



*The Eighteenth
Annual*

**North American
Computational
Linguistics
Open
Competition**

2024

www.naclo.org

2024 Student Handbook

Please check <http://www.naclo.org> for updates and announcements

2024 Contest Dates (USA and Anglophone Canada)*

Open Round: January 25, 2024 / Invitational Round: March 14, 2024

Site registration deadline: January 15, 2024

Student registration deadline: January 22, 2024

Contact nacloinquiries@googlegroups.com if you miss the deadline.

Walk-ins allowed with advance permission of the local site host.

* The dates for the 2024 Francophone contest in Canada will be announced later.

Check the [OLCF](http://www.olcf.org) site.

CONTEST OVERVIEW

The North American Computational Linguistics Open competition (NACLO) is a contest for US and Canadian pre-university students in which contestants solve compelling puzzles in linguistics and computational linguistics. Requiring no previous knowledge of linguistics, languages, or computing, these puzzles can be solved by analytical reasoning alone. They serve as a fun and educational introduction to a field to which many high school students have never been introduced. NACLO is targeted at high school students, but many younger students enjoy participating. (See below for eligibility requirements.) Winners of NACLO are eligible to compete in the International Linguistics Olympiad (IOL), one of about twelve international high school academic olympiads.

In Canada: Canada is represented by two teams at the IOL: an Anglophone team which is selected through NACLO, and a Francophone team which is selected through the Canadian Francophone Linguistic Olympiad (OLCF). Information about the OLCF can be found [here](#).

Open Round

The Open Round is open to all interested middle school and high school students; its purpose is to introduce students to the fields of linguistics and computational linguistics, as well as to identify the contestants who will advance to the Invitational Round. The Open Round will be on **January 25, 2024**.

Invitational Round

The Invitational Round will be on **March 14, 2024**. Its purpose is to provide an additional fun and educational challenge to those who did well in the Open Round, therefore, the problems are more difficult. NACLO also uses the Open Round to identify competitors for the North American teams competing in the International Linguistics Olympiad (IOL) if they meet IOL eligibility requirements. (See relevant section below for these.) If your school is closed for Spring Break on this date, you may be able to participate at a nearby university site or secondary school. See naclo.org for the lists of NACLO hosts. (Only sites that have students invited to the Invitational Round may be available, however.) Please contact nacloinquiries@googlegroups.org if you are unable to find a site nearby.

LOCATION DETAILS

University Sites

A number of colleges and universities host the NACLO contest. Available locations are listed on the [NACLO website](#). To participate at one of these NACLO sites, please choose the site when you register [online](#). The site host will contact registered students with directions and other important information about the day of the contest. Most university sites have a NACLO webpage with relevant details.

Schools that are sending several students to a university site may hire a school bus. If your school is not providing a school bus, you will need to arrange your own transportation with the help of your parents and teachers.

On the contest day, you should arrive at the university site at least 45 minutes before starting time so that you have time to find the room, check in, use the bathroom, etc. Typically, seating will be 20 minutes before the starting time, and the rules will be read at 15 minutes before the starting time. The contest booklets will be handed out at the designated starting time, and the facilitator at the university will tell you when to start working on the problems.

Some universities may use the contest as an opportunity to reach out to students who are interested in studying linguistics or computer science. They may provide information on careers in linguistics and language technologies and how you can study linguistics and language technologies in college.

High School Sites

More than 130 high schools host NACLO. If your high school is not a registered site but wants to host NACLO 2024, you and your teacher need to register. First, please ask your teacher to read the Coordinator Handbook available at <https://www.naclo.org/resources/handbook/>. Next, your teacher should register the school [here](#). Then, your teacher should register as a High School Host [here](#). Students can register to participate [here](#). For a list of high school site locations, visit the webpage [here](#).

Please do not register to participate in NACLO at a high school site unless you are enrolled at the school unless the site specifically states they are open to all students.

On the contest day, make sure to be there before the starting time. Typically, seating will occur at 20 minutes before the starting time, and the rules will be read at 15 minutes before the starting time. The contest booklets will be handed out at the designated starting time, and your teacher will tell you when to start working on the problems.

Homeschooled Students

- If you are homeschooled (according to the official rules of your state or province), you can still register for NACLO. Ask your parents to follow the instructions in the NACLO Coordinator Handbook.

Special Needs

If you have special needs, please notify the contest organizers at nacloinquiries@googlegroups.com **as soon as possible**. You should discuss all your special needs **well in advance of the contest**, and the NACLO organizing committee will respond to you with details and options specific to your needs.

