



College of Contract Management
United Kingdom

Professional Diploma in Forensic Quantum Analysis

Syllabus

30 September 2017

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1 Programme Structure and Rules of Combination

1.1 Rationale

The Professional Diploma in Forensic Quantum Analysis is designed for Claims Consultants, Engineers, Quantity Surveyors, Project Control Managers, and Contract Managers working for Civil Engineering, Oil and Gas, Petrochemical, Infrastructure, Power Plants, Nuclear, Buildings and Pipeline Projects in the Engineering, Procurement and Construction Sectors, who are progressing into a quantum analysis role. This qualification develops the learner's knowledge and skills in quantum analysis techniques which require to understand and analyse the financial consequences of delays and use programmes to figure out where financial losses began.

At the successful completion of the course, you will be able to accurately calculate financial losses and understand how this process is vital in the process of construction disputes. This could be labouring issues, weather conditions, time delays or poor performance.

1.2 Progression to career

The programme provides the underpinning knowledge and skills to advise about the potential risks of proceeding with a project, should a forensic quantum analyst be required to take short cuts or rely upon the work of others to stay within a very tight budget.

This programme will be delivered by an expert who is highly experienced in quantum analysis and expert witnessing over 30 years. He has been involved as an experienced lecturer and trainer in a number of programmes. The programme will be delivered in an interactive and practical format. The courses will include practical examples and case studies. Hence the course content reflects the practical aspects and challenges faced by the professionals and the industry.

1.3 Programme Rules of Combination

The course is of six months (approximately 26 weeks) duration, including assignment of each module. This contains 4 core units. Learner' performance will be assessed by an open book online exam (assignments).

Units:

- FQ510-Quantum Determination
- FQ520-Quantum Analysis
- FQ530-The use of Forensic Quantum Analysis by an Expert Witness

To achieve the Professional Diploma, candidates are required to complete all modules.

1.4 Entry Requirements

- Minimum 18 years old **and**
- Minimum 2 years' experience in the relevant sector.

1.5 Unit and Assessment Grades

The tutor will award a grade to the achievement of each unit (fail, pass, merit or distinction). Unit grades apply to overall performance in units including assignments and practical exercises.

Indicative marking descriptors for differentiating between levels of achievement when marking assignments are provided below (Section 1.8).

The overall grade for a qualification is calculated using a points system. Each unit grade attracts points as follows:

Fail	0 points
Pass	1 point
Merit	2 points
Distinction	3 points
Unit Exemption	1 point

1.6 Assessment

The assessment process is set by the College of Contract Management, which defines the requirements learners are expected to meet to demonstrate that a learning outcome has been achieved. All learning outcomes must be achieved in order to gain attainment of credit for that unit.

All completed assessments are marked internally, internally verified and subject to approval by our partner universities or institutions.

The assessment criteria are based on 3 areas:

1. **Task achievement** – This is a measure of how well the candidate answers the task question/questions and the identification of the important aspects of the task.
2. **Technical Content** – This is a measure of how well the candidate identifies, describes and evaluates the technical aspects of the task.
3. **Presentation** – This is a measure of how well the candidate presents the assignment and includes the quality of the structure and paragraphing, the quality and relevance of visual or graphical content and the referencing used for quoted sources.

1.7 Assignment Policies

1. All submission of assignments must include:
 - a) a copy of the full brief given by the Examination Officer or Course Administrator;
 - b) all source material must be cited in the text and a full bibliography of source material (including author, title, publisher, edition and page) listed at the end of the submission.
2. All submissions must be submitted into our system as instructed by the Examination Officer or Course Administrator.
3. All submissions under the student's name must only be the work of that student. All information sources must be acknowledged. There is the **possibility of failing the units if the contents of the assignment are plagiarised** as set out in the rules and regulations of the institution.
4. All submissions should be in pdf format and students **must** keep a copy of all submitted work for reference purposes. Receipt will be acknowledged by the College once the work is completed.
5. Whenever a candidate submits work after the approved deadline without an authorised extension, a maximum "Pass" grade will be awarded.
6. The Assessor will comment on the quality of the work for learning purposes.
7. Requests for extensions of submission deadlines must be made in writing **prior** to the submission deadline to the Examination Officer or Course Administrator and must be supported by documentary evidence if required.

