Course Introduction

Data Structures for Computer Professionals

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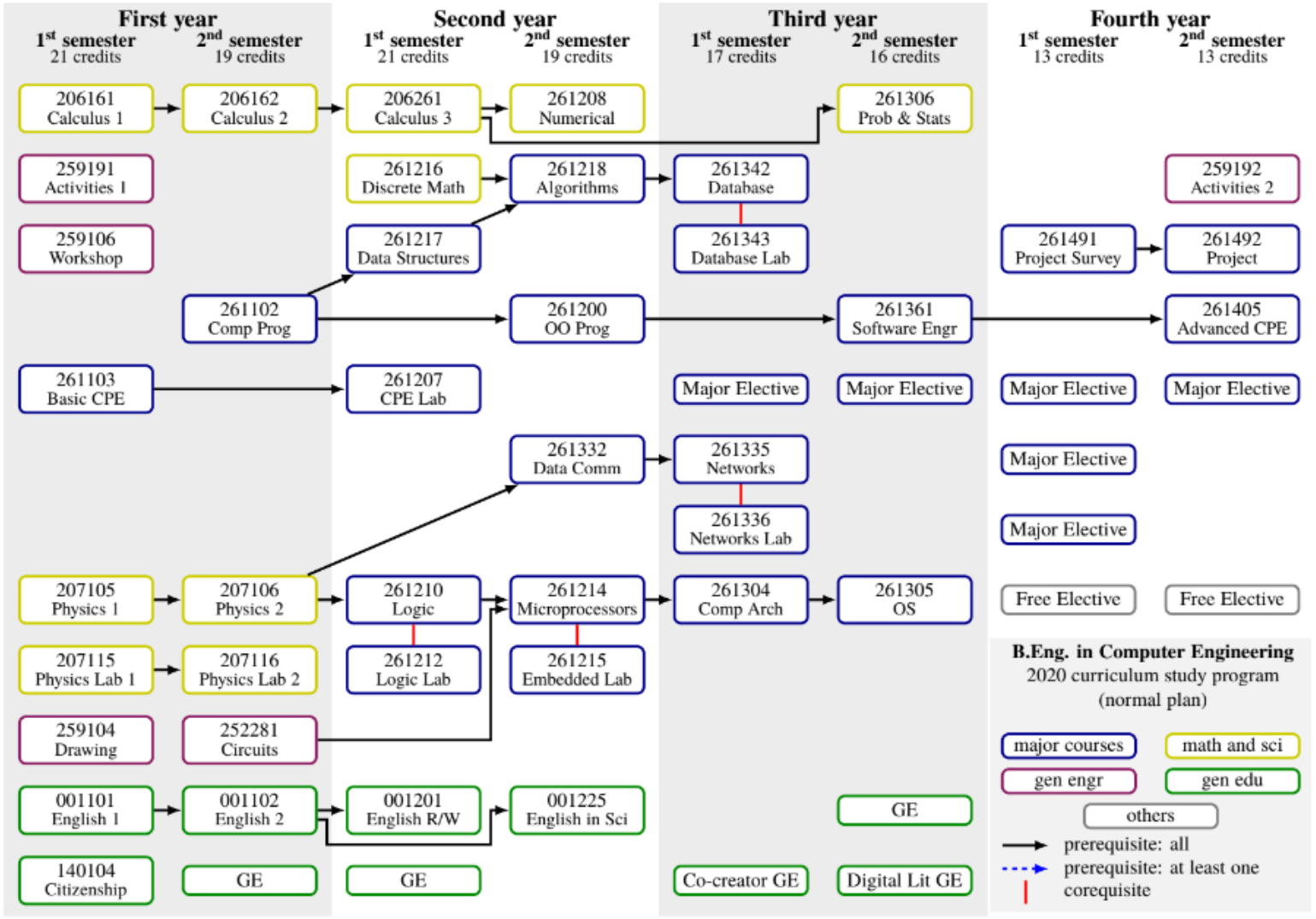
CPE Normal Plan (6306xxxxx)



'Data Structures' is a CS foundation course. Job interview questions will include D.S.

Why this Course?

