



Applied Studies (APST) 505

Advanced Structures (Revision 1)

Status:	Replaced with new revision, see the course listing  for the current revision 
Delivery mode:	Individualized study online  . Delivered via Brightspace.
Credits:	3
Area of study:	Architecture
Prerequisite:	Enrolment in an Athabasca University Graduate Architecture program, or referral from the Canadian Architectural Certification Board (CACB) for individuals with a professional degree in architecture from a university outside Canada.
Precluded:	APST 340 
Faculty:	Faculty of Science and Technology 
Notes:	For students interested in pursuing a career as a registered architect, this course contributes to the RAIC Syllabus Diploma. Information about

the [RAIC Syllabus Diploma](#)  is available on the RAIC website.

Credit may be transferred for previous work considered equivalent.

Overview

APST 505 will familiarize you with the detailed considerations of structural design, including quantitative load, stress and strain analysis, structural member design and most importantly the requirements set by the codes on design and construction of different types of structures. The scope of this course includes the qualitative and quantitative design of structural systems in steel, wood, concrete and masonry.

After completing this course, you will be able to design basic structural components in compliance with design codes and regulations within the scope of the practice of architecture. However since the course cannot cover every subject and detail of the codes and the codes are also modified from time to time, you should consult the codes directly for details and updates.

Outline

PART ONE: Loads and Limit States Design

- Unit 1: Gravitational and Lateral Loads
- Unit 2: Load and Resistance Factor Design

PART TWO: Steel Structures

- Unit 3: Material Properties and Structural Systems
- Unit 4: Steel Bending Systems
- Unit 5: Steel Axially Loaded Systems
- Unit 6: Steel Combined Systems

- Unit 7: Steel Connections

PART THREE: Wood Structures

- Unit 8: Materials and Properties
- Unit 9: Wood Bending Systems
- Unit 10: Wood Axially Loaded Members
- Unit 11: Wood Combined Systems
- Unit 12: Connections

PART FOUR: Concrete Structures

- Unit 13: Materials and Properties
- Unit 14: Members in Bending and Shear
- Unit 15: Axially Loaded Members
- Unit 16: Connections
- Unit 17: Prestressed Reinforced Concrete

PART FIVE: Masonry Structures

- Unit 18: Materials and Properties
- Unit 19: Masonry Axially Loaded Members

Learning outcomes

After completing this course, you should be able to

- calculate gravitational and lateral loads acting upon building structures.
- design structural elements of normative assemblies in steel, wood and concrete using limit states analysis within the constraints of the National Building Code and other regulations and standards covered in the textbooks.
- analyze structural system design, from assemblies to connections, for the purpose of identifying and optimizing opportunities for expressive design.

Evaluation

Your work in this course will be evaluated based on six assignments, one for each part of the course plus a final project (Assignment 6). The final project will cover the entire course and is worth 40% of your final grade. The minimum passing mark for the final project is 50%.

You must achieve a cumulative grade of 67% or greater to receive credit for APST 505.

Grading information is summarized in the table below:

Activity	Weight
Assignment 1	10%
Assignment 2	15%
Assignment 3	10%
Assignment 4	15%
Assignment 5	10%
Project: Assignment 6	40%
Total	100%

Students who wish to be certified by the CACB must achieve and maintain a final grade point average of 2.3 (67%) or greater.

Materials

Digital course materials

Links to the following course materials will be made available in the course:

Underwood, R., & Chiuini, M. (2007). *Structural design: A practical guide for architects* (2nd ed.). Wiley.

Other resources

The following resources are referred to and used in the examples and problems of the textbooks and will be needed to solve some of the exercise problems:

- National Building Code of Canada (NBCC). Available through the AU Library website.
- National Design Specification (NDS) for Wood Construction, 2015 Edition, American Wood Council. Available through the AU Library website.
- NDS Supplement: Design Values for Wood Construction, 2015 Edition, American Wood Council. Available through the AU Library website.
- Load and Resistance Factor Design Specification, Tables 3-50 and 3-50M, American Institute for Steel Construction. Available through the AU Library website.
- Metric Beam Tables, Table A.2M, Athabasca University. Available through the AU Library website
- W Column Tables, Athabasca University. Available through the AU Library website

Important links

- › [RAIC Centre for Architecture](#) 
- › [Graduate Diploma in Architecture](#) 
- › [Courses](#) 
- › [Fees and Funding](#) 

Athabasca University reserves the right to amend course outlines occasionally and without notice. Courses offered by other delivery modes may vary from their individualized study counterparts.

Opened in Revision 1, July 15, 2025

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