1.8 Professional Diploma in Forensic Quantum Analysis Indicative Marking Descriptors

Note: Please note that the bands below describe indicative characteristics only. An overall holistic approach is required when assessing a candidate's work and assigning a grade. Please read these grading bands in conjunction with the College of Contract Management Assignment Policy.

Grade	Task Achievement The Relevance of the Response	Inclusion of Relevant Technical Knowledge in Content	Presentation/Coherence
Distinction			
70% +	The work demonstrates a comprehensive understanding of the task. All relevant information is included. The main issues are effectively identified and analysed. There is evaluation and some analysis of solutions to issues relevant to the task. The response shows control of content within the word count.	The work demonstrates a strong understanding of a wide range of technical issues relevant to the task. There is analysis of the advantages/disadvantages of possible choices, risks and potential outcomes.	The work is appropriately structured and the argument is developed coherently. There is a recognised form of source referencing which supports the points in the task. Paragraphing and titling are used effectively to assist the reader. The use of visual/graphical information is clear and effective in assisting the reader. The graphical information is relevant to the task and is accurate.
Merit			
60-69%	The work demonstrates a clear understanding of the main issues relevant to the task. The issues are explained effectively and potential solutions identified. There is some attempt to analyse the merits of the solutions to the task. The task is broadly achieved within the word count, if relevant to assignment.	The work demonstrates an understanding of the key technical issues of the task. There is clear description of relevant technical aspects with some attempt to evaluate the merits of these as appropriate to the task.	Demonstrates an awareness of presentation and an attempt to present the information with clarity and coherence. There is referencing of sources and use of paragraphing and titling to assist the reader. There is use of clear graphical information to support the assignment which has broad relevance to the task. There may be some limited inaccuracies/omissions in these.
Pass			
40-59%	The work demonstrates an understanding of the task. The main points are identified and the task is achieved. There is no attempt to evaluate or analyse the solutions. There may be some inaccuracies, omissions and irrelevant content. There may be lack of control in relation to the word count.	The work demonstrates an understanding of the main technical issues which are identified. This may be limited to description with little evidence of evaluation. There may be some omissions and inaccuracies in the detail. There may be some irrelevant details.	There is an attempt to structure the information. There is evidence of paragraphing and titling which is not always appropriate. Some basic graphical information may be included which is of some assistance to the reader. There may be some omissions or inaccuracies. The work is generally coherent but there may be occasional lapses in coherence and structure.
Fail			
0-39%	The work shows a poor understanding of the task. Frequent inaccuracies. Failure to identify important aspects of the task. Much of the information is irrelevant to the task. There may be evidence of copy and paste from external sources. The response may be limited to lists of words with no attempt to explain the relevance/merits of these to the task. The assignment falls short of the word count.	The work demonstrates a lack of understanding of the technical aspects. There are omissions of important technical information. Errors are evident in the technical content. There is no attempt to explain the relevance of the technical content to the task.	Lacks structure and may be limited to lists of points which are not developed. Disorganised in structure causing difficulty for the reader to understand the points. The response is illegible or incoherent in places. No referencing of external sources. The graphical illustrations are of poor quality or absent. They may be irrelevant. There may be errors and a lack of clarity causing difficulty for the reader to understand.

1.9 Calculating Overall Qualification Grade

To calculate the overall qualification grade, the individual units grades should be added together and compared to the table below:

Candidates must pass all 3 units of the programme.

Total Points for all 3 Units	Overall Grade
9	Distinction
8	
7	
6	
5	Pass
4	
3	
2 or fewer	Fail
Candidates must achieve at least a pass in (or hold exemption from) all 3 units to be awarded the Professional Diploma.	



