Unit 33: Forensic Photography

Unit code: F/502/5578

QCF Level 3: BTEC National

Credit value: 10

Guided learning hours: 60

● Aim and purpose

The aim of this unit is to develop learners' knowledge of theoretical principles for using equipment to make photographic portfolios for forensic purposes and how photography is used in the Criminal Justice System. They will gain skills in using equipment to make photographic records and producing photographic portfolios for forensic purposes.

● Unit introduction

Photographs can communicate more about a crime scene, and the appearance of the evidence within, than the written report. Forensic photographers produce a permanent visual record of the scenes of accidents and crime scenes for use as evidence, ultimately perhaps, in a court of law.

This unit introduces learners to the practices of photography, the use of photographic evidence in forensic work and the development of a portfolio of photographic work similar to those used in the Criminal Justice System (CJS).

Learners will be briefly introduced to traditional silver-based photography and, where possible, to fundamental wet photography techniques. However the unit also features the, now more commonplace, use of digital imaging technology. It gives learners the opportunity to appreciate how any advancement in technology brings both its advantages and disadvantages and focuses here on the field of image manipulation. Moreover, maintaining the chain of continuity with digital photography is an important challenge and learners should learn measures needed to meet the demands of the CJS.

Forensic photography of a scene of crime or accident is a rigorous recording of all the available evidence. It is normally carried out by the scene of crime officer who will have received general training in crime scene photography, but some of the larger police forces have dedicated forensic photographers for this purpose. Anyone interested in pursuing a career in this field should possess good photography skills.

● Learning outcomes

On completion of this unit a learner should:

1   Know the theoretical principles behind the selection and use of equipment to make a photographic portfolio for forensic purposes

2   Be able to use appropriate equipment and camera settings to make a photographic record for forensic purposes

3   Know how photography is used in the Criminal Justice System

4   Be able to produce a photographic portfolio for forensic purposes.

Unit content

1 Know the theoretical principles behind the selection and use of equipment to make a photographic portfolio for forensic purposes

Aesthetic principles: colour; patterns; textures; composition; format; symmetry

Technical theory: camera types (digital, non-digital); features (shutter speed, aperture, metering, white balance, depth of field); film (speed, type); image data storage (type, image file formats, image resolution); charge-coupled device (CCD); theory of light (absorption, diffraction, dispersion, reflection, refraction, inverse square law); lighting (direct, reflective, oblique, bounced, diffused, transmitted, axis)

Selection of conditions: depth of field; sharpness; composition to provide an image useable as evidence; variation of conditions according to subject

2 Be able to use appropriate equipment and camera settings to make a photographic record for forensic purposes

Cameras: SLR; digital SLR; digital compact; medium format

Lenses: primary; zoom; macro; compound; normal; fish-eye; wide angle; telephoto; covering power; focal length; hood

Filters: contrast; colour correction; polarising; tone modification; skylight; ultraviolet; special effects; neutral density

Lighting: sources, eg tungsten, tungsten-halogen, vapour release, ambient; colour; contrast; direction; for macro-photography; for texture; accessories, eg light meter

Flash: manual; automatic; dedicated fill-in; guns (electronic); off camera shoe cord; ring; metering; long peaking; practical technique, eg 'painting with light'; self-regulating; sensors

Films: monochrome; colour-negative-slide; infrared; speed; size; storage; film processing (health and safety; contact printing and enlarging; protocols)

Image data storage: image file formats; image resolution

Other equipment: tripod; remote shutter release; measuring tape; evidence markers; photo-evidence scales; photo-record sheets; notebook and pen

3 Know how photography is used in the Criminal Justice System

Ethics: codes of practice of professional institutes, eg Royal Photographic Society; professionalism; equal opportunities; chain of continuity; evidence preservation

Laws: civil; criminal; Police and Criminal Evidence (PACE) Act 1984; Serious Organised Crime and Police Act 2005; Criminal Procedure and Investigations Act 1996; Attorney General Guidelines on Disclosure of Evidence

Digital imaging: scanner; computer, eg calibration of monitor; internet; use of digital imaging software in image presentation, eg CorelDraw, PhotoShop, PageMaker; digital imaging procedure and practice