Online

NACLO will **not** be offering an online option in 2024. However, US and Canadian students living abroad may inquire about participation at nacloinquiries@googlegroups.com.

ELIGIBILITY

To participate in NACLO, you must satisfy all of the following criteria:

- You have never been enrolled as a full-time college or university student.
- You must be less than 20 years old on the first day of the IOL, whose dates are at <https://ioling.org/upcoming/>.
- You are a citizen of the US or Canada or a student in a secondary school in the US or Canada.
- You are available to participate in the contest at one of the times it's offered.
- You can either participate in the contest at a registered university site or find a teacher or librarian who can run a high school site as specified elsewhere.

IOL Eligibility

To be eligible for the Canadian IOL team, you must:

- Be eligible for and participate in NACLO.
- Be a citizen of Canada or a student in a Canadian secondary school, and provide proof if asked.
- You must meet all IOL eligibility rules in <http://ioling.org/rules/rules.pdf>

To be eligible for the US IOL team, you must:

- Be eligible for and participate in NACLO.
- Be a citizen of the US or a student in a US secondary school, and provide proof if asked.
- You must meet all IOL eligibility rules in <http://ioling.org/rules/rules.pdf>

IMPORTANT: Students must declare NACLO or another contest.

In a given year, you may only attempt to qualify for one national IOL team, per IOL Regulations. You may participate in more than one IOL-qualifying contest, but must declare before each one which national team you intend to qualify for. **Therefore**, if you are participating in NACLO and an IOL-qualifying contest in any other country (e.g., UKLO in the United Kingdom, OBL in Brazil, etc.) in the current year, you must declare this by emailing nacloinquiries@googlegroups.com prior to the NACLO Open Round (January 25, 2024). If no email is received before this date, you will by default be considered **ineligible** for both the Anglophone Canadian and US IOL teams.

IMPORTANT: Students must declare US or Canada

In the case of a multinational contest, like NACLO, all students must be considered as attempting to qualify for only one national IOL team, and must indicate which beforehand, per IOL Regulations. **Therefore**, if you are eligible for both the Anglophone Canadian and US IOL teams, according to the criteria above, you must choose one team that you wish to be considered for. You will be considered ineligible for the team you do not choose. To declare your choice, you must email nacloinquiries@googlegroups.com prior to the NACLO Open

Round (January 25, 2024). If no email is received before this date, you will be considered by default to have chosen the country which you selected during registration.

START TIMES AND LENGTH

There are two start times for the Open Round, 9:00am Central and 9:00am Pacific.

Sites in the Eastern and Atlantic time zones are expected to compete at the Central time zone starting time, which will be 10:00am in the Eastern time zone and 11:00am in the Atlantic time zone.

Sites in the Mountain, Alaskan, and Hawaiian-Aleutian time zones are expected to compete at the Pacific time zone starting time, which will be 7:00am Hawaiian-Aleutian, 8:00am Alaskan, and 10:00am Mountain.

<i>Time for the Open Round</i>	<i>Start</i>	<i>End</i>
Hawaiian-Aleutian	7:00am	10:00am
Alaskan	8:00am	11:00am
Pacific	9:00am	12:00noon
Mountain	10:00am	1:00pm
Central	9:00am	12:00noon
Eastern	10:00am	1:00pm
Atlantic	11:00am	2:00pm

Because the jury answers clarification questions live during the contest, NACLO cannot be flexible about the contest times. For students who have a conflict, their best chance may be to take the contest with the other set of time zones. For example, a student in the Pacific time zone can start the contest at 7am in order to participate with the Central, Eastern, and Atlantic time zones, but only if their entire site participates at this time or a new site is created by a teacher especially for that student.

The start times shown here are when students can work on the problems. Registration and other administrative activities should be completed earlier. Hosts and participants should arrive at the site 30-45 minutes prior to the designated start time to set up for the contest.

The Open (First) Round is three hours long. Note that the judges have the authority to lengthen it in the event of unforeseen circumstances.

The Invitational (Second) Round will be four hours long. The contest will start at 9 AM local time in all time zones except the Atlantic Time Zone.

<i>Time for the Invitational Round</i>	<i>Start</i>	<i>End</i>
Hawaiian-Aleutian	9:00am	1:00pm
Alaskan	9:00am	1:00pm
Pacific	9:00am	1:00pm
Mountain	9:00am	1:00pm
Central	9:00am	1:00pm
Eastern	9:00am	1:00pm
Atlantic	10:00am	2:00pm

PREPARATION

Some universities or high schools may provide training sessions for students in their area. These are not required for participation in NACLO and not all participating sites provide them. The training sessions may include problem solving practices, an overview of linguistics and computational linguistics, and ideas about careers in linguistics and computational linguistics. Training sessions may be done in the evening at a university or during the school day at your school. Be sure to check the NACLO website or contact site hosts near you to find out whether the site is hosting a training session.

