الوحدات الإثرائية لبرنامج موهبة الإثرائي العالمي 2025
طلاب

#	اسم الوحدة الإثرائية	الصف الدراسي
1	Medical & Surgical Sciences I	9,10
2	AI & Big Data	9,10
3	Aerospace and Rocket Engineering	9,10
4	Computer Science for a Digital Future	9,10,11
5	Cybersecurity & Cryptography	9,10,11
6	AI & Big Data in the Biomedical Sciences	9,10,11
7	Economics, Finance & Investment Essentials	9,10,11
8	Mechanical Engineering	10,11

Courses descriptions:

1. Medical & Surgical Sciences I (Foundation):

The Medical & Surgical Sciences (Foundation) course is designed to introduce students to the fascinating world of medicine, surgery, and practicing as a doctor. You will learn about core human anatomy, including the cardiac, respiratory, and musculoskeletal systems, and how they function together. The course will cover important topics such as anatomy, how diseases affect the body (pathology), the basics of how medications work (pharmacology), and the fundamentals of different types of medical examinations.

We will explore the body by looking at different regions, focusing on how cells and tissues make up organs like the skin, bones, and nervous system. You will also learn about common diseases and what they mean for health on a societal level. Through engaging classroom activities, fun simulations, and hands-on experiments in the lab, you will have the chance to apply what you've learned in a friendly and interactive way. Additionally, we will discuss how medicine relates to macro-scale global health trends, as well as how technology is changing the field.

By the end of this course, students will be able to:

- Identify different organs in the body and understand their basic functions.
- Describe how organs work together and their importance in health.
- Recognize the relationship between the architecture of the human body and its function.
- Understand how different medications affect different parts of the body.
- Practice basic skills used in healthcare settings, such as clinical examinations.
- Appreciate the role of medicine in society and its global effects.

- Imagine what the future of medicine might look like.
- Consider if a career in medicine could be a good fit for them.

2. AI & Big Data:

This course will introduce students to the major topics with the exciting, cutting-edge domains of artificial intelligence and Big Data, including machine learning algorithms, neural networks, deep learning, data acquisition and storage, and the cleaning and preparation of data. Students will explore different industrial applications of AI and Big Data, with specific attention paid to critical case studies, including healthcare and finance. Students will also engage in ethical debates that surround the development of strong AI. You will learn the design principles of AI and machine learning systems and learn to code and debug basic systems yourself. You will also learn techniques for the effective visualization and interpretation of large datasets, and about different career possibilities within the fields of AI & Big Data.

After taking this course, students will be able to:

- Describe different forms of AI, their strengths and weaknesses, and their industrial and real-world applications.
- Describe different Big Data techniques and applications.
- Provide a functional definition of algorithms and write basic algorithmic code.
- Understand how to prepare datasets for analysis.
- Code and debug basic AI software.
- Know a variety of techniques for the visualization and interpretation of large datasets.
- Reflect critically on the ethical questions regarding the development of strong AI, and the increasing deployment of AI across a number of industries and domains of everyday life.
- Project themselves into the day-to-day life of AI & Big Data professionals in a number of different domains and have a sense of whether a career in AI & Big Data is right for them.

3. Aerospace and Rocket Engineering:

This course provides a solid and holistic understanding of aerospace and rocket engineering through three content clusters: 1. Fundamental physics and mathematical foundation of the field; 2. Aerodynamics, orbital mechanics, and rockets; and 3. Space environment, payload and satellites. Students will learn about the theoretical and practical applications of this cutting-edge field, alongside the study of real-world cases, institutions, and organizations e.g., NASA and SpaceX. The course will help students develop an understanding of the space environment and space operations, alongside the principles underpinning space technology and satellite communications. Teaching will be delivered through tutorials, workshops, and practical sessions. It is particularly suitable for students who wish to acquire skills in this field and for those interested in studying it as their university major.

After taking this course, students will be able to:

- Understand core principles and theoretical underpinnings of rockets, flight, and aerospace science.
- Identify and weigh key factors affecting space exploration by analyzing case studies.
- Apply meaningful theoretical concepts and trade-off decision capability to solve problem scenarios.
- Design, execute and refine practical exercises and computer lab simulations involving projectile motion and flight design.
- Critically reflect on the ethics of space exploration and understand future prospects of the field.

4. Computer Science for a Digital Future:

In an increasingly interconnected world, computer science is a key area for almost every industry and has roots in both mathematics and engineering. This course will explore the relevant mathematical principles, computer architecture, data structures and algorithms underpinning computer science, and how they are driving the "digital future". Hot topics in the digital future span virtual reality, AI, data science, and machine learning. Digital technology is supporting the development of everything from autonomous ("driverless") cars to Fintech banks, surgical robots, and augmented gaming. This course exposes students to a range of digital technologies and the computer science that underpins them from theoretical, methodological, and practical perspectives. The course will be delivered through interactive tutorials, workshops, and practical sessions, and is suitable for students who wish to acquire skills related to software engineering, software applications, AI, computer science, and the tech jobs of the future. Particular emphasis will be directed towards programming languages, as well as practical work with programmable robotic technology.

After taking this course, students will be able to:

- Code and debug their own programs.
- Explain what kinds of programming approaches are used across the variety of cutting-edge technological fields described above.
- Understand how programmers code machine learning and AI software.
- Navigate different cutting-edge computer scientific fields with confidence and plan their own careers in any of these domains from an informed perspective.