Presentation: image reduction; 'one to one' images; bleach-out; toning; tinting; brightness; contrast; sharpness; cropping; sizing; adjustment of colour balance; mounting methods; style of presentation; conformation with legislation

Film: analogue, digital; moving and still images

4 Be able to produce a photographic portfolio for forensic purposes

General principles: three step approach to scenes (overview, mid-range and close-up photographs); use of measuring and marking devices

Scenes: types, eg burglary, murder, rape, domestic violence, grievous bodily harm, actual bodily harm, road traffic accidents, burnt-out vehicles, arson, damaged building and its furniture

Images inside and outside premises: confined spaces, eg retail stores, factories, houses, flats, cars, vehicle, person in motion; open spaces, eg farms, fields

Evidence: types, eg fingerprints, ear prints, trace evidence on firearm, drugs, forged documents, blood spatter, footprint casts, footprint impressions, hairs, fibres, condoms, excreta, glass, bodily bruising, bite marks, face of victim, toolmarks, serial numbers

Photographic portfolio: image selection; forensic suitability

Assessment and grading criteria

In order to pass this unit, the evidence that the learner presents for assessment needs to demonstrate that they can meet all the learning outcomes for the unit. The assessment criteria for a pass grade describe the level of achievement required to pass this unit.

Assessment and grading criteria		
To achieve a pass grade the evidence must show that the learner is able to:	To achieve a merit grade the evidence must show that, in addition to the pass criteria, the learner is able to:	To achieve a distinction grade the evidence must show that, in addition to the pass and merit criteria, the learner is able to:
P1 identify the theoretical principles behind the selection and use of photographic equipment for forensic purposes [IE1]	**M1** explain the theoretical principles behind the selection and use of photographic equipment for forensic purposes	**D1** justify the choice of photographic conditions and equipment for a forensic investigation
P2 select equipment and camera settings to make a photographic record for use as forensic evidence [SM3]	**M2** explain the selection of equipment and camera settings for given locations and situations when making a photographic record	
P3 outline the codes of practice and legislation followed to ensure the preservation of evidence and chain of continuity [IE2]	**M3** explain how the procedures followed ensure the preservation of evidence and chain of continuity	**D2** compare procedures followed to ensure the preservation of evidence and chain of continuity for digital image storage and 35 mm film
P4 describe how photographic images can be enhanced to maximise their value as forensic evidence	**M4** explain the uses of image enhancement to improve images for use as forensic evidence	**D3** analyse photographic images, suggesting how they could be improved for use as forensic evidence
P5 produce a forensic photographic portfolio of a crime scene for use as forensic evidence [CT1,5].	**M5** explain the significance of forensic photographic evidence.	**D4** justify the selection of images within the photographic portfolio.

PLTS: This summary references where applicable, in the square brackets, the elements of the personal, learning and thinking skills applicable in the pass criteria. It identifies opportunities for learners to demonstrate effective application of the referenced elements of the skills.

Key	IE – independent enquirers	RL – reflective learners	SM – self-managers
	CT – creative thinkers	TW – team workers	EP – effective participators

Essential guidance for tutors

Delivery

Tutors delivering this unit have the opportunity to use a wide range of techniques. These include practicals, lectures, discussions, seminars, site visits, guest speakers, darkroom work, internet research, use of library resources, and photographic gallery visits.

The aim should be to stimulate and educate learners so they will understand the main concepts of digital photography, how it has come to supersede 35 mm photography and its uses in the CJS. This understanding will enable learners to see the range of job opportunities available at every level, and the range of higher education courses on offer.

Tutors should be aware of the integration of some subject matter with several other units within the qualification. Health and safety issues relating to laboratory work, either in the centre or in the workplace, must be emphasised. Risk assessments, the use of COSHH and other regulations in place in any laboratories must be adhered to.

Where specific acts and regulations are referred to in this unit, the latest versions should always be considered.

Learning outcome 1 covers the theoretical principles behind the selection and use of equipment to make a photographic portfolio for forensic purposes. This should mainly involve the practical investigation of these theoretical principles combined with formal lectures and learner research. Learners should be encouraged to evaluate their photographic practical work to understand the principles involved in its creation.

