

Ethics and ownership

A-Level Computer Science 9618 · Topic 7 revision notes

Everything from the 3 lessons of this topic on a few pages: the key idea of each lesson, the diagram to remember, the points to learn and the traps examiners set. Read it, cover it, test yourself.

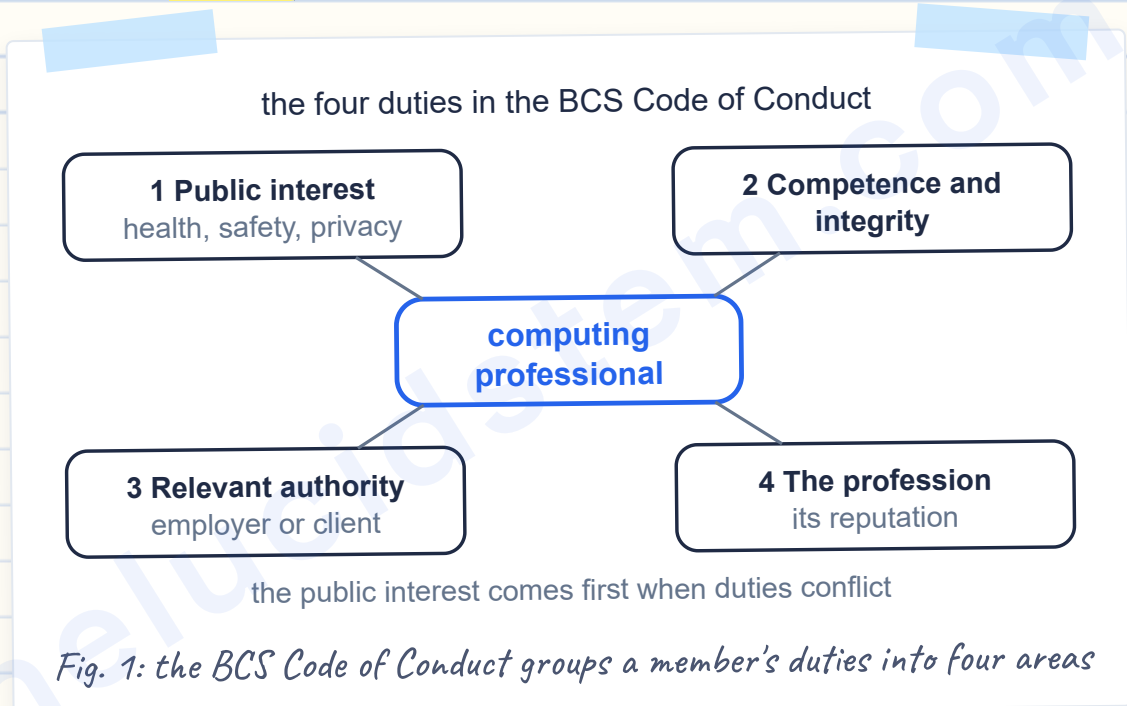
1. Ethics and professional codes of conduct
2. Copyright and software licensing
3. The impact of artificial intelligence

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1 Ethics and professional codes of conduct

Syllabus 7.1

Ethics are the moral principles that guide what is right and wrong in how a person behaves. A computing professional needs them because the systems they build affect the **public**, their **employer or client**, their **colleagues** and the **profession**. Professional bodies such as the **BCS** (British Computer Society, The Chartered Institute for IT) and the **IEEE** (Institute of Electrical and Electronics Engineers) publish a **code of conduct** that members agree to follow. Acting **unethically** can cause harm, break the law, lose trust and end careers; acting **ethically** protects users and builds trust.



Worked example: Release date pressure

A manager tells a programmer to release a car's braking control update before testing is finished, so that a deadline is met. Explain the impact of acting ethically and unethically.

1. Who is affected: drivers, passengers and other road users (the public), the employer and the programmer.
2. Duty: the public interest (safety) comes before the duty to the employer.
3. Ethical action: refuse to sign off the release, explain the risk honestly, and finish the testing. Impact: the release is late and the manager may be unhappy, but nobody is put at risk and the company's reputation is protected.
4. Unethical action: release untested code. Impact: a fault could cause accidents and deaths; the company faces recalls, lawsuits and loss of trust; the programmer could

be dismissed or expelled from their professional body.

Answer: Acting ethically delays the product but protects lives and trust; acting unethically risks harm to the public and serious legal and reputational damage.

Who, which duty, what happens.

- ✓ **Ethics:** moral principles about right and wrong; they go beyond the law.
- ✓ **Bodies:** BCS and IEEE publish codes of conduct, offer recognised status and CPD, and discipline members.
- ✓ **BCS duties:** public interest, professional competence and integrity, relevant authority, the profession.
- ✓ **Scenarios:** name the stakeholders, the duty involved, and the consequences of both the ethical and the unethical choice.

Watch out!

"Ethics means obeying the law" is not enough. Something can be legal and still unethical, such as releasing software you know has not been tested properly. Show that ethics are about moral choices, beyond what the law requires.

