WHY DATA, NOT OIL, DRIVES THE MODERN ECONOMY

SMU Open House

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A STORY OF THE WORLD'S MOST VALUABLE RESOURCE

PRELUDE

Inspired by a recent issue of *The Economist*, this DSA Second Major talk explores the new oil of the modern economy — data.

PRELUDE

For much of the 20th century, oil was a key driver of industrial power, geopolitical influence, and economic growth.

Data is now a central driver of economic and business value. It fuels AI, ML, personalisation, and automation.

Companies that control and analyze massive amounts of data gain strategic advantages — much like firms and nations that once controlled oil reserves.

PRELUDE

Data is the new oil of the modern economy.

DATA

- Is abundant and renewable
- Enables insights beyond traditional resources
- Can be copied and reused without depletion
- Powers AI, ML, and decision-making
- Grows exponentially

PRELUDE

WHAT IS DATA?

- More than just numbers: includes text, images, audio, video, and sensor readings
- Exists in structured, semi-structured, and unstructured forms

Industry increasingly works with **multimodal data** — datasets that combine numbers, text, images, and even audio or video.

PRELUDE

WHERE DOES DATA COME FROM?

- **Human-generated** — surveys, transactions, social media
- **Machine-generated** — sensors, IoT devices, satellites
- **Business systems** — sales records, invoices, email interactions, customer inquiries, website activity
- **Public & open data** — government and research repositories

PRELUDE

WHAT IS DATA SCIENCE?

DATA SCIENCE COMBINES

- Mathematics & statistics
- Computer science
- Domain knowledge

For example, some data scientists specialize in economics.

> *"A **data scientist in economics** knows more statistics than a computer scientist, more computer science than an economist, and more economics than a statistician."*
>
> — *Josh Wills*, adapted for economics

PRELUDE

WHAT DOES A DATA SCIENTIST DO?

A DATA SCIENTIST

- Works with multimodal and often big data from multiple sources
- Transforms raw data into information, and information into insights
- Applies statistical, artificial intelligence (AI), and machine learning (ML) models to produce explainable predictions, accurate classifications, and actionable recommendations

INTERLUDE


HOW THE CLIENT
DESCRIBED THEIR DATA
Excel
XML
TXT
PDF
THEIR DATA

DSA SECOND MAJOR

QUICK FACTS

- Launched in 2019
- Open to all SMU students
- One of SMU’s largest second majors
- 200+ graduates

DSA SECOND MAJOR

WHY DSA?

- Develop industry-valued skills
- Work on industry-relevant projects using in-demand programming languages
- Receive mentorship from faculty and industry practitioners
- Benefit from the support of the DSA Society at SMU
- Earn up to 4 MDSE course exemptions and qualify for the MDSE DSA Distinguished Alumni Scholarship

DSA SECOND MAJOR

WHAT DO DSA STUDENTS LEARN?

CORE COURSES

- Data wrangling, visualization, and analytics
- Probability and statistical inference
- Computational thinking
- Statistical learning
- Programming in Python, SQL, and R

ELECTIVE COURSES

- Data storytelling
- Machine learning
- Artificial intelligence
- Big data technologies (Spark, NoSQL databases), and more

DSA SECOND MAJOR

WHO EMPLOYS OUR DSA GRADUATES?

DSA SECOND MAJOR

LEARN MORE

- DSA Second Major website
  (Download the DSA flyer)
- MDSE programme website
  (Download the MDSE brochure)
- DSA Society website

EPILOGUE

HOW TO CONFUSE MACHINE LEARNING

DATA SCIENCE & ANALYTICS

School of Economics

DSA SOCIETY

Personal Journey - Wai Ying

- Year 2 SOE DSA student
- Honorary Finance Secretary of DSA Society
- Job scope was to analyse data and look for suspicious pattern
- Saw firsthand how raw data when analyzed correctly could tell a powerful story and protect the company

Personal Journey – Vidhi

- Year 2 SOB DSA student
- President of DSA Society
- Looking for internships in data science
- Saw firsthand how raw data when analyzed correctly could tell a powerful story

Why DSA 2nd major

Turn data into insights

Companies are collecting ever-increasing amounts of data & extracting value from them
Data scientists and analysts are in high demand

