

EDINBURGH COLLEGE

BUILT ENVIRONMENT

HND ARCHITECTURAL TECHNOLOGY HND BUILDING SURVEYING HND CONSTRUCTION MANAGEMENT

DETAILS OF COURSES – Session 2016/2017

Session times and dates

Session will start mid-August 2016. You will attend college three full days a week. Classes run 08:30 – 16:00.

Commitment

Your lecturers will be here to help you with your work but they will also be looking for commitment from you. It is important that you have **excellent attendance** to keep up with work and ensure your funding is paid.

It is also important that you are on time for all classes or you will miss parts of the course which can't be picked up later. Regular attendance at classes is very important. It can be tempting to miss classes but it's worth thinking about what this can mean.

Funding

If you are successful in gaining a place on the course, you can **apply for SAAS funding**. Complete an application **as soon as possible** and provide any evidence required. Remember: an offer of a place on the course isn't a guarantee that you'll be given an award. If you need help with the application, staff at Learner Services can help you.

Students will be required to purchase their own drawing equipment and a non-programmable scientific calculator.

Support for Learning

It is important that you get the right support so you can do well at college. If you have a learning support need please let Learner Services know as soon as possible, so that they can make arrangements. Support can include things like enabling technology / additional time for assessments, hand outs on coloured paper etc.

Course Structure

HND courses consist of 30 unit credits studied over a two year period. Each semester you will work towards 8 units. Units will be delivered over 18 weeks.

In year 1, HND 1 Architectural Technology, HND 1 Building Surveying and HND 1 Construction Management share a common course framework of units equivalent to HNC Built Environment. Progression to second year is only by successful completion of a minimum of 12 units including Graded Unit and Maths. Year 2 units specialise into your chosen subject area.

Assessment

All units are assessed continually and consist of a number of learning outcomes which must be passed individually to successfully pass each unit. 100% attendance in classes is essential to ensure that you have the knowledge required to pass each assessment.

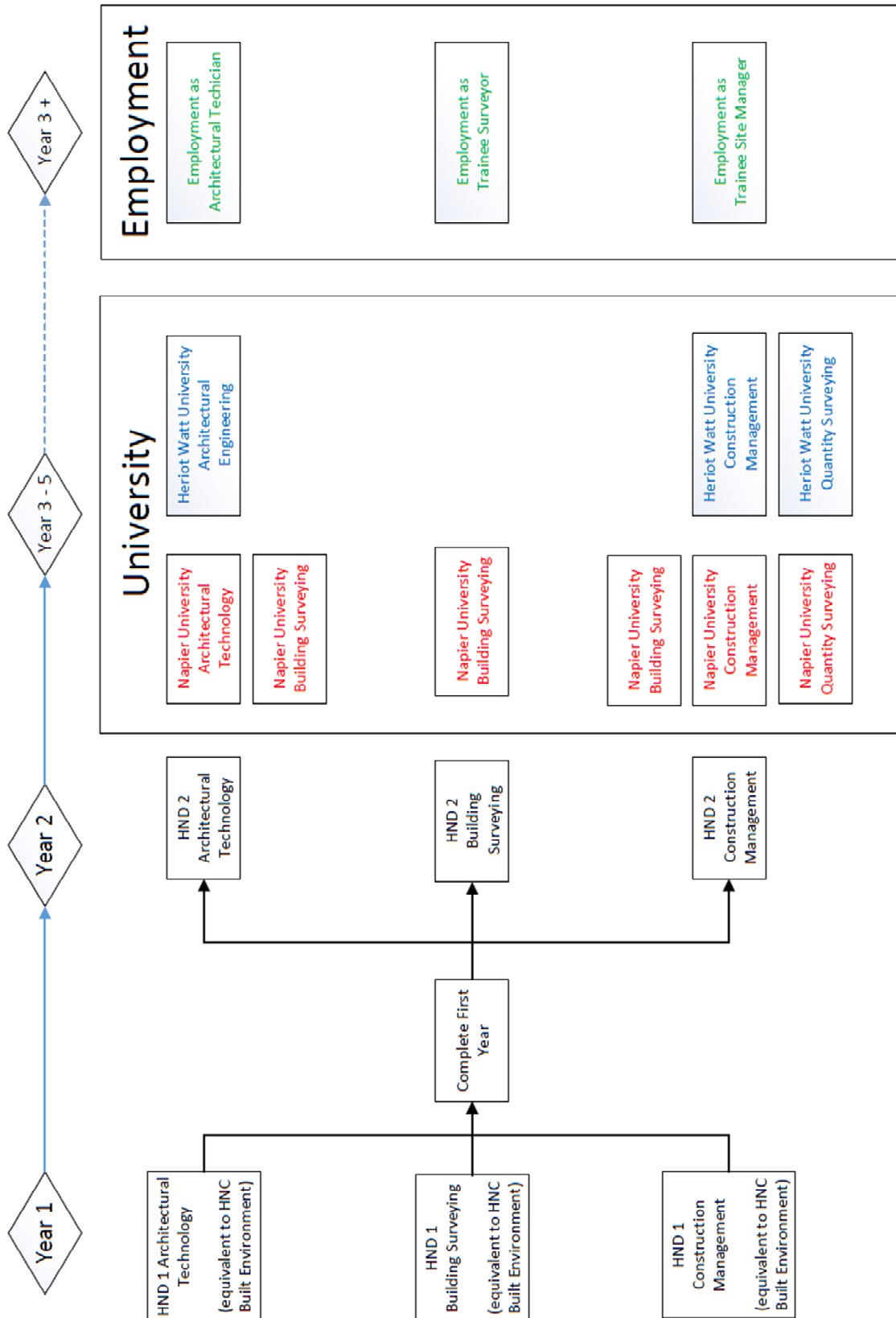
Progression

You must complete a minimum of 12 units including Graded Unit and Maths to progress to HND 2nd year. Reviews with each student will take place at the end of Year 1 to discuss suitable progression to Year 2 based on achievement, attendance and attitude to study.

Your HND will qualify you to work in the construction industry.