In addition, NACLO is creating and uploading training videos at its [YouTube Channel](#). NACLO also hosted a Math Jam at the Art of Problem Solving ([session transcript](#)) and plans to offer more sessions in the future. Finally, the NACLO website includes [practice problems](#) and [additional resources](#).

GENERAL CONTEST RULES AND RECOMMENDATIONS

You must write your solutions in **black ink**, and **you may use pencils only for scratch work**. You may use blank paper for scratch work; however, you should copy your final solutions into the spaces provided in the problem booklet, and you may enclose additional sheets only if the space in the booklet is insufficient. Scratch paper is to be handed in with the answer booklet but kept separate from it.

PEN: You must submit all your solutions in writing, using a **black pen**, only in the space provided and ensure that your handwriting is legible. The use of a black pen is essential to ensure legible photocopying or scanning of the solutions, which may be done to streamline the grading process. You should bring your own pens.

PAPER: You are **not** allowed to bring your own paper or use any written or printed materials such as books or your own notes produced before the contest.

The facilitators will provide extra blank paper. However, there should never be answers to more than one question on a single sheet of paper. Extra paper should be scanned together with the booklet. The answers will be split by problem number and shipped to graders around the world. You should write only on one side of the papers so that these pages can be scanned if needed. **Furthermore, you may not take any booklets or scratch paper with you when you leave the site.**

ELECTRONIC DEVICES: You may not use any electronic devices except basic wristwatches. In particular, you may not use calculators, computers, tablets, cell phones, pagers, or wristwatches with internet access or built-in calculators. Attempts to use electronic devices will normally lead to disqualification. If you have any medical electronic devices, required for health reasons, you should let the facilitators know before the contest.

TALKING: You may not talk with anyone except facilitators, and you may not collaborate with other contestants. Attempts to communicate with other contestants will normally lead to disqualification.

BAGS: Bags should be placed under the seats before the contest, and they may not be used during the contest. If you have brought snacks, these should be placed on the desk before the contest begins.

CELL PHONES: If you have a cell phone, pager, or any other sound-emitting device in your bag, you should turn it off before the contest. Just switching it to vibrate or silent mode is not sufficient.

RESTROOM: You may take bathroom breaks during the contest; however, you may not take your bags, any electronic devices, problem booklets, or your notes with you when temporarily leaving the room. Also, two contestants may not take a bathroom break at the same time.

EATING: Unless the local facilitator overrides this rule, students may bring a snack into the contest site and eat during the contest, but they should be considerate of others. In particular, they should avoid "noisy" foods, such as foods with noisy wrappers, and foods with a strong odor. The facilitators have the authority to remove any types of food from the contest site if they feel that these types of food may distract other contestants. Noisy wrappers should be opened before the contest begins.

TARDINESS: If you arrive late, you may still participate in the contest; however you may not ask facilitators to repeat any instructions or announcements that have been missed. Also, you may not ask for time extensions at the end of the contest, which means that you will have less time than the other contestants.

QUESTIONS: If you have a question, raise your hand, and one of the facilitators will talk with you. When talking with a facilitator, you should keep your voice low, to make sure that you do not distract other contestants and do not accidentally provide a hint for solving the problem.

If you need a clarification for a specific problem, the facilitator will need to contact the judges via email, which means that an immediate answer may not be available. Please note that local facilitators are unable to answer student questions without contacting the judges. If the judges agree that the problem requires a clarification or correction, they will normally announce it to all site facilitators via email.

If the judges feel that an answer is already contained in the booklet, or that attempting to give you an answer may give someone an unwanted hint, they may refuse to answer the question by telling you that they are unable to answer the question.

GENERAL PROBLEM SOLVING ADVICE: You may solve the given problems in any order, and you should try to solve as many problems as possible. You are not penalized for incorrect answers. Some problems (mostly on the Invitational Round) **may** include "practice" (explanations) and "theory" questions; the practice sections are worth approximately 60% of the score, and the theory sections are worth approximately 40%. You may receive partial credit for providing an incomplete solution to a problem, and/or partial credit for specific ideas for solving it. Thus, if you have ideas for solving a problem, you should write them even if you have not been able to develop a complete solution. In other words, you should show your work and/or thought process when solving these problems.

Given the large number of expected participants in the Open Round, most or all of the problems in that round will not require a "theory" part. Instead, the answers will be automatically gradeable. "Blue," "17", "1A, 2D, 3D, 4E, 5C", "nihuetzi," and "A>C>G>F>B>E>D" are fine answers. The problem booklets will be designed to include an answer sheet.