Learn the data skills you need

Programming languages such as R, Python & SQL
Big data & big computing technologies such as MySQL, Hadoop & Spark

Explore statistical learning

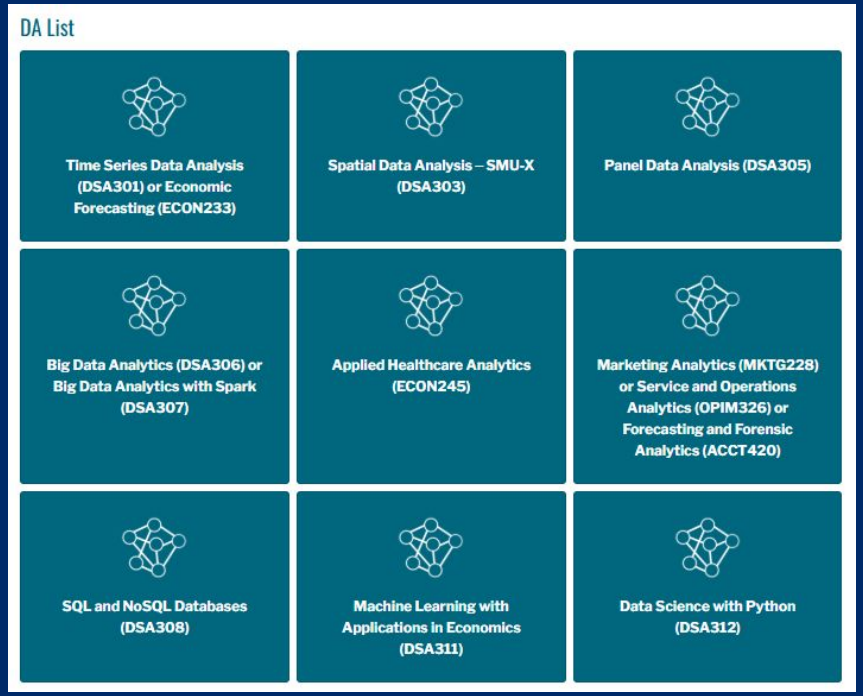
Train & test statistical models that describe & generalize datasets
Use statistical models & machine learning algorithms to generate predictions & gain insights