Universities accept the HND as an entry qualification to degree programmes.

The diagram on the next page illustrates this.



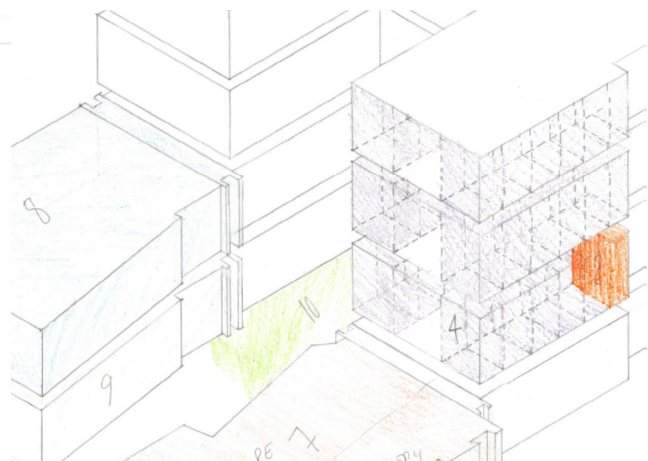
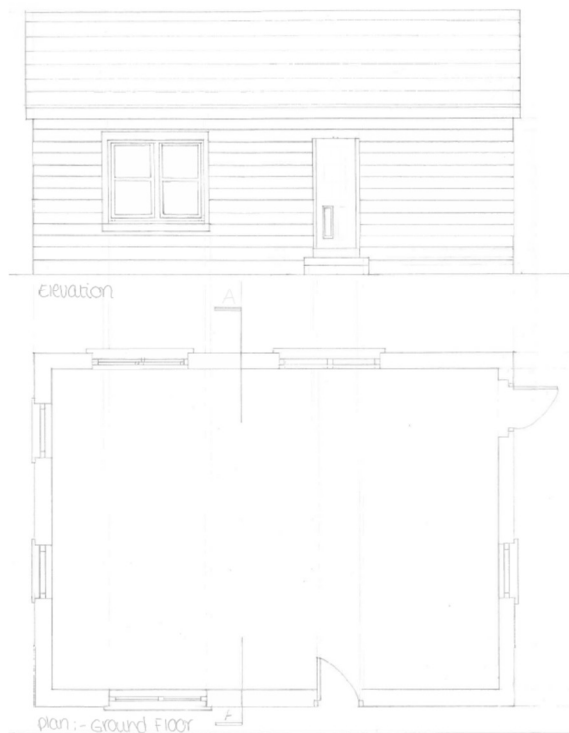
Architectural Design Sketching and Drawing

You will learn about basic architectural design concept and elements.

You will be assessed in a number of ways: 5 drawings in a portfolio, History of Architecture research assignment, case study report, massing assignment and one classroom based assessment.

You will develop knowledge and skills in:

- Illustrating basic architectural concepts
- Explaining and illustrating the relationship of architectural form, function and mass
- Interpreting construction drawings



Structural Mechanics

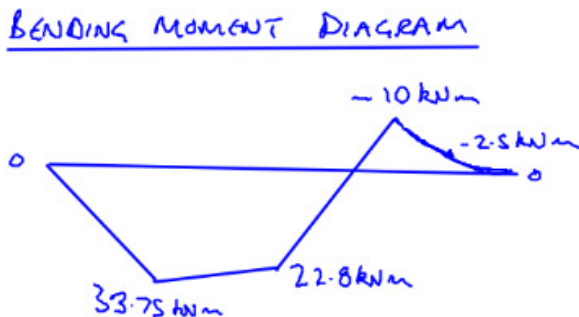
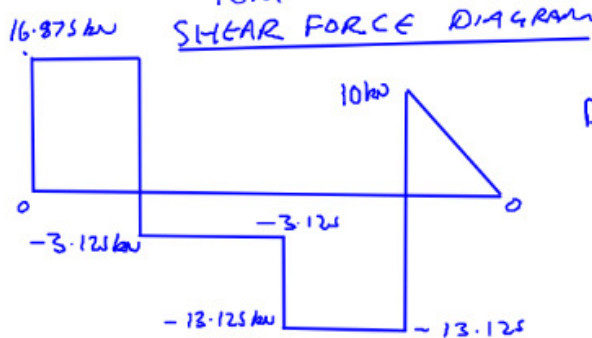
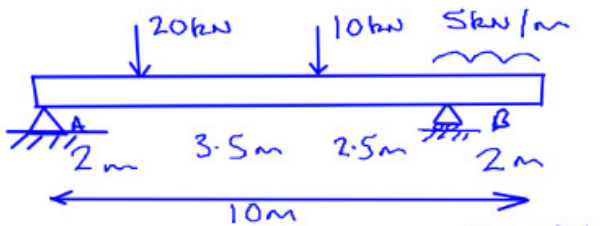
You will learn how to solve problems relating to statically determinate beams and frames to develop an understanding of the effect of loads on a building frame.

You will be assessed by two classroom based assessments.

You will develop knowledge and skills in:

- Evaluating loads on elements of structures and calculating support reactions
- Analysing problems relating to direct stress and strain
- Calculating shear forces, bending moments and deflections
- Analysing pin jointed frame using method of sections and joints

Shear Force & Bending Moment Calculation



Calculations

$$\sum H = 0 \quad H_A = 0$$

$$\sum U = 0 \quad V_A + V_B = 40 \text{ kN}$$

$$\sum M = 0 \quad \text{moments @ A}$$

$$20 \times 2 + 10 \times 5.5 - V_B \times 8 + 10 \times 9 = 0$$

$$V_B = 23.125 \text{ kN}$$

$$V_A = 16.875 \text{ kN}$$

Distance from A	Shear Force	Bending Moment
0	0 → 16.875	0
2	16.875 → -3.125	$2 \times 16.875 = 33.75$
S.S	-3.125 → -13.125	5.5×16.875 $-20 \times 3.5 = 22.8$
8	-13.125 → +10 kN	8×16.875 $-20 \times 6 - 10 \times 2.5$ $= -10 \text{ kNm}$
9	10 - 5 = 5 kN	9×16.875 $-20 \times 7 - 10 \times 3.5$ -5×0.5 $+ 23.125 \times 1 = -2.5$
10	5 - 5 = 0 kN	0

