



8544

INTRODUCTION TO
AVIATION AND AEROSPACE
TECHNOLOGIES (10)

20S/20E/20M

An Aviation and Aerospace Technologies Course

8544: INTRODUCTION TO AVIATION AND AEROSPACE TECHNOLOGIES (10) 20S/20E/20M

Course Description

Introduction to Aviation and Aerospace Technologies is intended for students wishing to investigate aviation and aerospace technologies. Curriculum content focuses on the maintenance and manufacturing of aircraft. The emphasis will be on project-based learning activities.

Cross-curricular learning outcomes, or essential skills from subject areas including, but not limited to, information and communication technologies, science, English language arts, and mathematics, are to be integrated into the authentic learning activities of the course.

The curriculum is not sequential. For instructional purposes, the sequence of learning outcomes can vary based on the learning activities within the course.

Goal 1: Describe and apply appropriate **health and safety** practices for aerospace technologies.

GLO 1.1: Describe and apply appropriate **health and safety** practices for aerospace technologies.

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| SLO 10.1.1.1 | Demonstrate an awareness of the principles of Workplace Hazardous Materials Information Systems (WHMIS) as they apply to aerospace technologies. |
| SLO 10.1.1.2 | Describe the purpose of Material Safety Data Sheets (MSDS). |
| SLO 10.1.1.3 | Describe workplace health and safety procedures (e.g., S.A.F.E., Right to Refuse). |
| SLO 10.1.1.4 | Demonstrate the ability to follow safety information on supplier labels. |
| SLO 10.1.1.5 | Follow personal and environmental health and safety procedures. |
| SLO 10.1.1.6 | Identify immediate hazards and their impact on self, others, and the environment. |
| SLO 10.1.1.7 | Identify and follow appropriate emergency response procedures. |

Goal 2: Demonstrate comprehension of the **principles of flight**, as they apply to aviation and aerospace technologies.

GLO 2.1: Demonstrate an understanding of **aerodynamics, control, and stability** in **fixed-** and **rotary-wing** aircraft.

- SLO 10.2.1.1 Demonstrate an understanding of the terms relating to aerodynamics and airfoils.
- SLO 10.2.1.2 Demonstrate an understanding of the four forces acting on an aircraft in straight and level flight.
- SLO 10.2.1.3 Demonstrate an understanding of Newton's third law and Bernoulli's principle as they apply to the generation of lift by airfoils.
- SLO 10.2.1.4 Explain how an aircraft is controlled around its three axes, and the primary flight control surfaces that accomplish this control. This should include built-in aircraft stability.
- SLO 10.2.1.5 Explain secondary flight control surfaces, such as tabs, flaps, spoilers, and leading edge devices.

Goal 3: Demonstrate an understanding of the **major components of an aircraft** and their **functions**.

GLO 3.1: Demonstrate an understanding of the **major components of an aircraft** and their **functions**.

- SLO 10.3.1.1 Identify the five major components of a fixed-wing aircraft.
- SLO 10.3.1.2 Describe the functions of the major components of a fixed-wing aircraft.

Goal 4: Demonstrate comprehension of **aircraft systems**.

GLO 4.1: Describe **aircraft systems** and their purposes.

- SLO 10.4.1.1 Describe the types of systems that are present in fixed-wing aircraft.

Goal 5: Demonstrate the safe and appropriate **operation of equipment and tools**.

GLO 5.1: Describe the safe and appropriate **management of equipment and tools**.

- SLO 10.5.1.1 Demonstrate the safe and appropriate cleaning, storage, and management of equipment and tools.

- SLO 10.5.1.2 Demonstrate the use of pounding, turning, cutting, holding, and measuring hand tools in the aviation and aerospace industry.
 - SLO 10.5.1.3 Demonstrate the safe operating procedures for the pounding, turning, and cutting equipment used in the aviation and aerospace industry.
 - SLO 10.5.1.4 Select, operate, and maintain the appropriate pounding, turning, cutting, holding, and measuring hand tools, power tools, and equipment used in the aviation and aerospace industry.
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GLO 5.2: Demonstrate the **operation** of **tools and equipment** to fabricate **metallic** parts and projects.

- SLO 10.5.2.1 Demonstrate several common metal fastening processes, such as using threaded fasteners and riveting.
 - SLO 10.5.2.2 Demonstrate several common metal forming processes.
 - SLO 10.5.2.3 Apply several mechanical forming processes to a metal product.
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GLO 5.3: Demonstrate the **operation** of **tools and equipment** to fabricate **non-metallic** parts and projects.