DSA Curriculum

Open to all degrees to complement your primary major

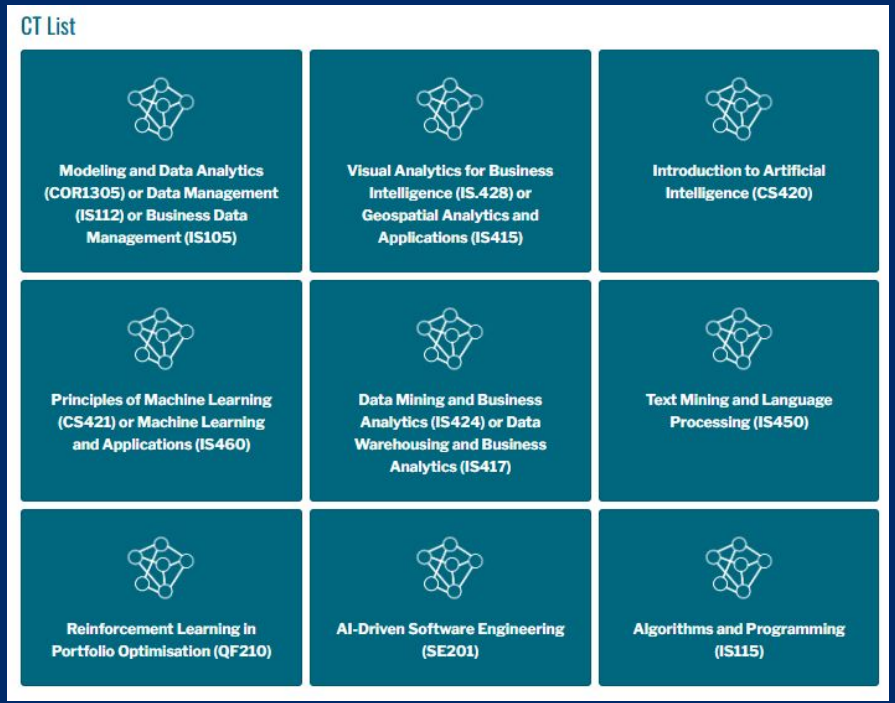
DSA Curriculum

Data Analysis (DA) List



DSA Curriculum

Computing Technology (CT) List



New Launch: Master of Data Science in Economics

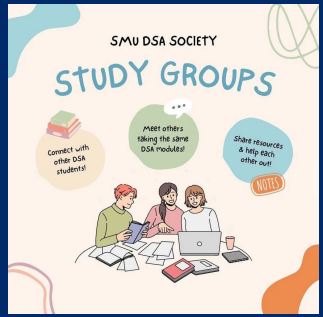
Benefits of DSA Major Graduate:

- Up to **$12,000** credit exemptions
- **$10,000** scholarship for top graduates
- **$8,000** alumni discount
- **$30,000** potential total savings

DSA SOCIETY

DSA Society – Your Home Base for the Journey

Founded in AY 2021, we're here to support DSA Second Major and Master students from the classroom to their careers.



Building Skills

- Run workshop for portfolio building and provide mentors for interview preparation

Forging Connections

- Organize industry talks with companies and networking sessions with potential employers.

Fostering Fellowship

- We're a community. We learn together and support each other through events like our upcoming DSA Games Night and Welfare Drive.

Past Events Held

Industry Talk by IBM

- Learn insights about how IBM use data science in their operations and projects

Data Analytics with Python Workshop

- Learn useful Python skills for data visualisations and extract useful information from datasets

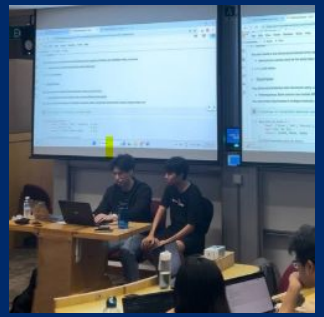
Case Competition with EDGE Agentic Labs

- Present innovative business decision based on Machine Learning Models

DSA SOCIETY

Upcoming Events In August

Industry Networking



Python Workshop

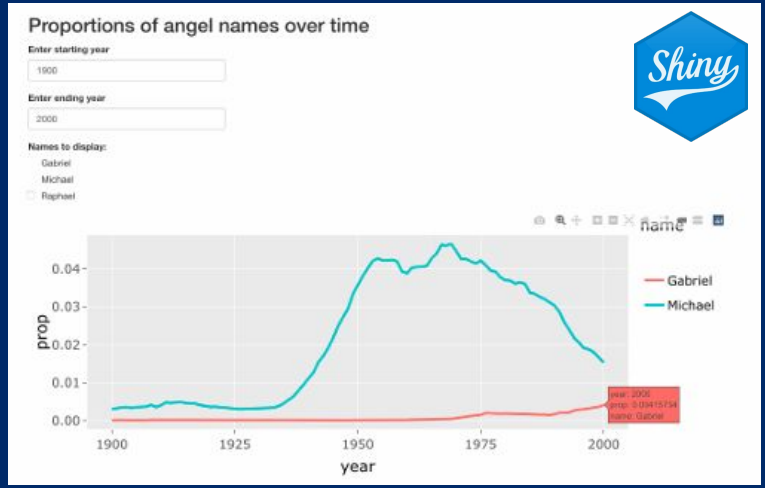
Case Competition

DSA SOCIETY

Module Experience - Data Analytics With R (DSA 212)

Building interactive data graphics using Shiny

```r
library(babynames); library(dplyr); library(ggplot2); library(plotly); library(shiny)

AngelNames <- c("Raphael", "Michael", "Gabriel")

Angels <- babynames |>
  filter(name %in% c("Raphael", "Michael", "Gabriel") & sex == "M")

ui <- fluidPage(
  titlePanel("Proportions of angel names over time"),
  numericInput("startyear", "Enter starting year",
               value = 1900, min = 1880, max = 2016, step = 1),
  numericInput("endyear", "Enter ending year",
               value = 2000, min = 1881, max = 2017, step = 1),
  checkboxGroupInput("names", "Names to display:",
                     sort(AngelNames), selected = c("Gabriel", "Michael")),
  plotlyOutput("plot")
)

server <- function(input, output, session) {
  output$plot <- renderPlotly({
    DF <- Angels |>
      filter(year >= input$startyear & year <= input$endyear & name %in% input$names)

    ggplot(data = DF, aes(x = year, y = prop)) +
      geom_line(aes(color = name), size = 1) +
      theme_grey(base_size = 18)
  })
}

shinyApp(ui, server)
```