Building Science

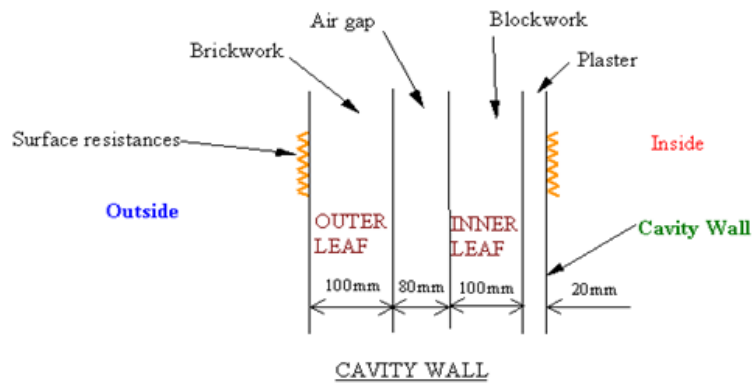
You will learn how to apply the principles of heat transfer, condensation, light, sound and noise measurements.

You will be assessed by four classroom based assessments.

You will develop knowledge and skills in:

- Applying principles of heat transfer in building design
- Applying principles of psychrometry to condensation in building design
- Applying principles of sound and noise in building design
- Applying principles of light and light measurement in building design

Calculate the 'U' value for the wall shown below.



Thermal conductivities:

Brickwork - 0.84 W/m °C

Blockwork - 0.65 "

Plaster - 0.50 "

Surface resistances: outside 0.055 m²°C / W and inside 0.123 m²°C / W

The air gap resistance is 0.18 m²°C / W.

$$‘U’ = \frac{1}{R_{os} + \frac{l_{brick}}{k_{brick}} + R_a + \frac{l_{block}}{k_{block}} + \frac{l_{plaster}}{k_{plaster}} + R_{is}}$$

$$‘U’ = \frac{1}{0.055 + \frac{0.100}{0.840} + 0.18 + \frac{0.100}{0.650} + \frac{0.020}{0.500} + 0.123}$$

$$‘U’ = \frac{1}{0.055 + 0.119 + 0.18 + 0.154 + 0.040 + 0.123}$$

$$‘U’ = \frac{1}{0.671}$$

$$‘U’ = \underline{1.49 \text{ W/m}^2\text{°C}}$$

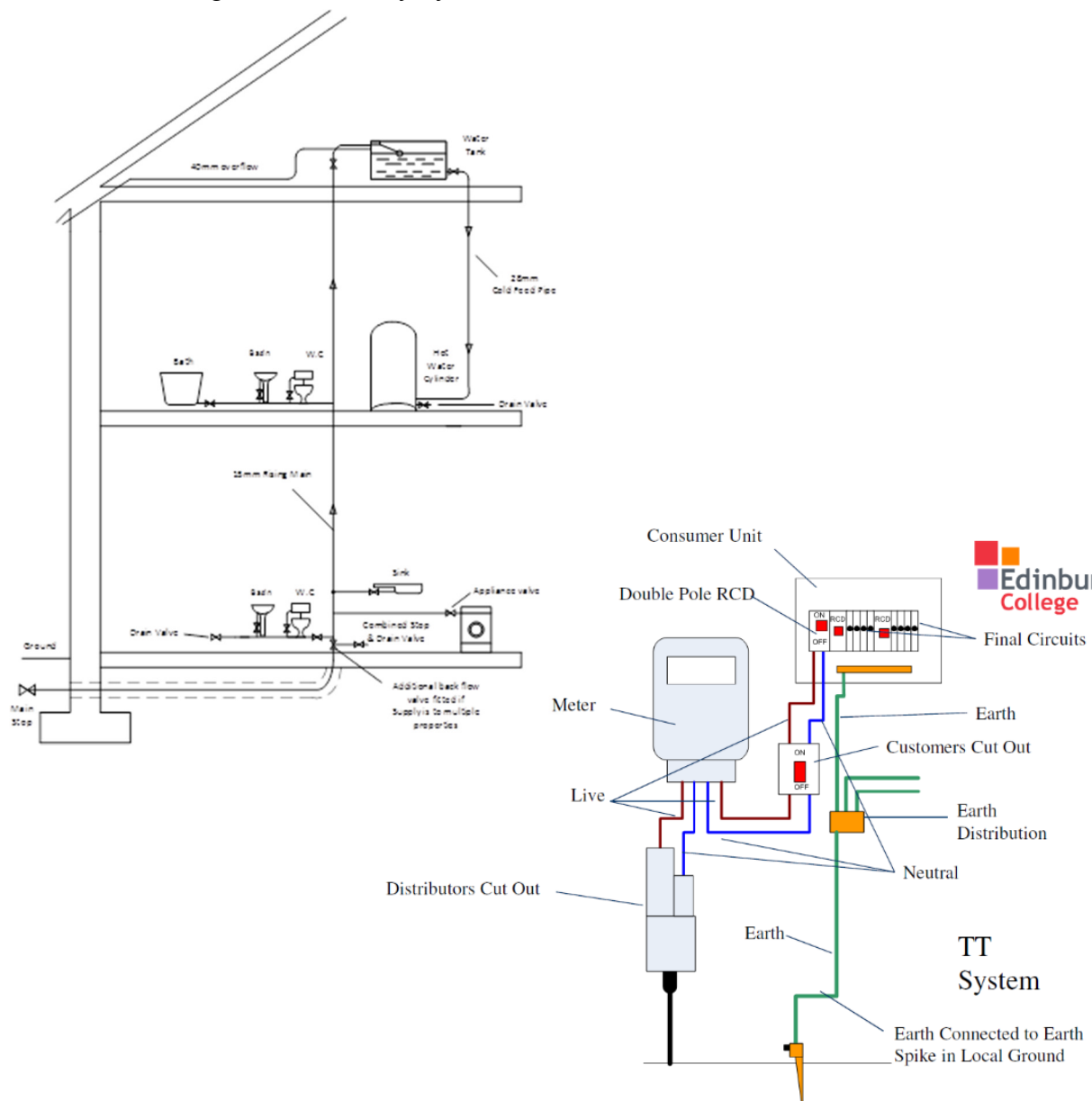
Building Services: An Introduction

You will learn the principles of building services in domestic buildings including drainage, hot and cold water supply, electricity distribution, heating and security systems.