- SLO 10.5.3.1 Perform the kit cutting of composite materials for a solid laminate constructed project.
 - SLO 10.5.3.2 Perform a manual layup using PLT and CLT processes for composite plies for a solid laminate constructed project.
 - SLO 10.5.3.3 Set up and complete the curing process for a composite project.
 - SLO 10.5.3.4 Perform a trim process using manual trimming procedures for post-cured composite materials.
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Goal 6: Demonstrate comprehension of the properties and applications of various **materials and consumables** used in the aviation and aerospace industry.

GLO 6.1: Explain the **properties** of various **materials and consumables** used in the aviation and aerospace industry.

- SLO 10.6.1.1 Identify and classify common metallic and non-metallic materials.
- SLO 10.6.1.2 Demonstrate an understanding of material properties as they apply to the aviation and aerospace industry.
- SLO 10.6.1.3 Define composite materials as they pertain to composite fabrication.

SLO 10.6.1.4	Describe the importance of warp fibre direction.
SLO 10.6.1.5	Explain matrixes in composites, including, but not limited to, epoxies.
SLO 10.6.1.6	Explain the requirements for composite classification.
SLO 10.6.1.7	Describe common reinforcement materials used for laminates, and compare their qualities.
SLO 10.6.1.8	Explain the advantages and disadvantages of composite materials.
SLO 10.6.1.9	Explain the purpose for curing composite material.

GLO 6.2: Describe **applications** of the various aerospace **materials and consumables**.

SLO 10.6.2.1	Describe which materials are used in the various aircraft structures and components.
SLO 10.6.2.2	List the applications of composite materials in aircraft fabrication.
SLO 10.6.2.3	Describe types of composite construction.
SLO 10.6.2.4	State methods of processing pre-cured composite materials, including the use of hand and power tools for <ul style="list-style-type: none"> ■ cutting ■ drilling ■ sanding
SLO 10.6.2.5	List the steps for curing a composite layup.
SLO 10.6.2.6	State methods of machining post-cured reinforcement materials, including the use of hand and power tools for <ul style="list-style-type: none"> ■ cutting ■ drilling ■ sanding
SLO 10.6.2.7	Describe the fabrication of non-metallic composite structures, including, but not limited to, solid laminates.
SLO 10.6.2.8	Identify and explain how to use the tools and equipment used in kit cutting of composite materials.
SLO 10.6.2.9	List the steps involved in trimming composite panel.
SLO 10.6.2.10	Determine a rivet layout pattern.
SLO 10.6.2.11	Describe solid rivets.

Goal 7: Fabricate parts and components for use in the aviation and aerospace industry.

GLO 7.1: Fabricate **metallic** parts.

SLO 10.71.1	Use common measurement/layout tools used in metalworking.
SLO 10.71.2	Describe the process for marking and drilling holes in sheet metal.
SLO 10.71.3	Describe the use of layout tools and instruments.
SLO 10.71.4	Apply rivet-sizing formulas.
SLO 10.71.5	Perform rivet pitch and edge distance calculations.
SLO 10.71.6	Describe the inspection of formed rivets.

GLO 7.2: Fabricate **non-metallic** parts.

SLO 10.72.1	Use common measurement/layout tools used in composite fabrication.
SLO 10.72.2	Describe layout procedures for different fabrication applications.
SLO 10.72.3	Describe the use of layout tools and instruments.
SLO 10.72.4	Inspect a composite panel using the tap test and the visual method.

GLO 7.3: Fabricate **electrical/electronic** components.

No applicable SLOs.

Goal 8: Describe and demonstrate the transferable **cross-curricular skills** as they pertain to **aviation and aerospace technologies**.

GLO 8.1: Read, interpret, and communicate information relevant to aviation and aerospace technologies.

SLO 10.8.1.1	Demonstrate the proper use of tools, materials, and equipment used to create technical drawings.
SLO 10.8.1.2	Identify and use traditional “board” tools used in drafting, such as T-squares, drafting machines, set-squares, scales, and rules.
SLO 10.8.1.3	Identify the main conventions related to simple technical drawings.
SLO 10.8.1.4	Demonstrate an understanding of drawing practices, including methods of illustration and sketching.

SLO 10.8.1.5 Use technical language and terms appropriately in context.