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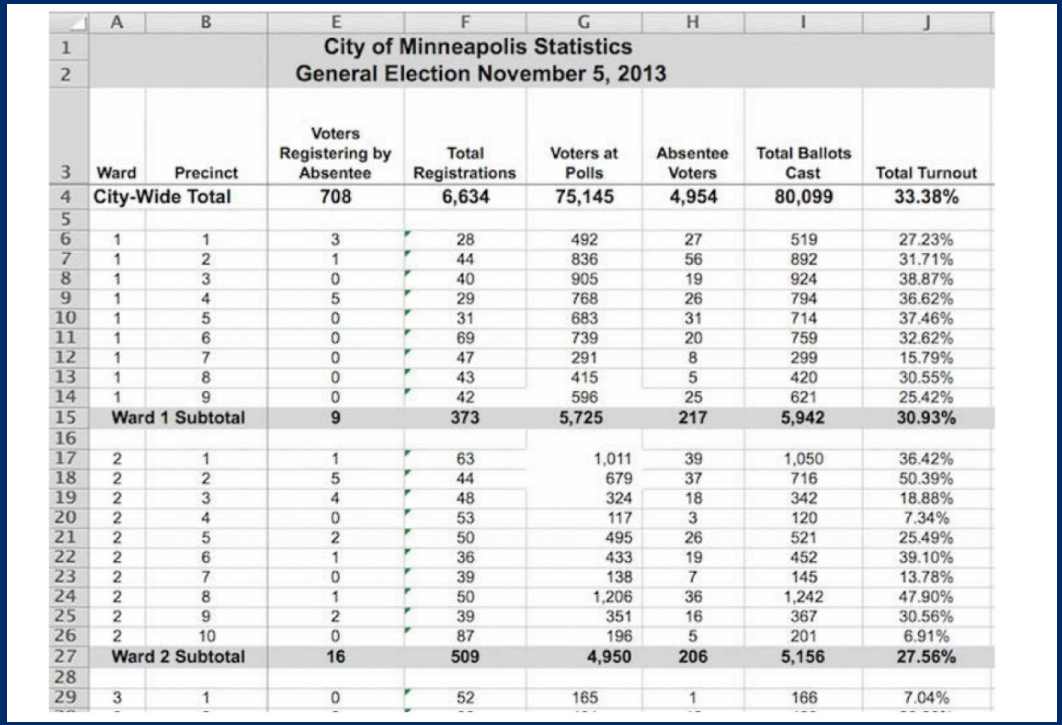
Module Experience - Data Analytics With R (DSA 212)

What makes a messy dataset?



	A	B	E	F	G	H	I	J
1	City of Minneapolis Statistics							
2	General Election November 5, 2013							
3	Ward	Precinct	Voters Registering by Absentee	Total Registrations	Voters at Polls	Absentee Voters	Total Ballots Cast	Total Turnout
4	City-Wide Total		708	6,634	75,145	4,954	80,099	33.38%
5								
6	1	1	3	28	492	27	519	27.23%
7	1	2	1	44	836	56	892	31.71%
8	1	3	0	40	905	19	924	38.87%
9	1	4	5	29	768	26	794	36.62%
10	1	5	0	31	683	31	714	37.46%
11	1	6	0	69	739	20	759	32.62%
12	1	7	0	47	291	8	299	15.79%
13	1	8	0	43	415	5	420	30.55%
14	1	9	0	42	596	25	621	25.42%
15	Ward 1 Subtotal		9	373	5,725	217	5,942	30.93%
16								
17	2	1	1	63	1,011	39	1,050	36.42%
18	2	2	5	44	679	37	716	50.39%
19	2	3	4	48	324	18	342	18.88%
20	2	4	0	53	117	3	120	7.34%
21	2	5	2	50	495	26	521	25.49%
22	2	6	1	36	433	19	452	39.10%
23	2	7	0	39	138	7	145	13.78%
24	2	8	1	50	1,206	36	1,242	47.90%
25	2	9	2	39	351	16	367	30.56%
26	2	10	0	87	196	5	201	6.91%
27	Ward 2 Subtotal		16	509	4,950	206	5,156	27.56%
28								
29	3	1	0	52	165	1	166	7.04%

