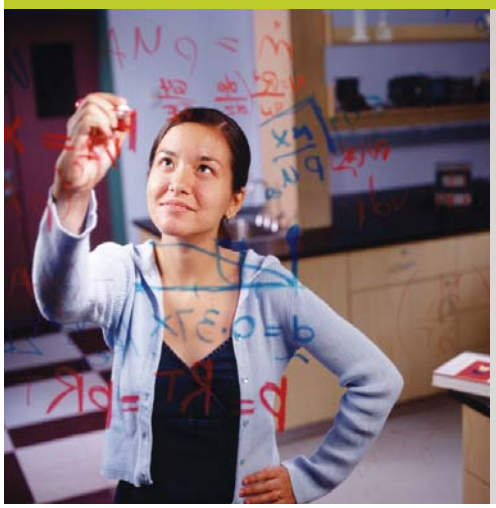
Frontiers



July 13 - 25, 2008: A two-week, summer residential program for soon-to-be-juniors and -seniors interested in science, mathematics, and engineering.

Frontiers is an on-campus research and learning experience that challenges you to explore the outer limits of knowledge in science, mathematics, and engineering. Now in its 26th year of operation, it continues to be enthusiastically received by its participants.

Monday through Friday, you will attend classes and do lab work in your chosen area of study. With classmates from all over the country, you will work on projects and assemble your findings. You will learn from outstanding professors and use state-of-the-art experimental, analytical, and computer technology and facilities. WPI students majoring in your area of study will assist you in the lab and in study groups.

The academic program is distinguished from others by its focus on current laboratory techniques and unsolved problems in the following areas: aerospace engineering, biology, chemistry/biochemistry, computer science, electrical and computer engineering, interactive media and game development, mathe- matics, mechanical engineering, physics, and robotics. Participants have the opportunity to engage in one of six communication modules: American history through film and the Internet, creative writing, elements of writing, music, speech, and theatre. A full schedule of activities complements the academic program, including evening workshops, field trips, movies, live performances, and tournaments. During scheduled hours you may use our well-equipped fitness center, gymnasium, softball diamond, and tennis courts. Also available for your use is Gordon Library, which supports study and research with its collection of more than 298,000 books, 90,000 audio and videocassettes, films, music recordings, and microforms. You will be given an account on WPI's computer system and you'll have access to PCs and UNIX workstations.

A schedule of activities will be provided upon your arrival. We think you'll find this summer enrichment experience challenging, well-balanced, and loads of fun!

College Life Just like you pictured it.

frontiers@wpi.edu • phone 508-831-5286 • fax 508-831-5875
WPI Frontiers Program, Office of Admissions, Bartlett Center,
100 Institute Road, Worcester, MA 01609-2280

wpi.edu/+frontiers

Areas of Study

Aerospace Engineering
Explore the science of flight to learn how wings and aircraft create lift to fly. Basic concepts in aerodynamics— including drag, streamlining, airfoil stall and aircraft design—will be studied. You'll conduct wind- and water-tunnel experiments to visualize the flow over aircraft, and run computer simulations for different airfoil shapes. Using what you have learned, you'll design and build a simple model aircraft, test it in the wind tunnel, and see it soar in free-flight.

Biology and Biotechnology
Explore this science from molecules and cells to ecology and evolution. You will cut, splice, and insert DNA to engineer new bacteria; eavesdrop on your own nerves and muscles using computer-based technology; prepare and view cells in an electron microscope; extract and test hormones that make crabs change color; meet a tiny roundworm that is the new favorite of geneticists; use DNA fingerprinting and antibodies to track genes and the proteins they code for; and study reproduction, ecology, anatomy, and scientific contributions (including a Nobel Prize!) of the ancient horseshoe crab.

Chemistry and Biochemistry
Shrink down to the world of molecules and explore how life functions at one of its most fundamental levels. Combine the newest technologies in the fields of chemistry and biochemistry to explore what happens when molecules collide; peel apart proteins and DNA; discover how enzymes work; and use computer modeling to see what biomolecules look like in 3-D. You'll see how chemistry can make color, fire, light, and electricity; you'll use the latest genetic and biochemical techniques to create organisms that glow.

