMP SCHEDULES

JUNE 15-20, 2014 (nine course offerings)
Chemistry
Design: Think. Know. Do.
Forensic Science (Basic)*
Human Anatomy Exploration with Histological Techniques
Medicinal Herbs*
Mock Trial
Multimedia
Pharmacy*
Theatre

JUNE 22-27, 2014 (nine course offerings)
Astronomy and Physics*
Biochemistry
Cryptography
Engineering Pathways*
Environmental Science*
Exercise Physiology and Sports Science
Forensic Science (Advanced)*
Mock Trial
Technology – HOT

*These camps require an additional fee for travel and/or supplies.

The Ohio Northern University Summer Academic and Honors Institute is funded by the Martha Holden Jennings Foundation and Ohio Northern University.
MULTIMEDIA June 15-20
“Covering the Story: Online and On The Air” will give you a week of hands-on learning about multimedia news-gathering, including finding stories; interviewing newsmakers; recording interviews for radio, TV and online; shooting and editing video; and producing stories for display over radio, TV and online. You will learn about Adobe Audition and Final Cut Pro as you put together content for a Wordpress website dedicated to the weeklong experience.

PHARMACY (Only Seniors accepted) June 15-20
In the pharmacy course, you will gain insight into the various science disciplines involved in the research and development of pharmaceutical products. Through hands-on lab and research experiences, you will learn the steps required to manufacture a product and how to counsel patients on the use of medications. You will visit four different pharmacy practice settings and prepare a final presentation for faculty and parents.

TECHNOLOGY: HANDS-ON TECHNOLOGY June 22-27
Innovations and technology abound in your journey from design to competition at the Hands-On Technology (HOT) camp. You will be exposed to a world of inquiry through problem-solving exercises to obtain a deeper learning of technology in action. You will experience hands-on science, technology, engineering and mathematics as you design, develop, create and test a radio-controlled hovercraft. Use state-of-the-art software programs to design your prototype while operating and using cutting-edge technologies and equipment. Examples include advanced 3-D designing, 3-D printing/rapid prototyping, creating printed circuit boards, thermal forming of plastics, material fabrication, metal casting, robotics and others that develop and test your abilities to create a competition winner. Each participant will take his or her creation with him or her when completed.

THEATRE – ‘ROUND THE WORLD OF THEATRE
June 15-20
You will learn the basic skills of theatre production through practical methodology. Focusing on all aspects of theatre, including design, acting and management, this hands-on course offer insight into the world of professional theatre. Using one core text, you will divide your time between scenic and prop design, lighting/sound, and basic acting, culminating in a short presentation of your work on day five in the Stambaugh Studio, a state-of-the-art facility on the campus of Ohio Northern University. The invited audience to this final production will include your parents as well as guests. This course offers the opportunity to learn a great deal about a number of different facets of theatre rather than just one element.

NEW THIS YEAR

COURSE DESCRIPTIONS

JUNE 15-20, 2014 (nine course offerings)
JUNE 22-27, 2014 (nine course offerings)

ASTRONOMY AND PHYSICS June 22-27
Riding the Edge: The Physics of Cedar Point. Spills, thrills, chills—and that’s just the math and science.

Riding the Edge closely examines the physics behind the scream machines that make our hearts race and stomachs drop. You’ll gain fundamental knowledge of the principles of physics and solve problems in the context of using critical thinking and inquiry skills of applied physics. Classroom projects in engineering and physics will provide the basis for the science behind the thrill rides. The course’s “final exam” is a full day at the world’s biggest physics lab—Cedar Point in Sandusky, Ohio. Through the astronomy segment of the course, you’ll spend significant time exploring the skies by day and by night.

