



IMS
NUMERICAL METHOD

NM High School Data Science Competition



Info Pack

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About NM High School Data Science Competition (NM HS DSC)

We bring the transformative power of data science to students to help solve our world's greatest challenges.

We find real world questions where data science can have positive social impact, then run online modeling competitions for students to develop the best models to solve them.

Welcome to the NM High School Data Science Competition (NM HS DSC), where we share the best practices in applied math and data science. This is a new data science competition for grades 9 to 12 students brought to you as a Corporate Social Responsibility (CSR) project by NM, a leader in the data science industry. NM today is a group company, having a number of subsidiaries and associate companies in several different industries. Their goal is to use mathematics to make the world better. They want to be the bridge between academia and industries so useful ideas can be adopted quickly rather than waiting for years.

NM HS DSC will be organized by SIMCC, a leader in academic competitions and assessments. Proceeds from this competition will be used to fund scholarships and grants for students and teachers.

Questions of this competition, data sets, and judging will be prepared by NM. This will ensure that the material is relevant and highly pertinent to data science. NM will also create, maintain, and improve Data Science training materials based on the formative and summative performance reports from SIMCC.

Most high school students will not be able to code at a level practiced in the data science field. Thus, the goal of organizing this competition for students is to inform students of data science as a field and get them interested in it to create an infrastructure that will prompt students to enter data science, carrying the industry forward.

In the news:

11.5 million job openings by 2026, sky-high salaries: Why data science is booming?

Many people do not understand what data science is, often mistaking it for data entry, database administrator or a similar entry-level job. Humans have learnt to use oil effectively by refining it. Data science is the 'refining of data' to make it useful, and unlike oil, every company needs to use data to solve complex issues.

Data science started off as a tool used by banks to detect fraud but is now being used worldwide in areas such as internet search, health care, speech recognition, image recognition and even airline routing.

Data science is evolving quickly and has the potential to revolutionise decision making and management of our resources. This statement defines the way data science has evolved – as a lucrative and high-growth career option for youngsters.

For three years in a row, the role of a data scientist has been named the number one job in the US by Glassdoor. According to a report by the US Bureau of Labour Statistics, the rise of data science needs will create roughly 11.5 million job openings by 2026. The World Economic Forum predicts that by 2022, data scientists and analysts will become the number one emerging role in the world.

Data science experts are needed in virtually every job sector, not just technology. In fact, five of the world's biggest tech companies – Google, Amazon, Apple, Microsoft, and Facebook – contributing to over 52 per cent of the world's market capitalisation globally, are the biggest employers of data scientists and engineers.



Objective

We are a team of dedicated Data Science professionals and educators who want to provide students with essential skill in applied mathematics and statistics into data science. Data science uses techniques such as machine learning and artificial intelligence to extract meaningful information and to predict future patterns and behaviors.

Data science is the fastest growing field in this generation. As data science is a growing field, companies wish to hire upcoming talent and ensure their employment pools are filled with educated, informed, and talented individuals.

This data science competition is aimed to promote data science and offer more opportunities for students to Acquire Skills and Recognition for SUCCESS and have a clear path to enter this growing industry. Our goal is to further provide students with data science specific skills to ensure they are prepared for an increasing data-driven world.

This NM data science course is unique in a number of aspects. First, our target readers are high school to junior college students who may not have been exposed to the necessary mathematics for data science. As data science is an interdisciplinary field of mathematics, statistics and computer science, we start with linear algebra, which is fundamental to all numerical computing, and gradually build up the more advanced mathematics to regression and machine learning. We want to pave a solid theoretical foundation for young readers. Unlike a college textbook, the mathematics concepts are intentionally made not rigorous so that junior students can understand the intuition behind them. Many examples are provided and illustrated with charts, graphs and pictures for easy understanding.