You will be assessed by two classroom based assessments.

You will develop knowledge and skills in:

- Selection and design of above and below ground drainage systems
- Selection and design of hot and cold water supply and distribution
- Producing sketches of supply and distribution of electricity
- Producing annotated sketches of space heating systems
- Describing home security systems



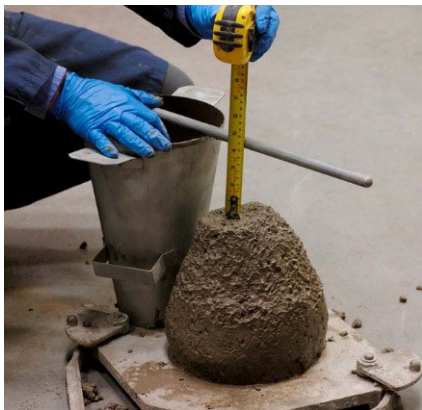
Construction Materials and Specification

You will learn about the properties of construction materials and carry out testing in our fully equipped department Materials Testing Laboratory.

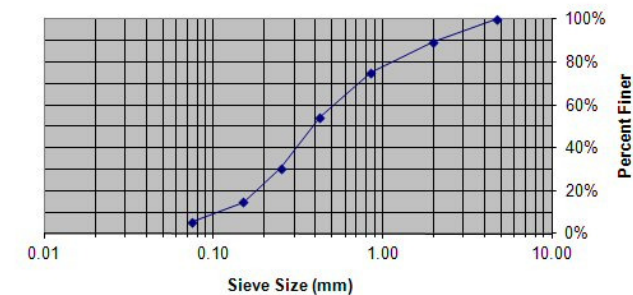
You will be assessed by one classroom based assessment, practical assessment of your participation in lab testing experiments and the submission of 4 lab reports to support these.

You will develop knowledge and skills in:

- Describing the manufacture and properties of construction materials
- Carrying out laboratory tests on construction materials
- Preparing sample specifications for construction materials



Concrete Sand					D ₁₀	D ₃₀	D ₆₀
Sieve Number	Diameter (mm)	Mass of Soil Retained on Each Sieve (g)	Percent Retained (%)	Percent Finer (%)			
4	4.750	0.0	0.0%	100.0%			
10	2.000	41.2	10.7%	89.3%			
20	0.850	55.0	14.3%	75.0%			
40	0.425	80.0	20.8%	54.3%			0.54
60	0.250	91.6	23.8%	30.5%			
100	0.150	60.5	15.7%	14.8%		0.25	
200	0.075	35.6	9.2%	5.6%	0.11		
PAN		21.5	5.6%	0.0%			
Sum =		385.4			0.11	0.25	0.54



Effective Size (mm) **0.11**
 Uniformity Coefficient **4.89**
 Coefficient of Gradation **1.01**



Construction Technology: Domestic Construction

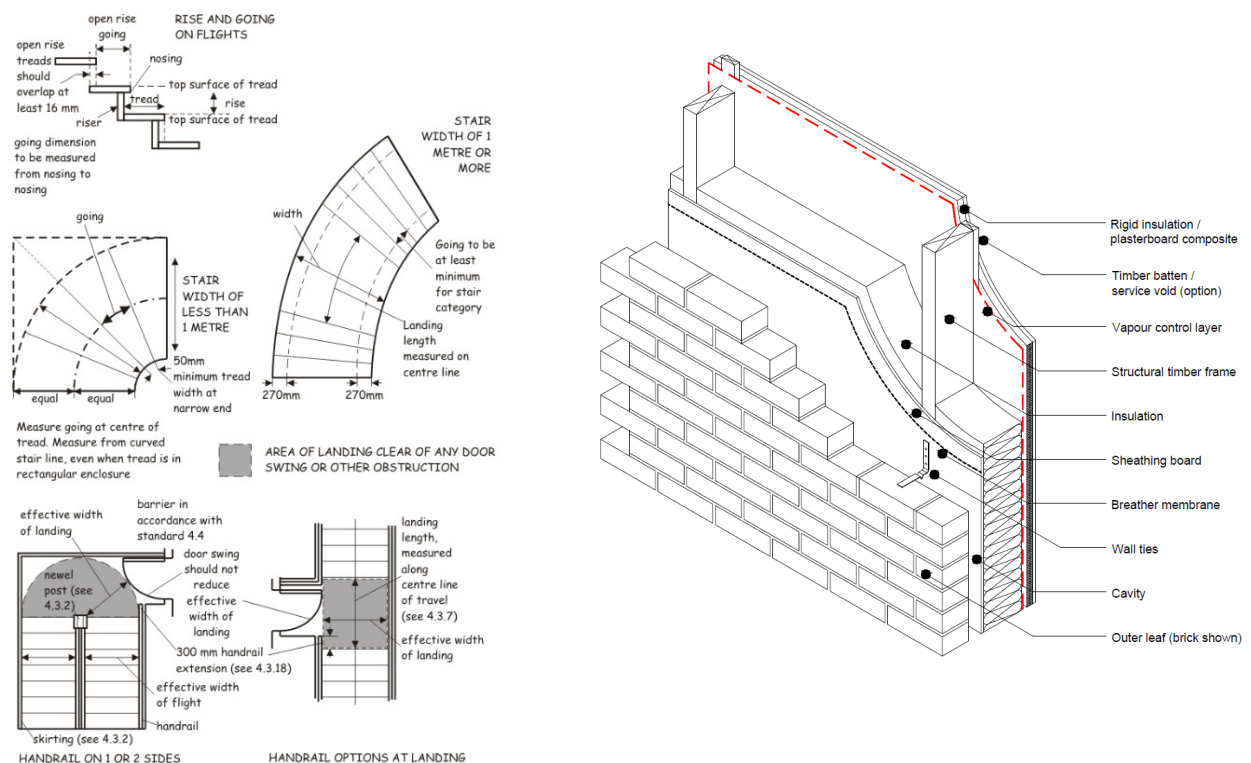
You will learn about domestic buildings including the construction of masonry and timber walls, solid and suspended floors and pitched and flat roofs.