BIOCHEMISTRY, BIOTECHNOLOGY MOLECULES TO MEDICINES: STRUCTURE AND FUNCTION June 22-27
Join the biochemists at Ohio Northern University for a weeklong experience to explore how DNA sequence is related to protein structure and how this affects protein function. You will examine the basic and advanced concepts required to understand those relationships. This will be done through intensive laboratory experiences and exciting classroom discussion. You will be introduced to amino acids and how they form proteins, the “machines” or “appliances” in the body that do all the work and allow cells and life to exist. The structure/function relationship of proteins will be studied and how this plays a part in their role in molecular biology, medicine and disease. You will delve into lab work, grow cells and allow cloned proteins to be made by bacteria. You will use this information and related concepts to understand how a protein does its job and how a damaged or malformed protein can contribute to disease. Disease symptoms are often due to changes in the structure of a protein, which affect how it functions in the body. During this weeklong course, you will see how DNA mutations play a role in the formation of malfunctioning proteins and resulting disease states. As a visual demonstration of this, you will examine how changes at the DNA level can result in altered protein structure and properties as you examine the attributes of a protein that glows green but can be changed to a non-glowing protein or one that glows blue through changes in the DNA sequence. As you explore, you will have opportunities to perform fundamental molecular biology and biochemical techniques. The application of molecular biology techniques to such controversial topics of genetically modified organisms and gene therapy will be presented followed by discussion regarding associated merits and ethical concerns.

CHEMISTRY – THE CHEMISTRY OF THE TOMATO: SEE IT, LIVE IT, TASTE IT June 15-20
Join us as we dissect the tomato and discover the chemistry lurking behind its bright red cover!

Tomato...sounds boring. However, if you attend “The Chemistry of the Tomato” course at Ohio Northern University, you are in for a big surprise, because the tomato is full of interesting chemistry! Why is the tomato red when ripe? Why is the skin of the tomato so tough? What else is in a tomato beside “red”? Are they really good for you? In this course, students will be introduced to a variety of fundamental topics in chemistry through short lectures and extensive hands-on laboratory experiences relating to the tomato. Students will isolate and characterize the molecule responsible for the tomato’s red color. Questions will be asked. Can we determine the chemical differences between the skins (cuticles) of tomatoes and determine what molecule makes some cuticles tougher than other cuticles? Why is the tomato so tasty? Why can the tomato be grown in water or soil? Does the growing environment change the tomato’s composition with respect to water and chemical content? What is the role of sodium in the tomato, and do we need to worry about the amount of sodium in a tomato to maintain a healthy diet? Discover a rainbow of colors that can be created when we add bromine to tomato juice! What are the chemical reactions that are taking place? Can we mimic this reaction in the laboratory? This course will introduce students to several chemistry disciplines, including analytical, organic, biochemistry and physical chemistry, and will be guided by experts in each discipline. You will have a chance to become familiar with high-performance instrumentation used in each discipline.

CRYPTOGRAPHY June 22-27
Cryptography is a key element of the computing environment in the contemporary world, with numerous applications (finance and banking, network security, electronic voting, encrypting music and video files, to name just a few). In this workshop, you will learn the basic techniques of secure communication and acquire a working knowledge of famous cryptographic protocols such as RSA, ElGamal and Goldwasser-Micali cryptosystems, Diffie-Hellman key exchange, and others. You’ll receive the necessary background in number theory (indispensable for a solid knowledge of cryptography) by experts in the field with extensive teaching, research and publishing experience. You will receive ample hands-on opportunities for putting your newly acquired knowledge to work with the help of sophisticated computer algebra systems such as MAPLE or MATLAB. Funny as well as challenging moments throughout the workshop will involve deciphering cryptograms, sharing secret keys and cryptography role-playing.
DESIGN: THINK. KNOW. DO. June 15-20
During the design camp, you will embark on an exciting journey to explore the fundamentals of visual communication. Working in teams, you will redesign a nonprofit visual identity, including the logo, through a combination of research activities. You will learn how a variety of visual elements and methods, such as color, typeface, illustration and photography, convey an identity. You also will work with other students to understand the organization’s market, gather research on the identity, develop design criteria based on that research, develop alternative versions of a new identity, refine one version as the final design solution, and present a formal presentation of their design solution. Also, architecture, environmental design, landscape architecture, interior design and industrial design will be addressed during morning sessions to introduce the education, career paths and professional practices of other major design fields.

ENGINEERING PATHWAYS June 22-27
Hands-on activities will give you an understanding of the three basic engineering fields: civil engineering; electrical/computer engineering; and mechanical engineering. Classroom and laboratory activities take place in the engineering laboratories on campus and will include hands-on activities related to engineering. As an example of activities, you might determine the aerodynamic loads on a wing, apply and use strain gauges on a test sample, perform tensile testing on metals, or use programmable logic controllers to control an automated system. Field trips will be taken to visit with practicing engineers to enhance your knowledge of engineering and encourage interaction with professional engineers. You will learn about engineering applications through field trips and meetings with other practicing mechanical, civil and electrical engineers.