SCORING

Every problem will be worth a specified number of points; harder problems are generally worth more points. The judges will score each solution based on its correctness, quality, and clarity, and determine the overall score as the sum of solution scores. The judges will complete the scoring and announce the results (ideally, within three to six weeks after the competition).

The judges are solely responsible for scoring the solutions, ruling on unforeseen situations, and selecting the winners; their decisions are final.

FREQUENTLY ASKED QUESTIONS

Can younger students (e.g., middle school students) participate?

The competition is intended for students in the 13-18 age group. If you are younger than 13, with parental permission, you can also participate. In this case, please **do not register online**. Instead, ask your parents to contact naclainquiries@googlegroups.com directly.

How many problems should I expect?

Participants should expect 6-9 problems during the Open Round and 8-12 (generally harder) problems in the Invitational Round.

What problem types should I expect?

You may encounter the problem types listed below. However, this list is not exhaustive, and you may also get problems of other types. The problems will contain all information required for solving them, and you do not need any specialized linguistic knowledge.

- *Translation problems:* A problem includes a set of sentences in a foreign language and their translations into English, which may be in order or out of order. Your task is to learn as much as possible from these translations and then translate other given sentences to or from English. Note that the foreign language may have "tricky" structure and grammar. For example, German sentences often end in verbs. Japanese people talk differently about their family and about someone else's family. Some languages do not use articles or any equivalent of "to be." Others treat animate and inanimate objects differently. Be prepared to figure out these unfamiliar features from the text.
- *Number problems:* A problem includes foreign sentences that describe basic arithmetic facts, such as "six times four is twenty-four," and your task is to figure out how to translate different numbers and expressions. Some languages use bases other than ten; others use different words for the same number depending on the objects being counted, etc.
- *Writing systems:* Your task is to figure out how a particular writing system works and then use it to write out a given text, such as an ancient inscription. Some languages are written right to left or top to bottom, others do not use vowels, etc.
- *Calendar systems:* Your task is to figure out what calendar was used by a particular civilization based on sentences that refer to it.
- *Formal problems:* In this context, "formal" means that you have to build a logical model of a language phenomenon. For example, a transformation rule may say "to convert an active voice sentence to passive voice, make the object of the former sentence the

subject of the latter one, convert the verb to passive voice by using an appropriate form of the verb "to be" with the past participle of the verb, and add "by" before the word that was the subject of the former sentence." If we apply this rule to "Maya ate an apple," we get "An apple was eaten by Maya."

- *Phonological problems:* Your task is to figure out the relationship between the sounds of a language and its writing system.
- *Computational problems:* Your task is to develop a procedure to perform a particular linguistic task in a way that can be carried out by a computer.
- *Other types:* Deciphering kinship systems, transcribing spoken dialogue, associating sentences with images, translating unknown languages from scratch, and many other types of problems.

Where can I find example problems and related reading materials?

You can find more than 200+ past problems on the main website under "[Practice Problems](#)."

You may find past IOL problems by going to <https://ioling.org/problems/>.

What knowledge and skills do I need?

You mostly need logical thinking, as well as basic general knowledge, such as about arithmetic and standard calendars. You do not need prior knowledge of linguistics, computer science, programming, or foreign languages.

How many people participate in NACLO?

In 2023, 1,500+ students participated at 130+ high school sites and 55 university sites.

What happens if I do well?

If you earn a high score at the Open Round, you will advance to the Invitational Round. You will be notified if you are invited to participate in the Invitational Round. The top-scoring four US students and the top-scoring four Anglophone Canadian students in the Invitational Round will be chosen to represent the United States and Anglophone Canada at the International Linguistics Olympiad provided they meet IOL eligibility requirements (See "IOL eligibility" section.) Additionally, four more top-scoring US students may be invited as a second team to represent the United States at the IOL. Team members will be expected to participate in weekly online practices from early May to mid-July.

If I advance to the International Linguistics Olympiad, will I have to pay for my trip?

NACLO always tries to raise funds to cover travel expenses so that team members do not need to pay. For the past several years, the US National Science Foundation has paid all the expenses for the two US teams. We also actively engage in fundraising to cover the Anglophone Canadian team. However, we may not always succeed in our fundraising efforts. Therefore, if you are selected for the team (US or Canada), we will inform you about the funding situation and let you know whether you will need to find additional sources of funding.

How well did the United States teams do at the IOL in 2007-2023?

