University of Toronto
Mathematics Network

SOAR — Summer Opportunity in Applied Research

What a great way to spend the summer—exploring mathematics!

Soar through an intensive three-week mathematical sciences camp at the University of Toronto. This year, SOAR will take place from July 26 to August 13, 1999. The program runs Monday through Friday, from 10:00 am to 3:00 pm at the University of Toronto's St. George campus.

The SOAR into Mathematical Sciences Summer Camp is an opportunity to explore a challenging mathematical topic in a stimulating environment at the University of Toronto. This year we will study networks, leading to graph theory, which forms the basis for many recreational puzzles as well as serious mathematical applications in computer science, organic chemistry, and other sciences. Excellent high school students, who can easily grasp new concepts, will soar into these investigations of sophisticated university-level mathematics and be challenged to think in different ways.

A typical week at SOAR 99 will include lectures, tutorials, problem-solving sessions, related games. Since mathematics is best learned by doing, emphasis will be on solving numerous problems related to graph theory. You will be encouraged to document your solutions for inclusion into a personal mathematical portfolio. Parts of the summer's exploration will require organizational, mathematical, literary or computer skills...so we will be looking for participants who either specialize or who have a variety of talents.

The camp experience of SOAR into Mathematical Sciences will be an opportunity to see what life at the University of Toronto and mathematical research are really like. You'll get the chance to explore and use the campus facilities such as the mathematics library and the computer facilities needed to research the project, as well as the recreational facilities during the social events.

The Topic

Graphs can be used to provide abstract representations of knots, maps, or the networks between computers, cities or people. Any collection of nodes and connecting lines is a graph. The techniques of graph theory have been developed to study the solubility of problems related to these arrangements, efficient algorithms for obtaining the solution and the level of complexity of the solution. Typical problems are matchmaking, scheduling, colouring of maps, and the traveling salesman problem.

This introduction to challenging abstract mathematics will include topics such as the pigeon hole principle, Eulerian graphs, trees, connectivity, edge colouring, planar graphs, Hamiltonian cycles and Ramsey theory. You will sharpen your understanding of formal proofs and have a deeper insight into applications of serious mathematics.

Who can come?

The program is for students who are currently in grades 10 to OAC. Students in these and lower grades will be considered based on a critical appraisal of their mathematical background and personal maturity.

You will need to be a SOAR team player and self motivated. You should exhibit strong mathematical aptitude. Other excellent assets are computer science skills, descriptive writing proficiency and artistic abilities. The application process is competitive, as SOAR is receiving applications from some of the best students in Ontario.

Residence information is available for those who live beyond an easy commute. Although residence is available, we cannot take responsibility for the students outside program hours.

How much does it cost?

A fee of $300 per student, made out to University of Toronto, is required for the three week program and should accompany the application form. Refunds (minus a $35 administration charge) will only be issued up to June 30th. SOAR is a non-profit program; the fee assists in covering the cost of lectures and computer time, class notes, occasional lunches, daily snacks and other incidentals.

NOTE: There is financial assistance available on the basis of need. The Department of Mathematics will support your request to reduce the cost of the camp jointly with your school. If you feel that you would need such assistance, please indicate this fact on your application.

How to apply.

SOAR into Mathematical Sciences Camp flyers are being faxed or mailed out this month to most of the high schools in Ontario. If your school hasn't received any (speak to a math or computer science teacher to find out), you can email the SOAR Coordinator and ask for one to be sent to you. Or, you can obtain electronic versions of the forms from the Mathematics Network Web Site, fill them out and send them in. There are two forms that need to be filled out:

1. The application form, to be filled out by you. You can submit this form electronically if you like.
2. The recommendation form. Have your teacher fill this out and return it to you so that you can include it with your application. Applications sent without a recommendation will be held until the recommendation form is received.