Second, our choice of programming language is Kotlin, a modern open-source Java Virtual Machine (JVM) based language designed to make people happy. Kotlin is the next-generation data science language. JetBrains develops Kotlin and Google officially makes it the preferred language for Android. Kotlin applications can be easily integrated with the dozens of Java application frameworks such as Spring Boot. Moreover, Kotlin, compiled to JVM bytecode, has superior performance compared

What you'll learn from Data Science Training materials created by NM:

Data Science Foundations

- Basic programming
- Foundation mathematics such as linear algebra, functions and statistics
- Visualization

Decision Making Under Uncertainty

- Build mathematical model to solve data science problem
- Simulation to make decision under uncertainty
- Optimal decision making

Predictive Analytics

- Linear & logistic regressions
- Time series analysis

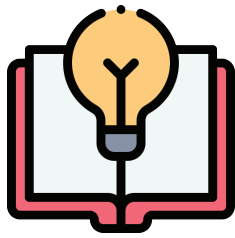
Machine Learning

- Artificial neural networks
- Classifications
- Clustering

After completing this programme you should be able to:

- ✓ Understand how to use data to derive meaningful results for any competition/business.
- ✓ Identify opportunities in competitions/workplace where data science capability can be leveraged.
- ✓ Understand different data science algorithms which are used to generate results.
- ✓ Develop data-driven solutions to business and scientific problems.
- ✓ Compete in High Stakes Data Science Competitions

Data science Competitions at NM and SIMCC enable you to compete with top students in data science and machine learning in the world. This is your chance to work on real life data science problems, improve your skill set, learn from expert data science and machine learning professionals, and score your way to the top of the Data Science leaderboard! You also stand a chance to win prizes and get a job at your dream data science company. Start your data science competition journey



LEARN

Learn data science skills by working on real world problems



GET DATA SCIENCE JOB

Upskill yourself and get hired in the best data science companies



BUILD YOUR DATA SCIENCE PROFILE

Showcase your data science expertise and get hired in top firms



WIN PRIZES

Stand a chance to win lucrative prizes



NM HS DSC Assessment Test (NM HS DSCAT)

Your journey to become a top Data Scientist begins here! Challenge your Data Science skills, track your performance, compete with fellow students via our Leaderboard.

Competition Details:

NM High School Data Science Competition (NM HS DSC) is open to all students from grades 9 to 12.

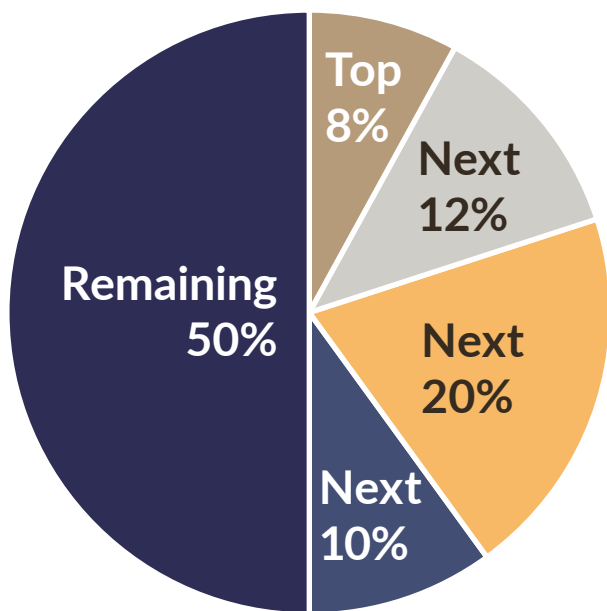
NM HS DSC is to measure the student's data science foundation in high school level without coding skill.

Level	Duration	Number of Questions	Question Breakdown	Total Marks
Grade 9/10	2h 30min	30	Q1-Q20 (2 marks each) Q21-Q30 (6 marks each)	100
Grade 11/12	4h	35	Q1-Q20 (2 marks each) Q21-Q30 (6 marks each) Q31-Q35 (20 marks each)	200

Syllabus:

- Programming
- Linear algebra
- Finding roots
- Data fitting and interpolation
- Optimization
- Statistics
- Artificial neural network
- Machine learning

Awards for SIMCC Local Competitions



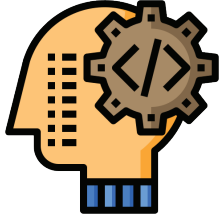
Students who have scored FULL MARKS will be awarded a Perfect Score certificate and a Perfect Score medal with their name and grade.