In 2007, the United States participated in the International Linguistics Olympiad for the first time. The top US team tied for first place; furthermore, one of the US contestants, Adam Hesterberg, earned the highest score in the individual contest and won one of two "first diplomas." In 2008, the top US team tied for first/second place, and the second team tied for third/fourth place. Furthermore, US contestant Hanzhi Zhu received a gold medal. The 2009 team earned a team gold. In 2010, the team earned the most awards ever – a gold medal (Ben Sklaroff), two silvers, three bronzes in the individual contest and the team first place for the highest team score at the individual contest. In 2011, even more awards came the US team's way, including a gold medal for Morris Alper.

2012 was another very successful year with two US students (Alex Wade and Anderson Wang) getting gold medals, four others getting silver or bronze, and one of the two US teams winning the team contest. In 2013, Alex Wade won a gold medal with the highest score among all participants whereas one of the US teams (Team Red) won the team contest. In 2014, Darryl Wu won an individual gold medal, and USA Red won a team gold medal. In 2015, James Wedgwood, James Bloxham, and Kevin Yang won individual gold medals. USA Red finished in first place among all teams based on the average score in the individual contest and also finished in second place in the team event. In 2016, US contestant James Wedgwood won a gold medal in the individual round for the second year running and US contestants also scooped three silver medals and two bronze medals. Additionally, USA Red earned the team trophy for the highest combined score on the individual event. Continuing the trend, the teams also won six medals at the 2017 IOL. Brian Xiao of USA Red won a gold medal while silver medals went to three other US contestants and bronze to two other US contestants. In 2018, perhaps the USA's best-ever year, USA Blue won gold in the team contest and USA Red won silver; four members won individual gold medals, three won silver, and one won bronze. USA Blue came first for combined individual scores. In 2019, two members won gold and five won silver, and USA Red earned the team trophy for combined individual scores. The Olympiad was not held in 2020. In 2021, it was held virtually. One member won gold, four earned bronze, and two earned an honorable

mention. USA Red won silver in the team contest and USA Blue earned an honorable mention. In 2022, The US won one gold medal, three silver medals, and one honorable mention. USA Red won the trophy for the team with the highest individual scores. USA Red also won a bronze medal in the team competition. In 2023, individual medalists were Deeraj Prothapagada (silver), Maya Schmidt (bronze), Benjamin Yang (bronze), Arul Kolla (bronze), Darren Su (bronze) and Jamie Li (honorable mention). In addition, USA Red team earned a silver medal in the Team Contest.

You may find more information about the results at the International Linguistics Olympiad website and the NSF press releases on the NACLO website.

How well did Canada do at the IOL?

Canada participated in the IOL for the first time in 2011. The team received a bronze medal (Daniel Mitropolsky) in 2011. In 2013, Daniel Lovsted won a bronze medal. In 2014, Daniel Lovsted won an individual gold medal, Yan Huang received a silver medal, Simon Huang won a bronze medal, while the Canadian team finished in second place overall based on the average score in the individual contest. In 2015, Emma McLean received a bronze medal. In 2018, Ken Jiang and Kevin Liang received bronze medals, and Shuli Jones received an honorable mention. In 2019, Ken Jiang won a gold medal, and Tianqi Jiang and Nathan Kim received silver medals. Furthermore, the Canada Anglophone team finished in third place by combined score in the individual contest. In 2021, Kunaal Chandrashekar received a bronze medal and Thomas Frith received an honorable mention. The Canada Anglophone team received a bronze medal in the team contest. In 2022, Kunaal Chandrashekar won a silver medal, and Aidan Wang and Kevin Yan won bronze medals. In 2023, individual medalists were Kunaal Chandrashekar (gold), Sukrith Velmineti (silver), Perry Dai (bronze) and Victoria Li (honorable mention). In addition, the Anglophone Canadian team earned a silver medal in the Team Contest.

You may find more information about the results at <https://ioling.org/results/CAN> and <https://ioling.org/results/CEN>.

What if my question was not answered above?

If you have further questions, please contact nacloinquiries@googlegroups.com.

REGISTRATION

If you are a student who is eligible to compete in NACLO, you may register by following these steps:

1. Go to https://www.naclo.org/register_student.php

2. Fill out all required fields and then click “REGISTER AS STUDENT.” Important points:
 - a. Make sure to use an email address that you check regularly so that you do not miss important contest information from NACLO. Using a school email address is strongly preferred.
 - b. Make sure to select a site; you will not be able to compete if you do not select a site. If no suitable site is available, see the instructions on the registration form about asking a teacher or staff member to register our high school or homeschool as a site.

Program Committee

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Andrés Pablo Salanova -- University of Ottawa
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