5.Cybersecurity & Cryptography:

This course will introduce you to fundamental components of computer science with a special focus on key tenets of cybersecurity and cryptography. Students will begin by understanding the basic language and architecture of computers, networks, and database systems, and will investigate the different possible security threats that computer systems confront. You will consider what value your private data might hold for organisations, and how organisations might use this data in nefarious ways without seeking your permission. Students will then look at social engineering techniques used by cybercriminals to try to trick users into giving away their personal data. The course then turns its attention to more common cybercrimes such as hacking, DDoS attacks, and malware, and considers methods to protect themselves and our networks against these attacks. You will also learn the basics of cryptography and learn to

encode and decode using cyphering techniques both ancient and modern. Students will undergo regular individual/group-based class exercises to implement their learning in various cyber threat scenarios.

After taking this course, students will be able to:

- Encrypt and decrypt messages using a variety of cyphering techniques.
- Describe the basic structure of computer networks and the most common ways in which these networks may be attacked.
- Code and debug simple cybersecurity software without assistance.
- Understand the role of cybersecurity in business and in government.

Project themselves into the day-to-day lifestyle of a cybersecurity professional and have a sense of whether a career in cybersecurity is right for them.

6. AI & Big Data in the Biomedical Sciences:

AI in the Biomedical Sciences will introduce students to the major topics of artificial intelligence (AI) and Big Data, including machine learning algorithms, neural networks, deep learning, data acquisition and storage, and the cleaning and preparation of data. In addition to these core topics, the course will dedicate at least 9 hours specifically to AI applications in the biomedical sciences, covering areas such as medical imaging, genomics, personalized medicine, drug discovery, and AI-driven diagnostic tools. Students will also engage in ethical debates surrounding the development of strong AI and its implications for healthcare. They will learn the design principles of AI and machine learning systems and gain hands-on experience coding and debugging basic systems. Additionally, the course will cover techniques for the effective visualization and interpretation of large biomedical datasets, helping students understand how AI is revolutionizing research and clinical practice in the biomedical field.

After taking this course, students will be able to:

- Explain the fundamental concepts of artificial intelligence, including machine learning, neural networks, and deep learning, using biomedical examples to demonstrate their understanding
- Analyze and evaluate ethical considerations surrounding AI applications in healthcare, for example patient privacy, bias in medical algorithms, and the role of AI in clinical decision-making.
- Deploy basic coding skills to create and debug simple machine learning algorithms, applying these skills to solve straightforward biomedical data problems.
- Demonstrate the ability to clean, prepare, and visualize datasets, showing how raw data can be transformed into meaningful insights for healthcare applications.
- Describe how AI technologies are currently being applied in specific areas of biomedicine, such as medical imaging, genomics, and drug discovery, and assess their potential impact on future healthcare delivery.

7.Economics, Finance & Investment Essentials:

This course introduces students to key financial and economic concepts through the lens of entrepreneurship and startups, combining mathematical and economic disciplines. Covering both micro and macroeconomics, students will learn about market fundamentals, financial modelling, risk management, and entrepreneurial finance, including venture funding, fintech, and cryptocurrencies. The course also explores trading, investment decisions, and the application of new technologies in financial markets. Additionally, it examines the societal impacts of economics, such as sustainable development and public policy. Ideal for those aspiring to careers in finance, business, and public policy, the course offers a practical focus on real-world financial applications and entrepreneurial strategy.

After taking this course, students will be able to:

- Explain key terms and concepts in microeconomics
- Analyse how macroeconomic factors like interest rates, inflation, and government policies impact business decision-making and market dynamics
- Design a basic financial model to project revenues and costs for a startup business, incorporating key economic principles and market analysis
- Evaluate different funding options for new ventures, including traditional venture capital, crowdfunding, and cryptocurrency-based financing
- Calculate risk-adjusted returns for various investment opportunities using fundamental mathematical and statistical concepts

Develop a sustainable business strategy that balances profit objectives with environmental and social responsibility goals

8. Mechanical Engineering:

This course will immerse you in the key topic areas of Mechanical Engineering explored in an undergraduate degree setting. Students will be exposed to fundamental concepts such as mechanics, thermodynamics and materials science, and their effects on different systems. Through experiments and computer lab simulations, including the use of Computer Aided Design (CAD), students will have a taste of the design, visualization and analytical processes involved in the field. The course aims to inspire students by acquainting them with current innovations in the areas of energy, materials, and control and highlighting future challenges in these domains that engineers are seeking to solve. At the end of the course, students will be able to appreciate the ever-evolving role of simulations and AI in designing structures, and present examples of current control techniques used in the industry.

After taking this course, students will be able to:

- Understand the core principles and theoretical underpinnings of mechanical engineering.
- Assess and balance key factors involved in mechanical design and manufacturing processes by analyzing case studies.
- Apply meaningful theoretical concepts and engineering principles to solve problem scenarios involving mechanical systems analysis.
- Visualize, design and prototype simple projects using Computer Aided Design (CAD)
- Critically reflect on the ethics of mechanical engineering in line with energy concerns and understand future prospects of the field in relation to AI and simulations.
- Survey different career possibilities within the field of Mechanical Engineering and have a sense of whether these might be a good fit for them.


@Mawhiba
Mawhiba.org