



Unit title:	Emerging technologies
Unit number:	6
Level:	4
Credit value:	15
Guided learning hours:	60
Unit reference number:	Y/601/0451

UNIT AIM AND PURPOSE

To enable candidates to understand emerging technologies and current developments across a variety of sectors by researching, and understanding the social impact and ethical implications of emerging technologies.

LEARNING OUTCOMES AND ASSESSMENT CRITERIA

A pass grade is achieved by meeting **all** the requirements in the assessment criteria.

Learning Outcome (LO)	Pass
The Learner will:	The Learner can:
LO1 Understand emerging technologies	1.1 examine the environments that utilise emerging technologies by identifying the emerging technologies and current developments in the field 1.2 examine the environments that utilise emerging technologies by assessing the dependency of these environments on future enhancements
LO2 Understand the impact of emerging technologies on society	2.1 analyse emerging technologies and their impact on society
LO3 Be able to conduct research into emerging technologies	3.1 undertake research on an emerging technology 3.2 present findings from the research 3.3 evaluate the research process
LO4 Understand the ethical implications of emerging technologies	4.1 evaluate the ethical implications of emerging technologies discussing the role of ethical committees

GRADING CRITERIA

A merit grade is achieved by meeting **all** the requirements in the pass criteria **and** the merit descriptors.

A distinction grade is achieved by meeting all the requirements in the pass criteria **and** the merit descriptors **and** the distinction descriptors.

Merit Criteria (M1, M2, M3)	Distinction Criteria (D1, D2, D3)
(M1, M2, and M3 are mandatory to achieve a merit grade. Each must be achieved at least once per unit to achieve a merit grade.)	(D1, D2, and D3 are mandatory to achieve a distinction grade. Each must be achieved at least once per unit to achieve a distinction grade.) (In order to achieve a distinction grade, all merit criteria must also have been achieved.)
MANDATORY TO ACHIEVE A MERIT GRADE	MANDATORY TO ACHIEVE A DISTINCTION GRADE
M1 Analyse concepts, theories or principles to formulate own responses to situations.	D1 Evaluate approaches to develop strategies in response to actual or anticipated situations.
M2 Analyse own knowledge, understanding and skills to define areas for development.	D2 Evaluate and apply strategies to develop own knowledge, understanding and skills.
M3 Exercise autonomy and judgement when implementing established courses of action.	D3 Determine, direct and communicate new courses of action.

TEACHING CONTENT

The Teaching Content describes what has to be taught to cover **all** Learning Outcomes.

Learners must be able to apply relevant examples to their work although these do not have to be the same as the examples specified.

LO1 Understand emerging technologies	
Examples of environments	Medical and healthcare, farming, education, manufacturing, communications, transport, cloud-based, financial, environmental, computing
Types of technology	Example areas include automation and machine learning such as IBM's Watson, user interface technologies (e.g. Google Glass, Microsoft Surface), distributed applications and cloud technologies (e.g. Dropbox, Mapping and social discovery such as BlueSquare)
Development of emerging technologies within the environment	Historical breakthroughs, current development, potential breakthroughs for the future based on the scope of current technologies.
LO2 Understand the impact of emerging technologies on society	
Examples of technologies	Wireless power, personalised medicine nutrition and disease prevention, enhanced education technology, computers and digital tools, assistive technologies, lights-out warehousing, cloud-based platforms
Impact	Their impact on society and how society has adapted as technologies have emerged from concept to current day.
LO3 Be able to conduct research into emerging technologies	
Research	Online journals, books, websites.
Research methodology	Systematic review of literature or action research.
Relevance of information	Authority, accuracy, objectivity, currency, coverage.
Presentation of findings	Referencing, citing, source types, bibliography.

LO4 Understand the ethical implications of emerging technologies

Ethical implications which need to be considered with emergence of technology; the testing of the technology; and the environments within which they are produced e.g. laboratories.