- The top 8% of the participants will receive GOLD medal and award certificate.
- The top next 12% of the participants will receive SILVER medal and award certificate.
- The top next 20% of the participants will receive BRONZE medal and award certificate.
- The next 10% of the participants will receive an Honorable Mention certificate.
- The remaining 50% of participants will receive a certificate of Participation.

Gold medalists will be invited to join Open NM Global Data Science Competition which is a higher level of data science competition for polytechnic/undergraduate students and high performing high school students.

Why Participate?

Develop Key Skills:



COMPUTATIONAL THINKING

Translate aggregates of data into abstract concepts and conduct data-based reasoning



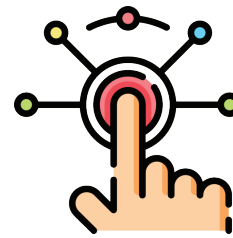
DESIGN MINDSET

Create solutions in context where only part of the requirements are known



SOCIAL INTELLIGENCE

Participate in the collaborative construction of solutions



DIGITAL CITIZENSHIP

Utilize information technology to improve society

Prizes:

Receive mentorship from the SIMCC Unicorn Center to scale your project into an entrepreneurship venture.

MORE PRIZES TO COME!

Registration Information

Date: **April 25 to May 13, 2022**

Online-only

Registration Fees:

- School Candidates: S\$20
(free for Singapore Government Schools)
- Private Candidates: S\$41.60

Competition Details:

Registration deadline: **April 9, 2022**

School Candidates:

Kindly approach your teacher-in-charge on how to register

Private Candidates:

Please register at: <https://form.simcc.org>

Refund Policy:

The contest fees paid by students to the competition are non-refundable. To host the competition, our organization invests a significant amount of time and resources, not to mention the various charges incurred to process the payments and registration.

As a social enterprise, SIMCC operates with a very lean team and limited resources to keep our operating costs low in order to make our competition affordable to all students. Hence, we will not be able to offer any refunds for competition fees to students who withdraw or cancel beyond our control.

If any student has been wrongly charged by SIMCC, or we cancel an event due to reasons under our control, we will happily refund the fees paid by the students.



Online Lessons:

Free Online Lessons:

Data Science Lessons – Grades 9, 10, 11, 12

<https://nm.dev/courses/introduction-to-data-science/>

Mock Tests Available:

Mock Tests Cost/grade = S\$30 (introductory price, usual \$50)

Sample Paid exercise 1:

<https://nm.dev/courses/introduction-to-data-science-workbook/>

Sample Paid paper 1:

<https://nm.dev/courses/nm-hs-dsc-sample-papers-2022/>

Sign up for NM HS DSC before March 1, 2022 and all contestants will get Mock Tests free for their grade level.

About Numerical Method (NM)

<https://nm.sg/>



NM's mission is to make the world better using mathematics by bridging the gap between academia and industries. <https://nm.dev/> We apply state-of-the-art mathematics that would otherwise only be on research papers to solve real-life problems, making things and processes more efficient and effective. NM HS DSC is NM's Corporate Social Responsibility project (CSR) to donate the competitions and training to raise funds for Scholastic Trust Singapore (STS) to help needy students and offer scholarships.

NM has created many innovative technologies to solve real-world problems for industries worldwide, from finance to manufacturing to logistics. In finance, we have a suite of portfolio allocation models that ranges from classical Markowitz theory to advanced stochastic asset allocation models. The progressive development of the allocation models makes more and more realistic assumptions that are better applied in realistic settings.

We are a pioneer in China's fixed income market modelling, having built (probably) the best zero-coupon curve for Chinese bonds. We have overcome many problems unique in the Chinese market such as lack of information. For factories and plants, we have built a number of data-to-decision systems, assisting management make scientific decisions based on mathematics and data to improve the efficiency and effectiveness of workflow, resources and profits. Our past projects

NM has contributed to research in numerical computing and data science. We have created a large collection of high-performance analytics, covering basic math like linear algebra and calculus to high level algorithms such as neural network and machine learning to applications including wealth management and decision-making systems. These analytics are now accessible on the S2 platform. Users are able to quickly build prototypes, test and deploy their models. <http://nm.dev/s2>



About SIMCC

SIMCC is a social enterprise and donates 20% of her contest revenues to support students and teachers. SIMCC is one of the largest academic contest organizers in Singapore and Asia. We are committed to popularizing education through thinking games and competitions, and allowing students to interact, cooperate and build lasting bonds of friendship that transcend borders.