Unit Title	Quantum Determination
Unit Code	FQ510

Summary

Status	core
Learning Hours	80hrs including Lectures and Exercises
Credits Value	8
Period of Study	8 weeks

Summary of Learning Outcomes

Learning outcomes are results of learning that students will have achieved on successfully completing a course. The following reference points were used in designing the learning outcomes;

- QAA Subject Benchmark Statements to ensure: that appropriate and effective teaching, support, assessment and learning resources are provided for students; that the learning opportunities provided are monitored; and that the provider considers how to improve them; and
- The professional competencies required by the APE.

Learning outcomes are expressed under three broad headings of achievement in both threshold and typical standards:

U: Understanding (a general awareness of the activity)

K: Knowledge (a more detailed level of understanding of the activity)

S: Skills (to be able, without supervision, to perform relevant functions)



Learning outcomes: The learner will:	Assessment criteria: The Learner can:
1. Introduction to forensic quantum in construction claims [K, S].	<ul style="list-style-type: none">1.1 Understanding the role of the forensic quantum analyst and skills required1.2 Understanding the forensic quantum analyst's approach to evaluation1.3 Contractual entitlement for the contractor to claims additional payment<ul style="list-style-type: none">• Contract forms• Variation claims• Delay claims (loss and expense)• Suspension and termination1.4 Contractual entitlement for the Employer to claims additional payment<ul style="list-style-type: none">• Contract forms• Delay claims by employer (liquidated damages)1.5 Understand evaluation process1.6 The basic test "remoteness of damages"1.7 Head of claims<ul style="list-style-type: none">• New or changed conditions or circumstances• Prolongation costs due to delay• Cost of disruption or loss of productivity• Finance charges and interest1.8 Overheads and profit<ul style="list-style-type: none">• Site overheads (P&G's)• Head office overheads and understanding use of formulas• Profit1.9 Global claims<ul style="list-style-type: none">• Total cost method of claim1.7 Quantum meruit
2. Evaluating financial information related to a given project recorded in the contractor's financial statements. [K, S].	<ul style="list-style-type: none">2.1 How to use impartial criteria to assess the report2.2 Accounting standards<ul style="list-style-type: none">• International Financial Reporting Standards (IFRS)• US Generally Admitted Accounting Principles (US GAAP)2.3 Source of financial information for evaluation2.4 Tracing the cost of a specific event in the accounting records (the bottom-up approach)2.5 Using the project financial estimate at completion to identify the existence of a cost overrun at project level (the top-down approach)



3. Able to determinate the damages in monetary units based on the findings of the delay expert. [K, S].	<p>3.1 General principles</p> <ul style="list-style-type: none">• Claiming damages for breach of contract or negligence• Recoverable losses <p>3.2 Award of financial damages</p> <ul style="list-style-type: none">• The costs incurred by the contractor that it would not have incurred in the absence of the damaging event• The loss of profit resulting from the damaging event• A lost profit if the damage is related to supplementary work• A loss of opportunity to make a profit <p>3.3 Understanding entitlement by reference to the contract and common law</p>
4. Quantum in construction disputes	<p>4.1 Key cases that deal with head of losses</p> <ul style="list-style-type: none">• Defects claims• Loss of profit• Overheads and preliminaries• Wasted management costs• Other examples
5. Case Law analysis	<p>5.1 Great Eastern Hotel Co Ltd v John Laing Construction Ltd & Anor 2005</p> <p>5.2 Fujitsu v IBM 2014 and Polypearl Limited v EON Energy Solutions Limited 2014</p> <p>5.3 Walter Lily v Mackay 2012 and Alfred McAlpine Homes North v Property and Land Contractors 1995</p> <p>5.4 Hadley v Baxendale 1854</p> <p>5.5 Pegler Ltd and Wang UK 2000 and GB Gas and Accenture 2010</p>