Applications are due by Friday, June 18th, 1999. Late applications will be considered if space is still available. Along with your application form, you should include:

1. Transcripts of all your high school grades, including term marks for courses you are currently taking.
2. A list of any contests entered or awards received in the past three years. Give dates, levels of achievement and marks awarded. Indicate if your rank is local, regional or national. Discuss academic, athletic, artistic, musical and other awards.
3. A separate sheet on which you have typed your name and a one-paragraph answer to each of the following questions:
   (a) What mathematical and science experiences have you had (related courses, individual or group projects, etc.)?
   (b) What is your attitude to the mathematical sciences? Describe any highlights or disappointments in your mathematical explorations.
   (c) What computer experience do you have (related courses, languages, software applications and individual projects completed, etc.)?
   (d) Describe your participation and achievements in projects and science fairs. Were these team efforts? What role did the other members play?

(e) Describe school related activities, clubs, athletics, etc.; your participation and responsibilities. What non-school activities do you most enjoy and why?

(f) Why are you a good candidate for SOAR?

Who to contact?

Nami Bland, the SOAR '99 Coordinator, at: namib@math.toronto.edu
Phone: (416) 978-3472
Fax: (416) 978-4107

University of Toronto Mathematics Network
SOAR — Summer Opportunity in Applied Research

1999 Student Application Form

Family Name: ______________________ Given Name: ______________________

Sex: M or F __________ Age: __________ Year to start University: __________

Home Address: ____

____

Postal Code: ______________________ Home Telephone: ______________________

School: ____

School Telephone: ____

School Board: ____

Recommending Teacher: ____

Teacher's School, if not yours: ____

Return this application form and the following supporting materials to the address below by Friday, June 18th, 1999. Late applications will be considered only if space is still available. *Be sure to also include a completed recommendation form that your teacher has filled out.*

1. Transcripts of all your high school grades, including term marks for courses you are currently taking.
2. A list of any contests entered or awards received in the past three years. Give dates, levels of achievement and marks awarded. Indicate if your rank is local, regional or national. Discuss academic, athletic, artistic, musical and other awards.
3. A separate sheet on which you have typed your name and a one-paragraph answer to each of the following questions:
   (a) What mathematical and science experiences have you had (related courses, individual or group projects, etc.)?
   (b) What is your attitude to the mathematical sciences? Describe any highlights or disappointments in your mathematical explorations.
   (c) What computer experience do you have (related courses, languages, software applications and individual projects completed, etc.)?
   (d) Describe your participation and achievements in projects and science fairs. Were these team efforts? What role did the other members play?
   (e) Describe school related activities, clubs, athletics, etc.; your participation and responsibilities. What non-school activities do you most enjoy and why?
   (f) Why are you a good candidate for SOAR?

Return this form to:

Nami Bland
SOAR in Mathematical Sciences Camp
Department of Mathematics

University of Toronto
Toronto, ON M5S 3G3
Email: namib@math.toronto.edu
Phone: (416) 978-3472
Fax: (416) 978-4107

UNIVERSITY OF TORONTO MATHEMATICS NETWORK
SOAR — Summer Opportunity in Applied Research

1999 Teacher Recommendation Form

Student: ______________________ School: ______________________

The ideal SOAR participant is a bright, self-motivated student who has a strong interest in Mathematical Sciences and has the maturity necessary to benefit from learning in a university-style environment.

Please explain why you feel this student is a good candidate for SOAR, by addressing each of the following areas:

Exceptional mathematical or analytical skills:

Maturity and ability to work independently and as a team member:

Good communication skills and leadership qualities:

continued on reverse . . .

Other skills (e.g. Computer science):

(Note: If you are not the student's teacher in that area, please have that teacher comment here, including their signature.)

How well do the student's grades reflect his or her abilities?

Signature: ________________________________

Position: ________________________________

Please complete and have the student return this form, together with the completed application, by June 18th, 1999 to:

Nami Bland
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Department of Mathematics
University of Toronto
Toronto, ON M5S 3G3

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