ENVIRONMENTAL SCIENCE – WHAT IS HAPPENING OUT THERE? June 22-27
In the Environmental Science course, you will learn about and perform the chemical and biological techniques used by environmental scientists to examine soil and water quality. While you won’t be able to study exotic locations like glaciers or coral reefs, you will go on numerous field trips into the local environment (the forests, wetlands and town areas) to gather samples and examine them with respect to pH, dissolved oxygen, phosphate and nitrate content. Identifying and assessing the number of species present in the areas of interest will evaluate habitat health. In addition to field and lab work, lectures will be presented on how energy is made and used by plants and animals and how chemicals in the environment might affect those processes. You will get the chance to formulate your own questions about the environment and design ways to answer those questions as you increase your knowledge base on issues relevant to the environment. If you are interested in the environment and how environmental scientists obtain data to monitor changes in ecosystems and the potential effect of human activity on those systems, join us for a week in the wild at Ohio Northern University.

EXERCISE PHYSIOLOGY AND SPORTS SCIENCE June 22-27
You will perform hands-on, interactive laboratory experiences involving the common health, fitness and exercise tests used to determine physical fitness and athletic performance. You will measure your own aerobic capacity, strength, power, flexibility, movement patterns and body composition using exercise physiology laboratory equipment and field tests. You will compare your values to accepted norms for trained and untrained individuals. Understandings of the role of specific measurements to health and fitness will be emphasized in each lab. Student data will be used to reinforce why measured physiological data explain the differences in performance between individuals. Measurements also will be used to design appropriate exercise programs for each student at the completion of the labs.

FORENSIC SCIENCE (BASIC) June 15-20
Through lectures on forensic theory and practice with hands-on activities, you will be exposed to many aspects of forensic investigation, including a day spent at the ONU Crime Scene House recognizing and collecting evidence. The week also will emphasize the importance of on-site and field-presumptive testing and analysis with final laboratory reports and presentations being the end work product. Your presentations will be assessed, and feedback will be provided prior to the final presentation.

ADVANCED FORENSIC SCIENCE June 22-27
Exposure to the major probative areas of forensic science will be emphasized, including fingerprint analysis with latent prints collection and examination, DNA analysis, firearms identification, toxicology, and illicit drug chemistry. There will be less emphasis on the crime scene investigation aspect and a greater emphasis on laboratory science, although the crime scene house will be utilized for collection of evidence to be analyzed. Laboratory reports will be written and assessed, and you will receive feedback.

EXPLORING HUMAN ANATOMY (NEW) HISTOLOGY June 15-20
The human body is an incredible living machine. Have you ever thought about how the different tissues and organs are organized to function? In this course, you will explore the human body by looking at tissues and organ systems using three different approaches in anatomy: gross anatomy, histology (microscopic anatomy) and developmental anatomy. Gross anatomy is the “big picture,” and you will explore this level of anatomy by looking at the organ systems in dissections of preserved mammalian specimens. Through the microscope, you will discover the patterns and internal organization of tissues and organs. You will look at many different tissues and organs mounted on microscope slides. The theory and application for histology slide preparation will be explained in detail. Lastly, you will observe living chicken embryos for a complete and in-depth understanding, a model for the study of animal and human developmental history, to discover how different organs/systems form
MEDICINAL HERBS – PREPARING AND USING MEDICINAL HERBS  June 15-20
This class will introduce you to the pharmacy growing in your garden, in the woods, in fields and along the roadside. You will learn to identify plants used medicinally and when, where and how to harvest responsibly. The class will cover preparation and compounding procedures to produce infusions, decoctions, salves, electuaries, aromatherapeutics and others. The mechanism of action of herbal preparations will be covered. A chemistry background is helpful but not required. Therapeutic dosing will be discussed. The class will be hands-on and involve few formal lectures; the predominant teaching methods are fieldwork and laboratory activities.

MOCK TRIAL – A MEANS TO LITIGATE A CASE  June 15-20 or June 22-27
A robbery! A theme park! A victim in a coma! Put your critical-thinking skills to work and participate in presentation of opening statements, direct and cross examinations, relevant objections, and closing arguments as you work through a mock trial of this authentic case. You will gain confidence and improve your analytical and speaking skills as you explore the legal process of a criminal trial. While proceedings in the legal profession are often very serious, you will have fun in this course, challenging your colleagues as you learn to think on your feet and argue objections intelligently.