Recommended Reading

- Wiley-Blackwell published in 2013, The Expert Witness in Construction by Robert Horne and John Mullen (ISBN: 9780470655931)
- Wiley-Blackwell published in 2019, Evaluating Contract Claims by John Mullen and Peter Davison (ISBN: 9781118918142)
- Palgrave Macmillan published in 2013, Construction Contract Claims by Reg Thomas (ISBN: 9781137520371)
- Aspen Publishers; 3 edition in 2000, Proving and Pricing Construction Claims from the Construction Law Library (ISBN: 978-0735514454)



Unit Title	Quantum Analysis
Unit Code	FQ520

Summary

Status	core
Learning Hours	80hrs including Lectures and Exercises
Credits Value	8
Period of Study	8 weeks

Summary of Learning Outcomes

Learning outcomes are results of learning that students will have achieved on successfully completing a course. The following reference points were used in designing the learning outcomes;

- QAA Subject Benchmark Statements to ensure: that appropriate and effective teaching, support, assessment and learning resources are provided for students; that the learning opportunities provided are monitored; and that the provider considers how to improve them; and
- The professional competencies required by the APE.

Learning outcomes are expressed under three broad headings of achievement in both threshold and typical standards:

U: Understanding (a general awareness of the activity)

K: Knowledge (a more detailed level of understanding of the activity)

S: Skills (to be able, without supervision, to perform relevant functions)



Learning outcomes: The learner will:	Assessment criteria: The Learner can:
1. Understand the methodologies of quantum /damages analysis of direct, indirect, and 'other' costs. [U, K]	<p>1.1 Technical analysis to isolate changes in scope, timing, sequencing, work methods, site conditions, specifications, labour productivity, etc. to which costs are applied. The importance of demonstrating causation and linkage to the costs incurred.</p> <p>1.2 Cost variance analysis that compares the original estimate for the work with the actual cost incurred, and the cost variance is correlated to causes of the cost growth. With reference and understanding to the use of indices and models such as the measured mile as a benchmark for productivity and navigating the issue of errors in planned outputs.</p> <p>1.3 Combination of both methods</p>
2. Able to calculate quantum/damages to produce a well-supported and compensable claim or presents a strong defense against the validity of the Plaintiff's claim. [K, S]	<p>2.1 Overview of quantum calculations of Extension of Time claims</p> <p>2.2 Man-hour, quantity, and cost variance analysis</p> <ul style="list-style-type: none">• Contractor's responsibility for bid error and performance problems• Owner's responsibility for compensable problems <p>2.3 Evaluation of the reasonableness of the contractor's bid estimate</p> <p>2.4 Costs of changes in scope</p> <p>2.5 Loss of productivity costs</p> <p>2.6 Delay/Prolongation costs</p> <p>2.7 Disruption costs</p> <p>2.8 Costs associated with contractor performance problems/rework</p> <p>2.9 Calculation of other costs</p> <p>2.10 Calculation of owner damages</p> <p>2.11 Calculation of damages incurred by the owner under</p> <ul style="list-style-type: none">• Contractor's defective work• Decreased production capacity due to a defective design• Actual delay or liquidated damages resulting from the contractor's delay



3. Able to analyse loss of productivity caused by late engineering, RFIS, and field changes. [K, S]	<p>3.1 Measured mile analysis</p> <p>3.2 Corroboration with industry studies</p> <p>3.3 Reasonable of bid productivity</p> <p>3.4 Actual productivity / earned value calculations</p> <p>3.5 Timing of impacting events</p> <p>3.6 Cumulative impacts</p>
4. Case Studies	<p>Case Study 1: Seeking to recover for increased costs paid to design and construct a project due to the Contractor's mismanagement under circumstance of owner will be the plaintiff.</p> <p>Case Study 2: Evidencing and demonstrating losses of productivity due to change in law and/or government regulations.</p> <p>Case Study 3: With reference to Van Oord and another v Allseas UK Ltd, how to establish the events that occurred and how the individuals to a project must consider the evidential standard of the contemporaneous documents.</p> <p>Case Study 4: Consideration of the possible methods to establish causation and quantification by reference to the methods included in the Society of Construction Law protocol.</p> <p>Case Study 5: When considering the law of evidence and specifically the weight and admissibility of submissions in specific regard to the requirement to evidence submissions with reference to contemporaneous records.</p>