Learning outcome 2 builds on the knowledge and techniques developed for learning outcome 1. It covers the selection and use of appropriate equipment and camera settings to make a photographic record for forensic purposes. This learning outcome should involve formal lectures, learner research and practical investigation. Learners should have access to digital or 35 mm film cameras, and other materials to help them undertake photographic tasks. Ideally, various crime scene scenarios should be recreated for learners to demonstrate their developing photographic skills. Documentaries and case studies could provide additional sources of material.

Learning outcome 3 covers the importance of procedures in ensuring preservation of evidence and chain of continuity in forensic photography. It also features image manipulation and learners should be encouraged to examine the historical precedents of a process long practised before the advent of digital photography. Learners must have access to image manipulation software and need to develop an understanding of the acceptable use of this software when dealing with evidence. Input from tutors and possibly specialist speakers is recommended. Some areas can be covered by learner research.

Learning outcome 4 ties in with learning outcomes 1 and 2 and depends on learners' ability to use digital photography and understand the principles involved. Learners should produce a range of photographs that include close-up, mid-range and general overview images. It is expected that image manipulation software will be used where necessary in the preparation of the photographs for the portfolio. Learners should present their photography in a manner suitable for forensic purposes. Learners need to access a variety of crime scenes to develop their photography skills before recording the scene for their portfolio.

Outline learning plan

The outline learning plan has been included in this unit as guidance and can be used in conjunction with the programme of suggested assignments.

The outline learning plan demonstrates one way in planning the delivery and assessment of this unit.

Topic and suggested assignments/activities and/assessment
Introduction to unit content and structure of assignments.
Technical theory: Introductory lecture on each of the concepts followed by practical exercise where applicable, eg aperture – learner to fix the shutter speed at 1/60s and take a photograph of an object at each available aperture setting.
Assignment 1: Theoretical Principles (P1, M1)
Equipment and camera settings: Introductory lectures on types of additional equipment available and their particular use for the recording of forensic evidence, followed by practical exercise where applicable, eg use of a macro lens and ring flash for recording fingerprint evidence.
Assignment 2: Location, Location, Location (P2, M2, D1)
Digital imaging – procedure and practice: Series of lectures to include the current Home Office guidance on digital imaging procedure along with an outline of the relevant laws both civil and criminal appertaining to this area, eg Criminal Procedure and Investigations Act 1996.
Assignment 3: Chain of Continuity (P3, M3, D2)
Manipulation of images: Lectures and practical sessions that concentrate on the use of digital imaging software to manipulate and present images in a form that maximises their value as forensic evidence but ensures no infringement of the laws, ethics and procedural guidelines specified.
Assignment 4: Art of Manipulation (P4, M4, D3)
Photographic portfolio for forensic purposes: Series of lectures and practicals that outline the procedures and practices for the photographic recording of various crime scenes and evidence.
Learners produce a forensic photographic portfolio of a crime scene to the standard required for use as forensic evidence. This could be assessed alongside criteria 1 for *Unit 32: Forensic Evidence Collection and Analysis.* Learners need preparation time for both the manipulation of images and their presentation.
Assignment 5: Crime Scene Portfolio (P5, M5, D5)

Assessment

All the pass grade criteria must be met in order for a learner to achieve this unit.

For P1, learners must identify how a camera works, how an image is created on a negative and the basic function of a CCD. They must appreciate how varying the shutter speed will affect image blur, how changing aperture size will affect depth of field and how both of these factors affect image exposure. Learners must identify the relationship between focal length and the angle of view and image magnification. They should identify the need to consider ISO, and its effect on the graininess of the image, and also how the size and type of the stored digital image affects the quality. Although it is recommended that learners are introduced to the theoretical principles of light, it is not important that the learner is assessed independently on them. Reference can be made to them in the assessment of how a photographic image is produced.

For P2, learners must, with guidance, select the appropriate camera (either 35 mm SLR or digital SLR) and lens to produce correctly exposed and focused evidential photographs. Learners need to consider the lighting requirements of the scene and select the correct flash or illumination technique. They should use a light meter to evaluate the lighting conditions. In low light conditions learners should use a tripod to obtain the correct exposure. If photographs are taken of fingerprints, learners should use a macro lens to obtain sufficient ridge detail.

