



8548

AIRCRAFT STRUCTURE
AND REPAIR (12A)

40S/40E/40M

An Aviation and Aerospace Technologies Course

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Course Description

Aircraft Structure and Repair is intended for students entering the transition phase of aviation and aerospace technologies. Curriculum content provides an introduction to the construction and repair of metallic and non-metallic structures. Topics include the following:

- fabrication of an airfoil
- repair of non-metallic structures
- non-destructive testing

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 12A.1.1.1 | Describe and apply appropriate health and safety practices for aircraft structure and repair. |
| SLO 12A.1.1.2 | Explain safety practices/precautions for metallic and non-metallic structures. |
| SLO 12A.1.1.3 | Describe safe handling of composite materials in pre-cured form. |
| SLO 12A.1.1.4 | Explain the health and safety requirements for core detailing, both pre- and post-cure. |
| SLO 12A.1.1.5 | Explain the health and safety requirements for liquid penetrant and magnetic-particle non-destructive inspection. |

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 12A.2.1.1 Demonstrate an understanding of aerodynamics, control, and stability as they apply to aircraft structure and repair.
- SLO 12A.2.1.2 Define terminology used in weight and balance procedures and reports. (AME 19.G17.1)
- SLO 12A.2.1.3 Explain reasons for weight and balance of aircraft. (AME 19.G17.3)

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 12A.3.1.1 Demonstrate an understanding of the major components of wings, and their flight controls and functions.

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

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

No applicable SLOs.

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 12A.5.1.1 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 for metallic and non-metallic structure and repair.

GLO 5.2: Demonstrate the **operation of tools and equipment** to fabricate **metallic** parts and projects.

- SLO 12A.5.2.1 Describe sheet metal tools. (AME 21.G6.5)
 - SLO 12A.5.2.2 Identify and handle aircraft sheet metal, and describe related documentation. (AME 21.A11.3)
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GLO 5.3: Demonstrate the **operation** of **tools and equipment** to fabricate **non-metallic** parts and projects.

SLO 12A.5.3.1 Demonstrate the operation of tools and equipment to fabricate non-metallic parts and projects.

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 12A.6.1.1 Explain the inspection and repair of aircraft.
 - SLO 12A.6.1.2 Describe aircraft development and the materials used. (AME 13.G12.1)
 - SLO 12A.6.1.3 Describe the physical properties of materials used in aircraft construction and repair. (AME 13.G12.2)
 - SLO 12A.6.1.4 Describe the physical properties of ferrous metals used in aircraft construction and repair. (AME 13.G12.3)
 - SLO 12A.6.1.5 Describe the physical properties of non-ferrous metals used in aircraft construction and repair. (AME 13.G12.4)
 - SLO 12A.6.1.6 Describe the types, uses, and maintenance of plastics and glass in aviation products. (AME 13.G12.6)
 - SLO 12A.6.1.7 Explain the formation of corrosion, and identify types of corrosion. (AME 13.G14.1)
 - SLO 12A.6.1.8 Determine the type of corrosion and corrosion-prone areas. (AME 13.G14.2)
 - SLO 12A.6.1.9 Identify correct removal methods, and remove and control corrosion. (AME 13.G14.3)
 - SLO 12A.6.1.10 Demonstrate methods used to prevent corrosion and to protect aircraft structures from damage caused by corrosive elements. (AME 13.G14.4)
 - SLO 12A.6.1.11 Describe the use of wood in aircraft manufacturing and repair. (AME 14.G12.7)
 - SLO 12A.6.1.12 Describe inspection and repair procedures for wood structured aircraft. (AME 14.A12.1)
 - SLO 12A.6.1.13 Describe fabric coverings used on aircraft. (AME 14.G12.8)
 - SLO 12A.6.1.14 Describe fabric covering inspection and repair. (AME 14.A12.2)
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GLO 6.2: Describe **applications** of the various aerospace **materials and consumables**.

SLO 12A.6.2.1 Describe which materials are used in various aircraft structures and components.

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

GLO 7.1: Fabricate **metallic** parts.

SLO 12A.7.1.1 Lay out, cut, and drill sheet metal. (AME 21.A11.4)
SLO 12A.7.1.2 Install rivets, inspect the condition and installation of rivets, and remove poor or damaged rivets. (AME 21.A11.5)
SLO 12A.7.1.3 Form and bend sheet metal. (AME 21.A11.6)
SLO 12A.7.1.4 Perform sheet metal repairs. (AME 21.A11.7)
SLO 12A.7.1.5 Explain inspection procedures.
SLO 12A.7.1.6 Conduct visual inspections.
SLO 12A.7.1.7 Explain and demonstrate a liquid penetrant inspection.
SLO 12A.7.1.8 Explain and demonstrate a magnetic-particle inspection.

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

SLO 12A.7.2.1 Identify the steps involved in selecting materials for composites.
SLO 12A.7.2.2 Identify the items needed for production/fabrication.
SLO 12A.7.2.3 Fabricate/repair non-metallic parts.

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 12A.8.1.1 Read, interpret, and communicate information relevant to aviation and aerospace technologies.

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

No applicable SLOs.

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

- SLO 12A.8.3.1 Demonstrate the 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 12A.8.3.2 Demonstrate the use of fractions, decimals, ratios, and percentages.
 - SLO 12A.8.3.3 Convert from imperial to metric measurements.
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GLO 8.4: Apply **scientific** knowledge and skills related to aviation and aerospace technologies.

No applicable SLOs.

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 12A.9.1.1 Demonstrate an awareness of careers in aircraft structure and repair.
 - SLO 12A.9.1.2 Demonstrate an awareness of industry groups associated with the aviation and aerospace industry and associated fields.
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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**.

No applicable SLOs.

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

- SLO 12A.10.2.1 Discuss how the use of lighter materials in aircraft results in a reduced impact on the environment.
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GLO 10.3: Describe **sustainable business practices** within the aviation and aerospace industry.

No applicable SLOs.

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 12A.11.1.1 Discuss the effects of operating in non-compliance with the *Canadian Aviation Regulations* on the viability of an aviation and aerospace facility, and the resulting impact on the community and stakeholders.

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

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

SLO 12A.12.1.1 Define TOWES (Test of Workplace Essential Skills), and state how it relates to employment in the aviation and aerospace industry.

SLO 12A.12.1.2 Apply the three domains of TOWES (text reading, document use, and numeracy) in learning activities.

SLO 12A.12.1.3 List and define the criteria that comprise the Global Industry Standard of essential skills for employees.

SLO 12A.12.1.4 List and define the criteria that comprise 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 12A.13.1.1 Describe the evolution of aircraft structures and repair, including technological progression and emerging trends.