Role of ethical committees	A range of ethical committees identified and evaluated for purposes, advantages/disadvantages. Legal implications e.g. 'right to be forgotten in Europe, role of software patents in protecting intellectual property/stifling innovation and use of 'obvious' ideas (e.g. Amazon 1 click button or Apple 'swipe to start').
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GUIDANCE

Delivery guidance

It will be beneficial to deliver this unit in a way that uses actual events, industry forecasts or sector specific contexts which offer the learner the opportunity to explore, develop and apply the fundamental principles of the sector or subject area. Typical delivery contexts could include: farming and animal welfare, environmental waste disposal solutions, disease prevention, transportation solutions, end-user technologies.

Learners will benefit from being encouraged to exercise autonomy and judgement to research emerging technologies and related ethical issues. Ethical implications in different environments could be discussed as a group then independently researched.

Learners will need to adapt their thinking and reach considered conclusions, when reflecting upon the impact and ethical implications of emerging technologies based on their research (*based on a foundation of relevant knowledge, understanding and/or practical skills*).

Learners would benefit from being presented with subject/sector-relevant problems from a variety of perspectives and from being given the opportunity to explore them using a variety of approaches and schools of thought. Research methodology and planning should be evidenced, the audience considered and the organisation of findings evidenced.

Assessment evidence guidance

Evidence must be produced to show how a learner has met each of the Learning Outcomes. This evidence could take the form of assignments, project portfolios, presentations or, where appropriate, reflective accounts.

Where group work/activities contribute to assessment evidence, the individual contribution of each learner must be clearly identified.

All evidence must be available for the visiting moderator to review. Where learners are able to use real situations or observations from work placement, care should be taken to ensure that the record of observation accurately reflects the learner's performance. This should be signed, dated, and included in the evidence. It is best practice to record another individual's perspective of how a practical activity was

carried out. Centres may wish to use a witness statement as a record of observation. This should be signed and dated and included in the evidence.

RESOURCES

Books

Prof Weller M. *The Digital Scholar: How Technology is Transforming Scholarly Practice*. London: Bloomsbury Academic. 2011.

Available to read free on:

www.bloomsburyacademic.com/view/DigitalScholar_9781849666275/book-ba-9781849666275.xml

Available to purchase at:

www.amazon.co.uk/Digital-Scholar-Technology-Changing-Academic/dp/1849666172

Journals

Various. (2012). *International Journal of Cloud Applications and Computing (IJCAC)*. Available: <http://www.igi-global.com/journal-contents/international-journal-cloud-applications-computing/41974>. Last accessed 20 Mar 2013.

Various. (2013). *International Journal of Emerging Technologies in Learning (iJET)*. Available: <http://www.online-journals.org/i-jet>. Last accessed 21 Mar 2013.

Websites

Research:

(Anon) n.d. *Research Methodology*. Available: www.ihmgwalior.net/pdf/research_methodology.pdf

Communications:

(Anon.) (2013). *An introduction to wireless charging: changing the way we think about power*. Available: www.wirelesspowerconsortium.com/what-we-do/how-it-works/ Last accessed 18 Mar 2013.

(Anon.) (2013). *The future is here: public and private charging infrastructure*. Available: www.wirelesspowerconsortium.com/what-we-do/future-visions/. Last accessed 18 Mar 2013.

Stucken A. (2013). *Emerging technologies in 2013*. Available: www.saga.co.uk/money/best-deals/emerging-technologies-in-2013.aspx. Last accessed 20 Mar 2013.

Environmental:

Goudarzi. (2007). *Top 10 Emerging Environmental Technologies*. Available: www.livescience.com/11334-top-10-emerging-environmental-technologies.html. Last accessed 20 Mar 2013.

Matthews R. (2013). *Ambitious Growth Predicted for Solar in 2013 and 2014*. Available: www.greenconduct.com/news/2013/02/27/ambitious-growth-predicted-for-solar-in-2013-and-2014/. Last accessed 22 Mar 2013.

Transport:

Ashton D. (2013). *The Race for the First Driverless Car*. Available: www.business2community.com/infographics/the-race-for-the-first-driverless-car-infographic-0438963. Last accessed 20 Mar 2013.