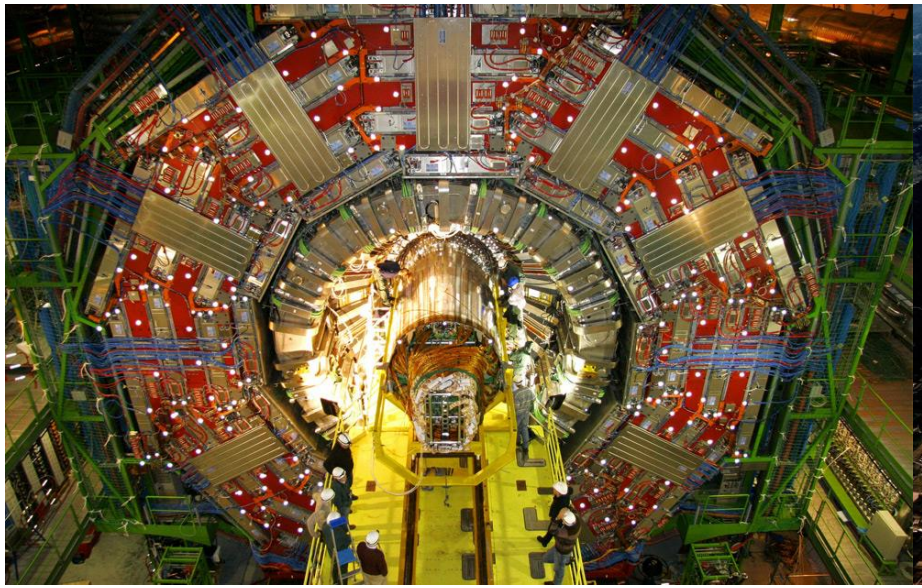
Big Data Everywhere!

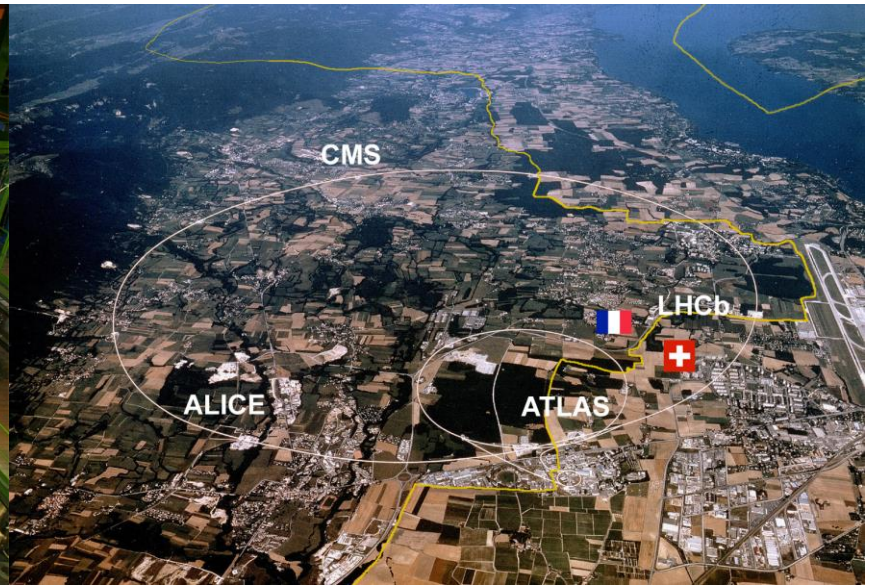
- Lots of data is being collected and warehoused
  - Web data, e-commerce
  - purchases at department/ grocery stores
  - Bank/Credit Card transactions
  - Social Network

How much data?

- 1 PB = 1,000,000,000,000,000B = 10^{15} bytes = 1000 terabytes.
- Google processes 20 PB a day (2008)
- Wayback Machine has 3 PB + 100 TB/month (3/2009)
- Facebook has 2.5 PB of user data + 15 TB/day (4/2009)
- eBay has 6.5 PB of user data + 50 TB/day (5/2009)
- CERN's Large Hadron Collider (LHC) generates 15 PB a year

CERN (Geneva, Switzerland)





How do you **organize** such a huge data?

This course teaches you to **efficiently organizing** the data as **they are growing**

- **Cheap** to store the data
  - Allocate 1TB for storing 1KB data -> Bad
- **Fast** to store the data
  - Take years for accessing the simple data -> Bad
- **Cheap** and **Fast** to process
  - Set value to memory quickly -> Good
  - Get value from memory quickly -> Good
  - Consume reasonable memory space -> Good

Data Structures covered in this class

- Linear Data Structures
  - Linked Lists
  - Arrays
  - Queues
  - Stacks
- Trees
  - Binary Trees
  - Binary Search Trees
  - AVL Trees
- Priority Queues
  - Binary Heaps
- Hash Tables
  - Hash Functions
  - Collision Resolutions
- Graphs
  - BFS
  - DFS

Java Programming using NetBeans IDE

- C# Programming Language
- Visual Studio 2022 (Windows Only)
  - Mac user please use Visual Studio Code
- Demo: FindMax function of an array