Computer Science
In this self-paced program, you'll have the opportunity to explore the world of programming as it is used in the World Wide Web and object-oriented languages such as Java. You'll also explore graphical and distributed programming environments. You'll have the chance to incorporate the work as part of effective multimedia interfaces for content of interest to you. In addition, special topics in computer science will be discussed according to student interest.

Electrical and Computer Engineering
Discover the fascinating world of analog and digital electronics through classroom exercises and laboratory hands-on activities. Learn to use lab equipment including power supplies, function generators and oscilloscopes to test circuits that you build. Apply this knowledge to a design project that you'll be working on throughout the course. Topics include audio amplification, infra-red optical transmission, analog signal processing, and digital logic.

Interactive Media and Game Development
Combine technology with art to create an interactive experience. Take on the role of programmer and artist, and work on a team to bring a game to life. Draw and model your environment, add your characters and sound effects, program your behaviors, and tell your story. Break down your idea into simple rules, write your algorithm, use powerful scripting languages, and publish your game on the Web.

Mathematics
Learn how a mix of classical mathematics and modern technology can be used to solve current problems and open up new areas. Use this background to examine encryption of numbers on the Internet via the RSA algorithm, and analysis of human voice patterns and musical instruments through Fourier methods. Specific problems of current information technology that these address include the need for secure transmission of data, such as credit card numbers over the Internet, voice-print technology, and storage and use of music in digital format (WAV vs. MP3 files, for example).

Mechanical Engineering
This broad discipline includes many areas of interest: energy production and transfer, mechanical design, materials science, biomechanics, and fluid flow, among others. Explore the breadth of mechanical engineering through a mixture of fundamental concepts and experimentation. Focus will be on two designs: a trebuchet, and an exploration of energy transfer.

Physics
Investigate selected fields or applications of modern physics—such as interplanetary travel, atomic spectroscopy, MRI (magnetic resonance imaging), quantum computing and black holes—through a combination of lectures, audio-visual presentations, hands-on laboratory experiments and visits to research facilities.

Robotics
Discover the science and technology of robot design and operation. *(This session is particularly useful in preparing participants for entry or leadership within the FIRST robotics team in their high schools.)* Learn about driveline design, sensor operations, programming, pneumatics, and manufacturing techniques. Use this information to solve a challenging robotics problem. Each subgroup in the session will brainstorm, design, build, and test its own creation. The chance to show your team's design superiority will come when robots meet for the climactic end-of-session tournament!

Communications Workshops

American History through Film and the Internet

This course combines film sources, class discussion, and internet research. Material covered will focus on four central themes: Work; Leisure/Recreation; the Urban Environment; American Politics. For each of the four modules you'll view films on the central theme, research the theme using Internet sources, and discuss their findings and conclusions with the class.

Creative Writing

Conduct a series of experiments with words, imagination, and ideas: fiction or nonfiction prose, poetry, or playscript. What you create will depend on your group members, the Frontiers experience, and what you've been writing along the way.

Elements of Writing

Investigate what happens when an author chooses certain vocabulary, sentence structure, and overall organization. This approach will help you improve the expository writing you will have to do in college. You'll also be given an opportunity to write college application essays in which you may reveal your individuality. You are encouraged to bring with you topics that appear on admission forms for colleges where you intend to apply.

Music

Participate in music activities and rehearse daily in an instrumental ensemble appropriate for your instrument. Perform in a concert at the conclusion of the program, presented in conjunction with the drama activities. Music selected will vary in style from jazz to pop to classical. Any student interested will also have the opportunity to improvise in a jazz setting.

Speech

Discover how to present your ideas in an organized format for optimal impact and understanding. Learn specific approaches and implement them through planned presentations that will be videotaped and analyzed. Explore the techniques that minimize the threat of nervous reactions and learn to utilize nervous energy for peak performance. The primary focus of the workshop will be on individual presentations, but some attention will be given to interactive communications (e.g., the campus interview for prospective college students).