Recommended Reading

- SCL Delay and Protocol 2nd edition, page 43
- Hudson's Building and Engineering Contracts, 13th Edition, chapter 6
- Walter Lilly & Company Limited v (1) Giles Patrick Cyril Mackay (2) DMW Developments Limited (2012) EWHC 1773 (TCC)
- Van Oord and another v Allseas UK Ltd [2015] EWHC 2074 (TCC)
- Obrascon Huarte SA v Her Majesty's Attorney General for Gibraltar [2014] EWHC 1028



Unit Title	The use of Forensic Quantum Analysis by an Expert Witness
Unit Code	FQ530

Summary

Status	core
Learning Hours	80hrs including Lectures and Exercises
Credits Value	8
Period of Study	8 weeks

Summary of Learning Outcomes

Learning outcomes are results of learning that students will have achieved on successfully completing a course. The following reference points were used in designing the learning outcomes;

- QAA Subject Benchmark Statements to ensure: that appropriate and effective teaching, support, assessment and learning resources are provided for students; that the learning opportunities provided are monitored; and that the provider considers how to improve them; and
- The professional competencies required by the APE.

Learning outcomes are expressed under three broad headings of achievement in both threshold and typical standards:

U: Understanding (a general awareness of the activity)

K: Knowledge (a more detailed level of understanding of the activity)

S: Skills (to be able, without supervision, to perform relevant functions)



Learning outcomes: The learner will:	Assessment criteria: The Learner can:
1. The determination of forensic quantum analysis by the Expert Witness in construction claims. [K, S]	<ul style="list-style-type: none">1.1 Understanding the role of the Expert Witness and the use of quantum analysis.1.2 Understanding the conceptual skills of the Quantum Expert1.3 Determining the key skills of a Quantum Expert Witness1.4 The forensic quantum analyst as the Expert Quantum Witness1.5 Understanding the Expert Witness's approach to the application of forensic quantum to his opinion.1.6 The stepped approach to providing an impartial and objective quantum opinion1.7 Understanding the Contractual entitlement hurdles to overcome to entitle a claim for additional payment1.8 Understanding the factual entitlement and the importance of evidencing causation to allow entitlement to additional payment<ul style="list-style-type: none">• Reference to witness statement1.9 Understand the law of evidence and both weight and admissibility in the evaluation process1.10 Recognising and identifying the appropriate methods of valuation
2. Evaluation of forensic quantum analysis. [K, S].	<ul style="list-style-type: none">2.1 Identifying a claimant's cause of action2.2 Understanding the causal requirements2.3 How to work within the requirements of remoteness2.4 Identifying the most appropriate measure of loss2.5 Balancing compensation with consequences2.6 Understanding the requirement of comparisons of equal and equivalent standing.2.7 Demonstrating an understanding of tender allowances and price considerations2.8 Interpreting voluntarily incurred costs and extracting them from damages claims2.9 Ensuring that duplication is eroded
3. Able to determine the damages and quantify in accord with the appropriate method and to interpret their inclusion impartially for inclusion in a report. [K, S]	<ul style="list-style-type: none">3.1 General principles of an expert determination<ul style="list-style-type: none">• Understanding instructions• Interpreting damages• Quantifying damages• Understanding causation



	<ul style="list-style-type: none">• Converting causation into quantum analysis
4. Quantum in construction disputes	<p>4.1 Balancing the costs incurred with the entitlement allowed and presenting this in a report</p> <p>4.2 Converting quantum forensic analysis into an Expert Quantum opinion.</p>
5. Case Law analysis	<p>5.1 Case Law 1</p> <p>5.2 Case Law 2</p> <p>5.3 Case Law 3</p> <p>5.4 Case Law 4</p>

Recommended Reading