You will be assessed by one classroom based assessment and 5 technical drawings.

You will develop knowledge and skills in:

- Describing forms of masonry and timber wall construction and finishes
- Identifying performance requirements, materials, functions and construction of doors, windows and stairs
- Sketching technical details for walls, floors and roofs

Figure 4.6. Measurement for stairs



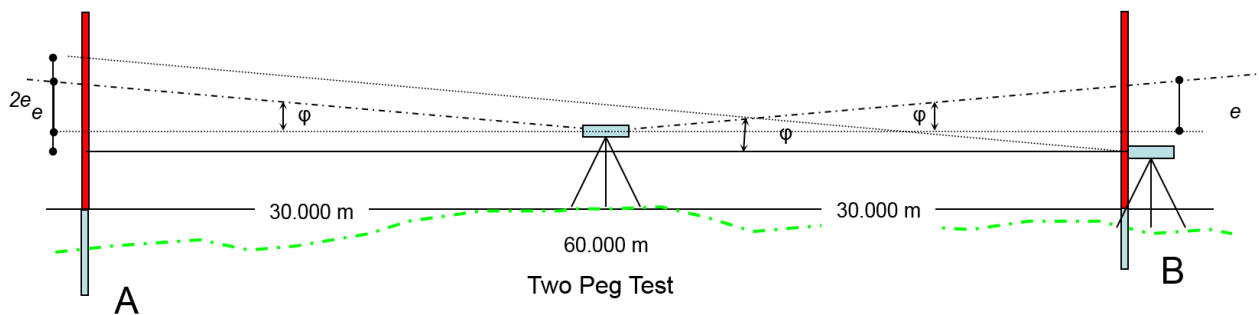
Construction Site Surveying A

You will learn techniques of land surveying including use of plans and maps. You will have the opportunity to carry out practical activities using automatic levels and total stations to set out within the College grounds.

You will be assessed by one classroom based assessment. You will be observed whilst taking part in four practical activities and following which you will produce and submit written reports for each.

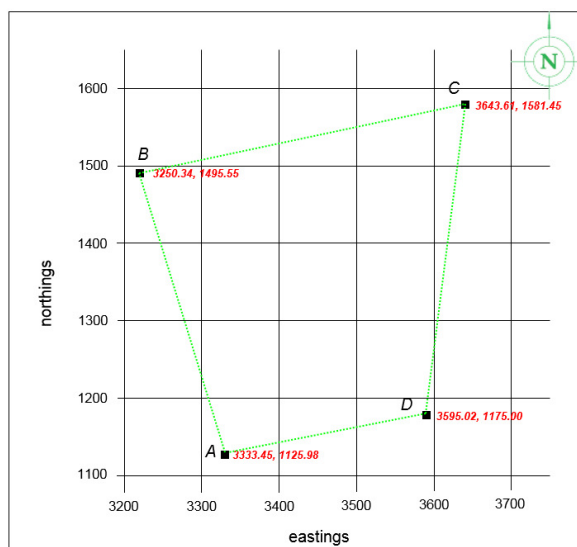
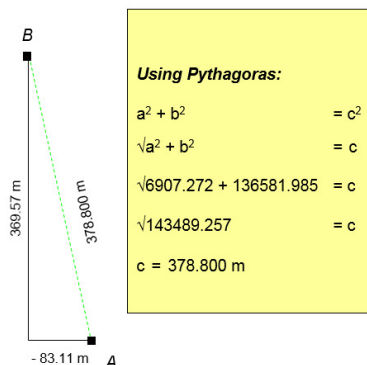
You will develop knowledge and skills in:

- Gathering information from OS plans and site plans to determine co-ordinates, distances, gradients, bearings and areas
- Carrying out levelling surveys and calculating contours, sections and volumes
- Carrying out measurement of angles and distances
- Setting out construction works in line and level



Length AB =

Station	Eastings	Northings
A	3333.45	1125.98
B	3250.34	1495.55
Partial co-ordinates	- 83.11	369.57



Building Measurement and Cost Studies

You will learn about the process involved in the preparation of a tender for building works. You will learn how to use New Rules of Measurement 2 and examine the factors affecting labour, plant and material costs.

You will be assessed by one classroom based assessment and submission of an essay.

You will develop knowledge and skills in:

- Quantifying materials for domestic construction using NRM2
- Describing factors affecting costs
- Estimating process for building works

Brick and Block Walling External Walls

Brickwork, half brick thick, in skin of hollow wall, in common bricks to BS 3921, 20N/mm², Category M, vertical, in stretcher bond, in gauged mortar(1:2:9)

	Outer Skin	
Height		
Floor – Ceiling	2.40	
Add to <u>d.p.c.</u>	0.15	
Add ceiling	0.03	
	<u>2.58</u>	
<u>Calculate centre line outer skin</u>		
Outer Girth	2/9.00	18.00
	2/5.00	10.00
	External Girth =	28.00
Deduct at Corners		
	4/2 1/2 / 102.5	0.41 d/t
	C/L	<u>27.59</u>

Calculate window height deduction

Lintel = 215mm + 10mm mortar = 225 mm = 3 courses
Sill = 85 mm = 1 course

Window	1.250
Lintel	0.225
Sill	0.075
	<u>1.550</u>

Calculate door deductions

<u>Door height</u>	2040	<u>Door width</u>	926
Frame	45	Frames 2/45	90
Lintel	225		<u>1016</u>
	<u>2310</u>		

Deduct	Windows	Wall = 27.59 x 2.58 =	71.18
		TW1 = 1.45 x 1.55 =	2.25
		TW2 = 2.00 x 1.55 =	3.10
		Door = 1.02 x 2.31 =	2.36
			<u>7.71 d/t</u>
			<u>63.47</u>

Construction Industry Fundamentals

You will learn about the members of the construction project team and how they interact. You will investigate contemporary issues within the Construction Industry such as Building Information Modelling (BIM) and the new RIBA Plan of Work.