Theatre

Produce a show from soup to nuts in under two weeks. Create a character, make a costume, hang the lights, record the sound, and build a set. Explore a wide variety of theatrical exercises and techniques, including warm-ups, expressive movement exercises, collective improvisation, and interpretive reading. Become familiar with essential elements of traditional comedy and tragedy, as well as contemporary experimental theatre. Put theory into practice by making an audience laugh, cry, and maybe even think.

Room and Board

Meals will be served in one of the dining facilities on the WPI campus, or elsewhere during off-campus trips. With advance notice, special meals may be prepared for those with dietary restrictions. Students will receive an identification card, which must be used to enter the dining hall for all meals.

Program participants will live in one of WPI's coed residence halls, supervised by current students and administrative staff. Rooms are double or triple occupancy; private rooms are not available. Telephone service is not available in individual rooms. Pay phones are located in the residence halls, and in various locations around campus.

A limited number of rooms are available on the night of July 12 to participants traveling from outside New England. Prior arrangements must be made through the Office of Admissions, 508-831-5286. Please note: Meal service begins July 13.

Mail

You may send and receive mail while at WPI. Mail is distributed daily during mealtime. Please use the following address:

(Your Name)
WPI Frontiers Program
Office of Admissions
Bartlett Center
100 Institute Road
Worcester, MA 01609-2280

Outgoing mail may be dropped in the mailbox in front of Daniels Hall, or at Central Mail in the Campus Center. Postage stamps may be purchased at Central Mail.

To Apply

This program is offered to soon-to-be high school juniors and seniors only. Complete the application form or apply online by visiting wpi.edu/+frontiers. Applications are due (postmarked) by May 31, and completed applications are reviewed on a rolling basis. Applications submitted after the deadline will be considered on a space-available basis. **If selected, every effort will be made to place you in your first-choice area of study or workshop. However, we will enroll you in your second or third choice if your first-choice program has been filled.**

Application Requirements

- A completed Frontiers 2008 application form with $50 application fee.
- Reference from your mathematics teacher, science teacher, or guidance counselor.
- Your official high school transcript submitted by your guidance counselor.

Standardized test scores are not required. However, if you have taken standardized tests (PSATs, SATs, ACTs), feel free to send them with your application.

Strong consideration is given to students receiving a B or better in a rigorous academic program, and have taken or are on track to complete PreCalculus before graduating high school.

Tuition

Your payment of $2,100 covers tuition, room, board, transportation, and entrance fees to group activities. Personal expenses vary, but should not exceed $100. A $500 nonrefundable deposit, which is applied to the tuition, is due upon acceptance into the program. The balance of the tuition is due June 15, 2008. If paying by check, please make it payable to WPI. If you wish to have your tuition charged to a credit card (MasterCard, Visa, American Express, or Discover), please call 508-831-5286.

Application Instructions and Information

Please review the following information carefully to ensure that your application is received on time for full consideration.

1. Please print legibly in blue or black ink, or type your application.
2. The reference must be provided by your mathematics teacher, science teacher (computer science is acceptable), or guidance counselor.
3. Please arrange to have your high school forward an official transcript of your courses and grades directly to **WPI Frontiers Program, Bartlett Center, 100 Institute Road, Worcester, MA 01609-2280.**
4. The application is due (postmarked by) May 31, 2008.

The application review process will begin on March 1st and decisions will be made on a rolling basis from that point forward. Admitted students will receive priority placement in their area of choice based on the date the applicaiton was received. Please note: Your applications will not be reviewed until we have received your reference and transcripts. Late applications will be reviewed on a space-available basis.

Send the application, along with your $50 application fee, to:

WPI Frontiers Program
c/o OFFICE OF ADMISSIONS
BARTLETT CENTER
100 INSTITUTE ROAD
WORCESTER, MA 01609-2280