Wüst C, (2013). *Auto Revolution: A Promising Future for Self-Drive Cars*. Available: www.spiegel.de/international/business/driverless-cars-are-a-reality-but-face-acceptance-obstacles-a-880716.html. Last accessed 22 Mar 2013.

Farming:

The iTunes U team. (2013). *Computer technology: robotic milking and interactive mirrors*. Available: www.open.edu/openlearn/science-maths-technology/computing-and-ict/computer-technology-robotic-milking-and-interactive-mirrors?track=3503a3374b. Last accessed 17 Mar 2013.

Working Group "FABRE Technology Platform". (2006). *Sustainable Farm Animal Breeding and Reproduction - A Vision for 2025*. Available: www.euroqualityfiles.net/vision_pdf/vision_fabre.pdf. Last accessed 18 Mar 2013.

Education:

Walsh K. (2012). *Making BYOD Work in Schools*. Available: www.emergingedtech.com/2012/12/making-byod-work-in-schools/. Last accessed 22 Mar 2013.

AT (Assistive Technology):

Beech R, Roberts D. (2008). *Assistive technology and older people*. Available: www.scie.org.uk/publications/briefings/files/briefing28.pdf Last accessed 20 Mar 2013.

Lamb J. (). *Improve usability with assistive technology*. Available: www.computerweekly.com/feature/Improve-usability-with-assistive-technology. Last accessed 20 Mar 2013.

Emerging end-user Technologies:

Kelly S. (2013). *Touchscreen 'that reacts even without touching'*. Available: www.bbc.co.uk/programmes/p015sd7s. Last accessed 18 Mar 2013.

Forrester ?. (2013). *Forrester's top 15 emerging technologies*. Available: <http://venturebeat.com/2013/02/07/forresters-top-15-emerging-technologies/>. Last accessed 19 Mar 2013.

Cellan-Jones R. (2013). *Zoe - Cambridge's emotional talking head*. Available: www.bbc.co.uk/news/technology-21827924. Last accessed 20 Mar 2013.

Dr. Hirst T. (2013). *A dark future for warehousing?* Available: www.open.edu/openlearn/science-maths-technology/engineering-and-technology/technology/dark-future-warehousing. Last accessed 22 Mar 2013.

Medical:

Fujitsu Laboratories Ltd. (2013). *Fujitsu Laboratories Develops Real-Time Pulse Monitor Using Facial Imaging*. Available: www.fujitsu.com/global/news/pr/archives/month/2013/20130318-01.html. Last accessed 22 Mar 2013.

Financial:

Henningsen P. (2012). *The Cashless Society is Almost Here - And With Some Very Sinister Implications*. Available: www.globalresearch.ca/the-cashless-society-is-almost-here-and-with-some-very-sinister-implications/5313515. Last accessed 19 Mar 2013.

Cedric X. (1995). *Moving Toward a Cashless Society*. Available: www.newdawnmagazine.com/Articles/Moving%20Towards%20a%20Cashless%20Society.html. Last accessed 19 Mar 2013.

Ethical Issues:

The Ethics Committee - Roles and Responsibilities
<http://www.navran.com/tools/Ethics-Committee-Description.pdf>

Field T. (2012). *Top 4 Cyberthreats of 2013*. Available: www.bankinfosecurity.com/interviews/top-4-cyber-threats-in-2013-i-1720. Last accessed 19 Mar 2013.

John J. Reilly Centre. (2013). *Emerging Ethical Dilemmas and Policy Issues in Science and Technology*. Available: <http://reilly.nd.edu/outreach/emerging-ethical-dilemmas-and-policy-issues-in-science-and-technology/>. Last accessed 20 Mar 2013.

Battye J, Blair H, Mellor D., (1999). *Ethical Issues of New and Emerging Technologies*. Available: www.scribd.com/doc/7804228/Ethical-Issues-of-New-and-Emerging-Technologies. Last accessed 20 Mar 2013.

Hotopf M, Wessely S, Noah N (1995). *Are ethical committees reliable?* Available: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1295071/pdf/jrsocmed00074-0035.pdf>. Last accessed 21 Mar 2013.