In 2019, SIMCC was appointed by University of New South Wales (UNSW) to take over International Competitions and Assessments for Schools (ICAS) in Brunei, Hong Kong, Macau, and Singapore. UNSW has been operating ICAS for 40 years in 30 countries. SIMCC organizes:

International Local Competitions and Assessments

1. SASMO – Singapore and Asian Schools Math Olympiad
2. SINGA Math – Singapore Math Global Assessments
3. AMO – American Mathematics Olympiad (AMO)
4. SMKC – Singapore Math Kangaroo Contest
5. DOKA – Depth of Knowledge Assessment (Mathematics HOTS)
6. BEBRAS – Singapore BEBRAS Computational Thinking Challenge
7. DrCT – Design Thinking with robotics and Computational Thinking
8. NM High School Data Science Competition
9. Open NM Dev Global Data Science Competition
10. VANDA International Science Competition
11. ICAS Competitions – English
12. ICAS Competitions – Math
13. ICAS Competitions – Science
14. ICAS Competitions – Writing
15. ICAS Competitions – Digital Technologies
16. REACH Assessments – English
17. REACH Assessments – Math
18. REACH Assessments – Science
19. REACH Assessments – Writing
20. REACH Assessments – Digital Technologies



Global Finals held in a specific country or Globally on the Same Day

21. SIMOC – Singapore International Math Olympiad Challenge (Global Finals)
22. STEAM AHEAD (IJMO, VANDA & DrCT Global Finals)
 - a) IJMO – International Junior Mathematics Olympiad (Global Finals)
 - b) VANDA SCIENCE Global Finals
 - c) DrCT Global Finals
23. SINGA Math Global Finals

SIMCC has a global presence and 5 offices internationally - Cambodia (Phnom Penh), Hong Kong/Macau, India (Mumbai), and Indonesia



Scholastic Trust (Singapore) Limited (STS) and Young Achievers Leadership Academy (YALA)

STS is a non-profit foundation that set up the International Junior Honor Society (IJHS) to recognize outstanding primary to junior college students who have won Gold awards in English, Mathematics, Science, Computational Thinking, Informatics and Digital Technologies.

Students are exclusively invited by STS and SIMCC to join this society to pursue excellence and IJHS provides a suite of services to help them succeed. Once inducted, STS supported by SIMCC will enhance their abilities in leadership, creativity, and character building through the Young Achievers Leadership Academy (YALA) and community service



The Young Achievers Leadership Academy (YALA) is a 5 days 4 nights leadership and personal development workshop conducted by Scholastic Trust (Singapore) Limited (STS).

YALA is an academic motivational camp for primary 4 to junior college 2 (Grades 4 to 12) students specially designed to cater to top students in their pursuit to reach their highest academic goals, such as cracking the admission process to the top schools of the country.

To get inducted into IJHS, students must have received **at least 2 Gold medals within the academic year (August 1 to July 30) in our competitions (SASMO, AMO, DOKA, SIMOC, DrCT, VANDA, NM HS DSC or any one of ICAS English, Mathematics, Science, Writing or Digital Technologies with High Distinction*)** Students who have received **1 International Local Gold medal and at least an Individual Silver medal in an International Global Competition (SIMOC, STEAM AHEAD)** will also be inducted.

Starting in 2020, SIMCC accepts ICAS Assessments - Distinction and above award in English, Mathematics, Science, Writing or Digital Technologies as a significant to satisfy the entry criteria to IJHS. We will accept ONE ICAS award for entry into IJHS only for the countries and territories where SIMCC is managing the ICAS competitions in Brunei, Hong Kong, Macau, and Singapore.

YALA and other scholarships are awarded to students with the highest points - from international local SIMCC competitions based on Perfect Score and Gold awards and international Global SIMCC competitions based on Individual Perfect Score, Gold, Silver and Overall Champion Individual awards. University scholarships will also require students to meet the university entrance requirements as well as receive a Gold award and above for a specific competition, such as AMO Gold award is required to win the Southern Illinois University (SIU) 4-year STEM undergraduate scholarship.



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