For M1, learners must explain the content of P1, not simply identify the concepts. Use of images taken by learners to aid these explanations is strongly advocated. For M2, the tutor must present learners with different crime scenes; both interior and exterior locations. This is an ideal opportunity to use scenes from the units *Forensic Evidence Collection and Analysis*, *Forensic Fire Investigation* and *Traffic Accident Investigation.* Learners must describe the equipment and conditions they would select for forensic photography, and justify their reasons. This can be done verbally or by presentation, but learners must present evidence for moderation purposes.

For D1, learners need to research the availability and practicality of cameras and equipment for forensic use, and compare items. This may, in part, be through review of the literature but learners are expected to carry out a practical comparison of images produced from a variety of equipment which could include 'point and shoot' digital, single use and mobile phone cameras as well as digital and 35 mm SLR. They should include an evaluation of content of P1 where necessary to justify the choice of conditions.

For P3, learners must outline the procedures used to ensure that photographic evidence meets the stringent requirements necessary when used for forensic purposes. For M3, learners must describe the procedures followed to ensure continuity and explain why there is a need for such procedures. Learners must include details and explanations of the procedures followed when image manipulation software is used. For D2, learners must compare the procedures followed to preserve evidence and maintain the chain of continuity in the use of both digital and 35 mm photography and any subsequent manipulation of images produced. Similarities and differences in the procedures should be detailed and compared.

For P4, learners must be familiar with image enhancement software and describe how it can be used to maximise the evidential value of the photographs without compromising their integrity. They should include details of the production of a one-to-one image. For M4, learners must explain the acceptable use of image enhancement software and the improvements achievable when dealing with images for forensic purposes. For D3, learners should analyse images they have produced before and after use of image manipulation software and evaluate the improvements made. If no suitable learner-generated images are available, they should be provided by the tutor.

For P5, learners must, with guidance, produce a portfolio of photographs of a crime scene, including general overview, mid-range and close-up images, to a standard required for use as forensic evidence. Image manipulation software should be used for improvements where appropriate and also in the production of a one-to-one image. The portfolio should include descriptions of the scene including: alleged crime, victim/loser's details, date, time, weather and lighting conditions. It is recommended that learners present the photographs in a manner fit for use in a court of law; the use of a commercial presentation folder to display the photographs is acceptable. The quality of the final presentation is crucial. Attention to fine detail and overall quality will decide whether learners meet this criterion. For M5, learners must justify the use of forensic photography in crime investigations. This may take the format of a short report or presentation. For D4, learners must justify why they have taken the photos they have. They must explain what the images show and any implications that can be drawn. This may be done as a presentation, or learners may wish to annotate their portfolios.

Programme of suggested assignments

The table below shows a programme of suggested assignments that cover the pass, merit and distinction criteria in the assessment and grading grid. This is for guidance and it is recommended that centres either write their own assignments or adapt any Edexcel assignments to meet local needs and resources.

Criteria covered	Assignment Title	Scenario	Assessment Method
P1, M1	Theoretical Principles	Working as a scene of crime photographer, give a presentation to trainee on operation of the camera equipment using photographs taken to identify the principles involved in their creation.	Presentation.
P2, M2, D1	Location, Location, Location	A position as a trainee crime scene photographer has been advertised in the local press. To apply you must choose the equipment and conditions to produce a portfolio to the standard required for use as forensic evidence.	Portfolio.
P3, M3, D2	Chain of Continuity	Local police force is making the change from 35 mm film cameras to digital. Working as a crime scene photographer, learner is required to produce leaflet to update SOCO on the procedures followed to ensure preservation of evidence and chain of continuity.	Leaflet outlining the procedures.
P4, M4, D3	Art of Manipulation	Working as a digital image technician, produce a report for SOCO describing what can be achieved by using software to enhance digital images.	Report on the use of digital imaging software.
P5, M5, D4	Crime Scene portfolio	Working as a scene of crime photographer, produce a portfolio of photographs of a crime scene for use as forensic evidence.	Portfolio of photographs.

Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

This unit forms part of the BTEC in Applied Science sector suite. This unit has particular links with:

Level 1	Level 2	Level 3
Crime Scene Investigation	Investigating a Crime Scene	Traffic Accident Investigation
		Forensic Fire Investigation
		Forensic Evidence Collection and Analysis

Essential resources

Learners should have access to SLR cameras, both digital and 35 mm, a selection of compact cameras eg point and shoot, single use etc, a selection of lenses and associated equipment, multigrade filters, lens cleaning brushes, cutting and mounting equipment, photographic paper, light meters and image manipulation software.