You will develop knowledge and skills in

- Roles and responsibilities of the parties involved in project design and procurement.
- Communication between parties.
- RIBA Plan of Work.
- Key issues within the Construction

You will be assessed with one closed book assessment and participation in a site team meeting with the submission of minutes.

The RIBA Plan of Work 2013 organises the process of briefing, designing, constructing, maintaining, operating and using building projects into a number of key stages. The content of stages may vary or develop to suit specific project requirements. The RIBA Plan of Work 2013 should be used solely as guidance for the preparation of detailed professional services contracts and building contracts.

www.ribaplanofwork.com

	0 Strategic Definition	1 Preparation and Brief	2 Concept Design	3 Developed Design	4 Technical Design	5 Construction	6 Handover and Close Out	7 In Use
Core Objectives	Identify client's Business Case and Strategic Brief and other core project requirements.	Develop Project Objectives, including Quality Objectives and Project Outcomes, Sustainability Aspirations, Project Budget, other constraints or conditions and develop Initial Project Brief. Undertake Feasibility Studies and review of Site Information.	Prepare Concept Design, including outline proposals for structure, design, building services systems, outline specifications and preliminary Cost Information along with relevant Project Strategies in accordance with Design Programme. Agree allocations to brief and issue Final Project Brief.	Prepare Developed Design, including coordinated and updated proposals for structural design, building services systems, outline specifications, Cost Information and Project Strategies in accordance with Design Programme.	Prepare Technical Design in accordance with Design Responsibility Matrix and Project Strategies to include all architectural, structural and building services information, specialist subcontractor design and specifications in accordance with Design Programme.	Coordinate manufacturing and create Construction in accordance with Construction Programme and location of Design Qualities from site as they arise.	Handover of building and conclusion of Building Contract.	Undertake In Use services in accordance with Schedule of Services.
Procurement *Variable task bar	Initial considerations for assembling the project team.	Prepare Project Roles Table and Contractual Tree and continue assembling the project team.	The procurement strategy does not fundamentally alter the progression of the design of the build prepared at a given stage. However, Information Exchanges will vary depending on the selected procurement route and Building Contract. A bespoke RIBA Plan of Work 2013 will set out the specific tendering and procurement activities that will occur at each stage in relation to the chosen procurement route.			Administration of Building Contract, including regular site inspections and review of progress.	Conclude administration of Building Contract.	
Programme *Variable task bar	Establish Project Programme.	Review Project Programme.	Review Project Programme.	The procurement route may dictate the Project Programme and may result in certain stages overlapping or being undertaken concurrently. A bespoke RIBA Plan of Work 2013 will clarify the stage overlaps. The Project Programme will set out the specific stages, activities and delivery programme outcomes.				
(Town) Planning *Variable task bar	Pre-application discussions.	Pre-application discussions.	Planning applications are typically made using the Stage 3 output application to be made.					
Suggested Key Support Tasks	Review Feedback from previous projects.	Prepare Handover Strategy and Risk Assessments. Agree Schedule of Services, Design Responsibility Matrix and Information Exchanges and prepare Project Execution Plan including Technology and Communication Strategies and considerations of Common Standards to be used.	Prepare Sustainability Strategy, Maintenance and Operational Strategy and review Handover Strategy and Risk Assessments. Undertake third party consultations as required and any Research and Development aspects. Review and update Project Execution Plan. Consider Construction Strategy including safety, health and wellbeing, and develop Health and Safety Strategy.	Review and update Sustainability, Maintenance and Operational and Handover Strategies and Risk Assessments. Undertake third party consultations as required and conclude Research and Development aspects. Review and update Project Execution Plan, including Change Control Procedures. Review and update Construction and Health and Safety Strategies.	Review and update Sustainability, Maintenance and Operational and Handover Strategies and Risk Assessments. Prepare and submit Building Regulations submission and any other third party submissions requiring consent. Review and update Project Execution Plan. Review Construction Strategy including sequencing and update Health and Safety Strategy.	Review and update Sustainability Strategy and implement Handover Strategy, including agreement of information required for commissioning, training, handover, asset management, future monitoring and maintenance and ongoing compliance of 'As-constructed' information. Update Construction and Health and Safety Strategies.	Carry out activities listed in Handover Strategy including Post occupancy Evaluation, review of Project Performance, Project Outcomes and Research and Development aspects. Updating of Project Information as required.	Conclude activities listed in Handover Strategy including Post occupancy Evaluation, review of Project Performance, Project Outcomes and Research and Development aspects. Locking of Project Information, as required, in response to ongoing client Feedback until the end of the building's life.
Sustainability Checkpoints	Sustainability Checkpoint – 0	Sustainability Checkpoint – 1	Sustainability Checkpoint – 2	Sustainability Checkpoint – 3	Sustainability Checkpoint – 4	Sustainability Checkpoint – 5	Sustainability Checkpoint – 6	Sustainability Checkpoint – 7
Information Exchanges (at stage completion)	Strategic Brief	Initial Project Brief	Concept Design including outline structural and building services design, associated Project Strategies, preliminary Cost Information and Final Project Brief	Developed Design, including the coordinated architectural, structural and building services design and updated Cost Information	Completed Technical Design of the project.	'As-constructed' information.	Updated 'As-constructed' information.	'As-constructed' information updated in response to ongoing client Feedback and maintenance or operational developments.
UK Government Information Exchanges	Not required.	Required.	Required.	Required.	Not required.	Not required.	Required.	As required.

*Variable task bar – in creating a bespoke project or practice specific RIBA Plan of Work 2013 via www.ribaplanofwork.com specific bars to be selected from a number of options.