DSA SOCIETY

Module Experience - Business Data Management (IS 105)

Writing complex business queries using SQL for project

Query 3 - Ticket Phase Effectiveness Analysis

MySQL

```
SELECT
    prs.event_id AS Event_ID,
    te.event_name AS Event_Name,
    tp.event_date AS Event_Date,
    tp.event_start_time AS Event_Start_Time,
    prs.phase_id AS Phase_ID,
    tp.phase_name AS Phase_Name,
    COUNT(prs.seat_num) AS Total_Seats_Released_During_Ticket_Phase,
    COUNT(so.order_id) AS Seats_Sold_During_Phase,
    ROUND((COUNT(so.order_id) / COUNT(prs.seat_num)) * 100, 2) AS Percentage_Sold_During_Phase,
    CASE
        WHEN COUNT(so.order_id) = COUNT(prs.seat_num) THEN 'COMPLETELY SOLD OUT'
        WHEN COUNT(so.order_id) = 0 THEN 'NO SALES'
        WHEN (COUNT(so.order_id) / COUNT(prs.seat_num)) * 100 >= 80 THEN 'HIGH DEMAND (>80%)'
        WHEN (COUNT(so.order_id) / COUNT(prs.seat_num)) * 100 >= 50 THEN 'MODERATE DEMAND (50-79%)'
        ELSE 'LOW DEMAND (<50%)'
    END AS Sales_Performance
FROM phase_release_seat AS prs
INNER JOIN ticket_phase AS tp ON prs.phase_id = tp.phase_id
INNER JOIN tm_event AS te ON prs.event_id = te.event_id
LEFT JOIN seat_order AS so ON prs.event_id = so.event_id
    AND prs.category_name = so.category_name
    AND prs.row_num = so.row_num
    AND prs.seat_num = so.seat_num
WHERE prs.event_id = 25097
    AND tp.event_date = '2025-11-15'
    AND tp.event_start_time = '19:30:00'
GROUP BY prs.event_id, prs.phase_id, tp.phase_name, te.event_name, tp.event_date, tp.event_start_time
ORDER BY Percentage_Sold_During_Phase;
```

To find out the percentage of seats sold during each ticket phases for the same event date and start time

To measure and easily analyse sales performance

To obtain ticket phase name

To obtain event name

To find out which seats were sold during each ticket phase

Query 3 - Ticket Phase Effectiveness Analysis

ticketmaster

Output for :

Event_ID: 25097
Event_Name: Kings & Queen of Comedy Asia 12
Event_Date : 2025-11-15
Event_Start_Time: 19:30:00

Event_ID	Event_Name	Event_Date	Event_Start_Time	Phase_ID	Phase_Name	Total_Seats_Released_During_Ticket_Phase
25097	Kings & Queen of Comedy Asia 12	2025-11-15	19:30:00	GS-2509702	General Sales - Early Bird	5
25097	Kings & Queen of Comedy Asia 12	2025-11-15	19:30:00	GS-2509704	General Sales	4

Seats_Sold_During_Phase	Percentage_Sold_During_Phase	Sales_Performance
4	80.00	HIGH DEMAND (>80%)
4	100.00	COMPLETELY SOLD OUT

DSA SOCIETY

Add DSA to your major.
Gain the world's most powerful skill set and a massive edge.

DSA SOCIETY

More Details on DSA 2nd Major and Master Programme

DSA 2nd Major

Master of Data Science in Economics

DSA SOCIETY

Follow Our Socials to Stay Updated

DSA SOCIETY

Thank You

Any Questions?

FAQ

1. Do I have to be from School of Economics to take DSA as a second major?
2. Is there a deadline for declaring my second major?
3. Are there any prerequisites for taking DSA?
4. Do I have to already be a proficient coder to do well in DSA?

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