They also need simulated crime scenes, various sources of artificial light, a fully equipped darkroom, apparatus and a forensic science laboratory.

Additionally, they need access to a learning resources centre equipped with photographic books, periodicals, journals, CD ROMs, ICT facilities, scanners, printers and software.

Employer engagement and vocational contexts

Centres should develop links with local police stations as both CSI and Traffic Accident Investigation units will use photography to record a scene. Specialists from these areas are usually willing to speak to learners about their work experience.

Indicative reading for learners

Textbooks

Blitzer L and Jacobia J – *Forensic Digital Imaging and Photography* (Academic Press, 2002) ISBN 9780121064112

Hicks R and Schultz F – *Darkroom Basics and Beyond* (Collins & Brown, 2003) ISBN 9781843400486

Langford M – *Basic Photography* (Focal Press, 2000) ISBN 9780240515922

Redsicker D R – *The Practical Methodology of Forensic Photography* (CRC Press, 2000) ISBN 9780849320040

Stone J and London B – *A Short Course in Photography: An Introduction to Photographic Technique, 6th Edition* (Prentice Hall, 2005) ISBN 0131933809

Stroebel L et al – *Basic Photographic Materials and Processes* (Focal Press, 2000) ISBN 9780240804057

Weiss S L – *Forensic Photography: The Importance of Accuracy* (Pearson Prentice Hall, 2008) ISBN 9780131582866

Websites

www.bipp.com	British Institute of Professional Photography
www.bjp-online.com	The British Journal of Photography
www.crime-scene-investigator.net/ digitalphotography-fried	Analysis of forensic digital photography
www.crime-scene-investigator.org	Forensic photography for the crime scene technician
www.ephotozine.com/techniques	General photography techniques, tips and advice
www.photo.net	Photo-Net community of photographers
www.photonhead.com/beginners	The Beginner's Guide To Photography
www.the_aop.org	The Association of Photographers

Delivery of personal, learning and thinking skills

The table below identifies the opportunities for personal, learning and thinking skills (PLTS) that have been included within the pass assessment criteria of this unit.

Skill	When learners are …
Independent enquirers	[IE1] identifying theoretical principles and researching the associated scientific principles [IE2] researching the relevant codes of practice
Creative thinkers	[CT1,5] generating ideas and trying out alternatives when producing a forensic photographic portfolio
Self-managers	[SM3] selecting and using appropriate equipment; organising time and resources

Although PLTS are identified within this unit as an inherent part of the assessment criteria, there are further opportunities to develop a range of PLTS through various approaches to teaching and learning.

Skill	When learners are …
Creative thinkers	[CT3] enhancing images for report on digital imaging software
Effective participators	[EP2,4] giving presentation on theoretical principles.

● Functional Skills – Level 2

Skill	When learners are ...
ICT – Use ICT systems	
Select, interact with and use ICT systems independently for a complex task to meet a variety of needs	using image manipulation software producing presentation for class on camera operation
Manage information storage to enable efficient retrieval	storing digital image files
Follow and understand the need for safety and security practices	maintaining chain of continuity of photographic evidence
ICT – Find and select information	
Select and use a variety of sources of information independently for a complex task	creating and finding illustrative materials for a leaflet and adapting them for use
ICT – Develop, present and communicate information	
Enter, develop and format information independently to suit its meaning and purpose including: ● text and tables ● images ● numbers ● records	manipulating digital images producing a leaflet outlining the procedures to ensure continuity producing a portfolio of images for forensic purposes (digital manipulation used) producing a presentation, using appropriate software, on camera operation
Bring together information to suit content and purpose	
Present information in ways that are fit for purpose and audience	
English	
Speaking and listening – make a range of contributions to discussions and make effective presentations in a wide range of contexts	delivering a presentation on camera operation
Reading – compare, select, read and understand texts and use them to gather information, ideas, arguments and opinions	reading information on camera operation researching the availability and practicality of cameras and equipment for forensic use
Writing – write documents, including extended writing pieces, communicating information, ideas and opinions, effectively and persuasively	writing report on the use of digital imaging software.