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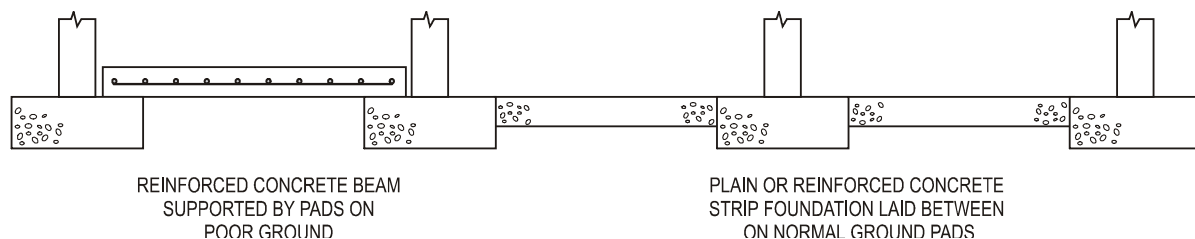
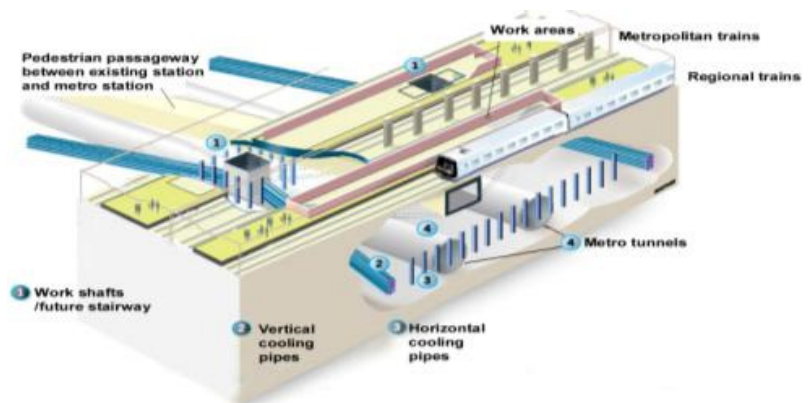
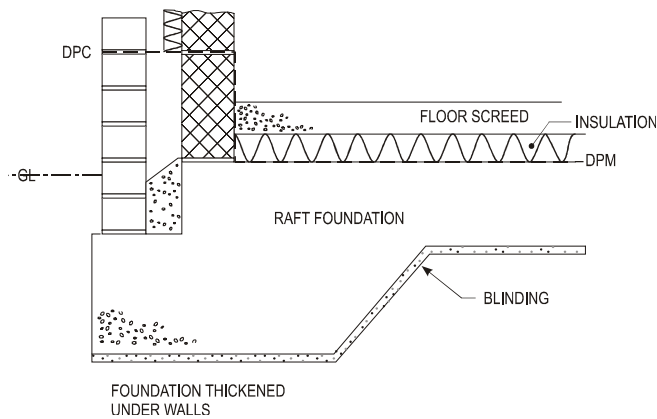
Construction Technology: Substructure

You will learn about substructure construction including site investigation, ground improvements and forms of foundations.

You will be assessed by 2 classroom based assessment and submission of five drawings.

You will develop knowledge and skills in:

- Processes of site investigations
- Methods of ground water control and improvement
- Forms of foundation and basement construction



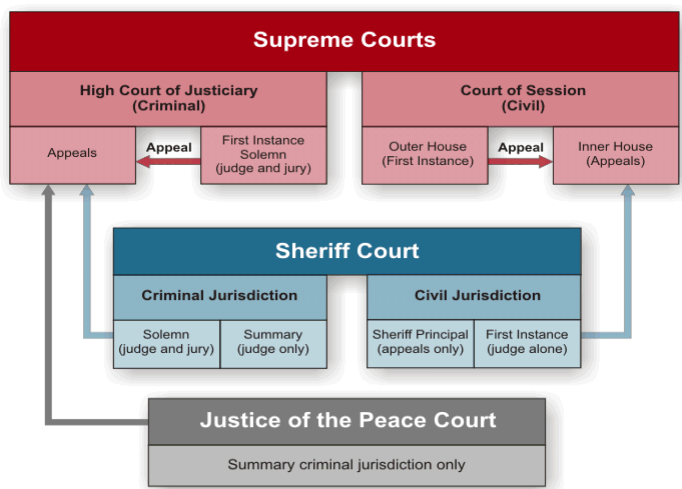
Scottish Law for Construction

You will develop a basic understanding of Scots Law and the Scottish legal system.

You will be assessed by four short classroom based assessments.

You will develop knowledge and skills in:

- Systems of law with reference to the construction industry
- Key principles of contract law and law of delict
- Principle rights and duties of employers and employees in health and safety legislation



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Advanced Search

Health and Safety at Work etc. Act 1974

1974 c. 37 Whole Act

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What Version

Latest available (Revised) Original (As enacted)

Advanced Features

Show Geographical Extent (e.g. England, Wales, Scotland, Northern Ireland)

Show Timeline of Changes

Opening Options

More Resources

Original Print PDF View more

Changes to legislation: There are outstanding changes not yet made by the legislation.gov.uk editorial team to Health and Safety at Work etc. Act 1974. Any changes that have already been made by the team appear in the content and are referenced with annotations.

Health and Safety at Work etc. Act 1974

1974 CHAPTER 37

An Act to make further provision for securing the health, safety and welfare of persons at work, for protecting others against risks to health or safety in connection with the activities of persons at work, for controlling the keeping and use and preventing the unlawful acquisition, possession and use of dangerous substances, and for controlling certain emissions into the atmosphere; to make further provision with respect to the employment medical advisory service; to amend the law relating to building regulations, and the Building (Scotland) Act 1959; and for connected purposes.