GLO 8.2: Acquire and organize information using **information and communication technology**.

SLO 10.8.2.1 Access and use a range of relevant information, material, and human resources.

SLO 10.8.2.2 Use a computer-assisted design and drafting (CADD) system to produce a simple technical drawing.

GLO 8.3: Apply **mathematical** knowledge and skills related to aviation and aerospace technologies.

SLO 10.8.3.1 Recognize and apply common measurement standards used in the aviation and aerospace industry.

SLO 10.8.3.2 Demonstrate the use of addition, subtraction, multiplication, and division (for more than 1-digit divisors or 2-digit multipliers) of whole numbers, decimals, and fractions to solve problems.

SLO 10.8.3.3 Use fractions, decimals, ratios, and percentages.

SLO 10.8.3.4 Convert from imperial to metric measurements.

GLO 8.4: Apply **scientific** knowledge and skills related to aviation and aerospace technologies.

SLO 10.8.4.1 Describe the characteristics of matter, including, but not limited to, atomic structure, states of matter, weight, mass, and density.

SLO 10.8.4.2 Describe Newton's laws of motion.

SLO 10.8.4.3 Identify any parts or systems of an aircraft and/or engine where Bernoulli's principle and/or Newtonian law is applied.

SLO 10.8.4.4 Compare and contrast potential and kinetic energy and how they apply to aircraft and/or aircraft systems.

SLO 10.8.4.5 Define *work*, *power*, and *force*.

SLO 10.8.4.6 Define the function of common simple machines and explain how mechanical advantage is applied to them.

SLO 10.8.4.7 Design a simple machine (on paper) that uses one or more methods of mechanical advantage.

Goal 9: Describe **career opportunities** in aviation and aerospace technologies and associated fields.

GLO 9.1: Describe **education** and **career opportunities** and **professional organizations** in aviation and aerospace technologies and associated fields.

- SLO 10.9.1.1 Demonstrate an awareness of careers in aviation and aerospace technologies and associated fields.
- SLO 10.9.1.2 Demonstrate an awareness of apprenticeship.
- SLO 10.9.1.3 Research the academic knowledge and skills required for employment and post-secondary education.

Goal 10: Demonstrate an awareness of **sustainability** as it pertains to aviation and aerospace technologies.

GLO 10.1: Describe the impact of the aviation and aerospace industry on **human health and well-being**.

- SLO 10.10.1.1 Describe basic concepts of human factors (Dirty Dozen) as applied to aviation maintenance.
- SLO 10.10.1.2 Identify organizational norms and establish a culture of safety in the workplace.
- SLO 10.10.1.3 Identify the impacts of aviation to human health and well-being.

GLO 10.2: Describe the aviation and aerospace industry's sustainability practices and impact on the **environment**.

- SLO 10.10.2.1 Explain how and why lightweight and recyclable materials are used in aircraft production.
- SLO 10.10.2.2 Discuss how the aviation and aerospace industry affects the environment.
- SLO 10.10.2.3 Describe the benefits of using environmentally friendly products and more efficiently designed aircraft.
- SLO 10.10.2.4 Describe and apply efficient materials usage and disposal practices.

GLO 10.3: Describe **sustainable business practices** within the aviation and aerospace industry.

- SLO 10.10.3.1 Define sustainable business practices.

Goal 11: Demonstrate an awareness of the **ethical and legal standards** as they pertain to aviation and aerospace technologies.

GLO 11.1: Practise the **ethical and legal standards** as they pertain to aviation and aerospace technologies.

SLO 10.11.1.1 Discuss ethical and legal standards in the aviation and aerospace industry workplace.

Goal 12: Demonstrate **employability skills** related to aviation and aerospace technologies.

GLO 12.1: Demonstrate **employability skills** related to aviation and aerospace technologies.

SLO 10.12.1.1 Demonstrate the criteria that comprise the Global Industry Standard of essential skills for employees.

SLO 10.12.1.2 Demonstrate the skills listed on the Conference Board of Canada's *Employability Skills 2000+* for employees.

Goal 13: Describe the **evolution** of aviation and aerospace technologies, including **technological progression** and **emerging trends**.

GLO 13.1: Describe the **evolution** of aviation and aerospace technologies, including **technological progression** and **emerging trends**.

SLO 10.13.1.1 Describe the evolution of aviation and aerospace technologies, including technological progression and emerging trends.