[31st July 1974]

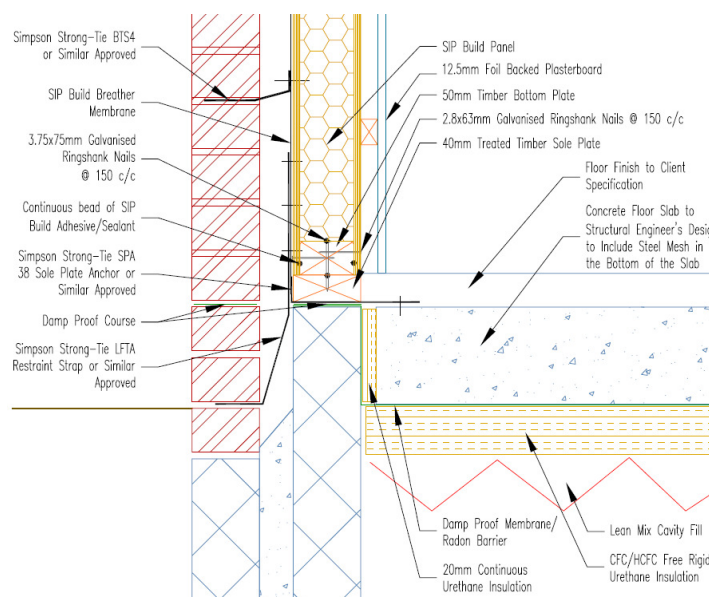
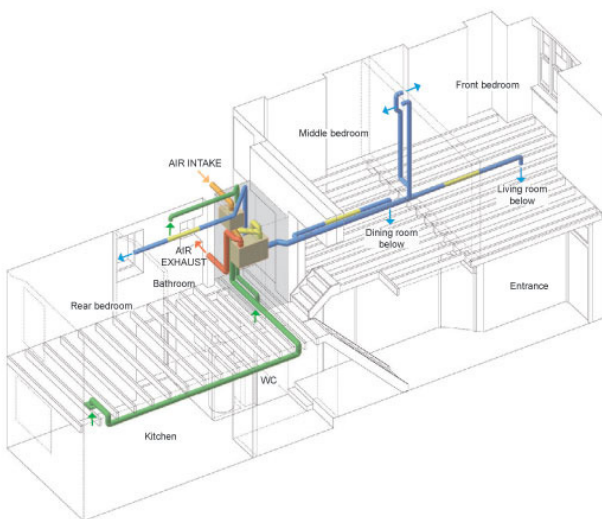
Sustainability and Modern Methods of Construction

You will learn about the environmental impact of construction and the application of new technological developments within the construction industry.

You will be assessed by two classroom based assessment and submission of two drawings.

You will develop knowledge and skills in:

- The historical evolution of building prefabrication in the 20th century to present day
- Different forms of off-site manufacture and on-site construction
- Design and site planning implications with modern methods of construction
- Environmental and sustainability issues associated with modern methods of construction



Mathematics for Construction

You will learn about and apply algebraic techniques to manipulate expressions and solve equations commonly found in construction, including algebra, trigonometry, circular measure formulae and statistics.

You will be assessed by 3 classroom based assessments.

You will develop knowledge and skills in:

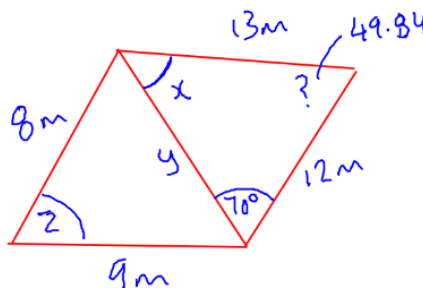
- Using mathematical expressions and solving equations
 - Factors; removal of brackets; linear, simultaneous and quadratic equations; indices and logarithmic functions, scientific notation
- Using trigonometry and circular measure formulae to solve problems
 - Pythagoras; sine, cosine and tangent ratio; sine and cosine rule; circular measure (arc length, sector area, segmental area); angular measure (degrees, minutes, seconds)
- Applying skills to construction problems including statistics and surveying
 - Simpson's rule, trapezoidal rule and standard deviation

Solve for x and y

$$\begin{aligned} \text{a). } 3x + 4y &= 41 & \textcircled{1} \\ 2x + y &= 19 & \textcircled{2} \end{aligned}$$

$$\begin{aligned} \textcircled{1} &\rightarrow 3x + 4y = 41 \\ \textcircled{2} \times 4 &\rightarrow 8x + 4y = 76 \\ \hline \text{subtract} & \quad 5x = 35 \\ \text{up} & \quad x = 7 \quad \downarrow \div 5 \end{aligned}$$

$$\begin{aligned} \text{put } x=7 & \text{ in } \textcircled{2} \\ 2 \times 7 + y &= 19 \\ 14 + y &= 19 \\ y &= 5 \end{aligned}$$



Find x, y, z.

$$\frac{\sin x}{12} = \frac{\sin 70^\circ}{13}$$

$$\sin x = \frac{\sin(70)}{13} \times 12 = 0.867$$

$$x = \sin^{-1} 0.867 = 60.16^\circ$$

$$13^2 + 12^2 - 2 \times 13 \times 12 \times \cos 49.84$$

$$111.784$$

$$y = \sqrt{111.784} = 10.57 \text{ m}$$

$$\frac{y}{\sin 49.84} = \frac{13}{\sin 70}$$

$$y = \frac{13}{\sin 70} \times \sin 49.84$$

$$y = 10.57$$

$$\cos z = \frac{(8^2 + 9^2 - 10.57^2)}{(2 \times 8 \times 9)}$$

$$\cos z = 0.231$$

$$z = \cos^{-1} 0.231 = 76.6^\circ$$

Built Environment: Graded Unit 1

You will learn complete a project using the skills learned through Semester 1. This assessment is based on a case study, usually to extend an existing domestic dwelling.

You will complete three stages; planning, development and evaluation. During the development stage you will have a number of tasks to complete including CAD and manual drawings of your initial and developed design ideas; specification of materials; writing a report to demonstrate that your design complies with current Building Standards, suggestions of sustainable options for materials and other activities to demonstrate your holistic understanding and application of your knowledge of domestic construction.

You will be assessed by portfolio submission.

You will develop knowledge and skills in:

- Self-study, research and analysis
- Problem solving
- Independent learning
- Time management
- Technical application of learning