In a "discuss the impact" question, one side is not enough. Marks go for the consequences of the ethical choice and of the unethical choice, for named stakeholders.

2 Copyright and software licensing

Syllabus 7.1

Copyright is the legal right of the creator of an original work, including a computer program, to control who may **copy, distribute and modify** it. A **software licence** is the agreement that states what a user is allowed to do with the software. **Free software** (Free Software Foundation) and **open source** software (Open Source Initiative) give users the **source code** and let them change and share it. **Shareware** can be tried free for a limited time or with limited features, then must be paid for. **Commercial** software must be bought, and the source code is kept secret.

what each kind of licence lets the user do

	free (FSF)	open source	shareware	commercial
source code given	✓	✓	X	X
may modify it	✓	✓	X	X
may redistribute	✓	✓	trial	X
fee to use it	no	no	after trial	yes

all four are protected by copyright: the licence sets the terms

Fig. 1: the four kinds of licence compared

Worked example: A company's secret method

A company has spent two years developing route-planning software that uses a method no competitor has. It wants to sell the software to delivery firms. Which licence should it use? Justify your choice.

1. The company needs income to recover two years of development costs, so a free licence does not suit it.
2. The method is its advantage over competitors, so the source code must stay secret.
3. A commercial licence lets it charge each customer, keeps the source code hidden, and forbids copying and reselling.
4. It could sell a site licence to large firms with many drivers.

Answer: Commercial licence: it earns money and protects the source code.

Source, change, share, pay.

- ✓ **Copyright:** the creator's legal right to control copying, distribution and modification; it lets them earn and encourages creation.
- ✓ **Free (FSF) and open source (OSI):** source code given; may change and redistribute; copyleft keeps changes free.
- ✓ **Shareware:** free trial, then pay; no source code. **Commercial:** pay for a licence; no source code; no copying.
- ✓ **Justify:** match a feature of the licence to a need in the scenario.

Watch out!

Buying software does not mean you own the program. You own a licence to use it under its terms; the copyright stays with the creator.

"Open source is free so it is better" is not a justification. Say what the person in the scenario needs (income, secrecy, collaboration, low cost) and which feature of the licence meets that need.

3 The impact of artificial intelligence

Syllabus 7.1

Artificial intelligence (AI) is the ability of a computer system to carry out tasks that would normally need human intelligence, such as **learning** from data, **reasoning**, recognising images and speech, and understanding language. AI is used in medicine, transport, finance, customer service and many other areas. Its impact must be judged in three ways: **social** (effects on people and society), **economic** (effects on jobs, businesses and wealth) and **environmental** (effects on energy, resources and the planet). Most impacts have both benefits and drawbacks.

weighing the impact of an AI system

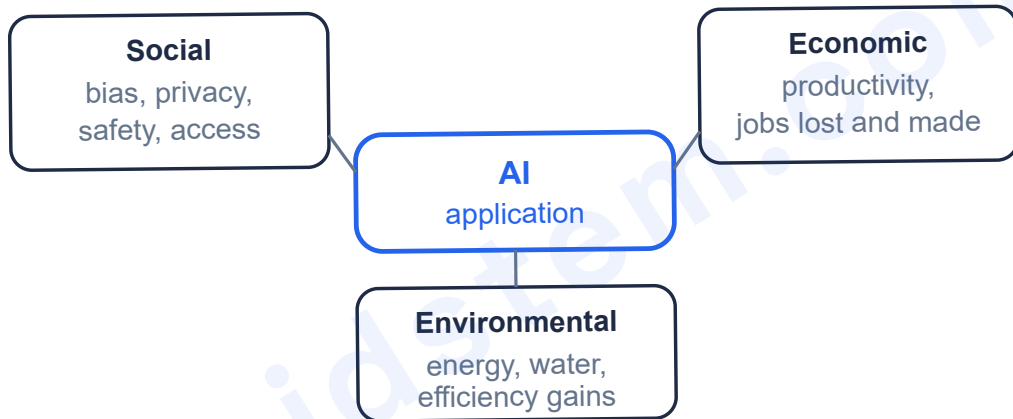


Fig. 1: three ways to judge the impact of an AI application

Worked example: A hiring tool

A company uses an AI system to sort job applications. It was trained on the applications of people the company hired over the last ten years. Explain one social impact.

1. The AI learns patterns from past hiring decisions.
2. If those decisions favoured one group, for example men, the AI learns the same preference.
3. Equally good applicants from other groups are then rejected more often, without a person noticing.

Answer: The system can repeat and hide bias, leading to unfair discrimination.

Social, economic, environmental.

- ✓ **AI:** a computer system doing tasks that normally need human intelligence, often by learning from data.
- ✓ **Social:** health, safety, accessibility, bias, privacy, deepfakes, accountability.
- ✓ **Economic:** productivity, costs, new jobs and lost jobs, retraining, who gains the wealth.
- ✓ **Environmental:** energy, water, hardware and e-waste, against efficiency savings; give both sides and a judgement.

Watch out!

Not every computer system is AI. A program that only follows fixed IF statements written by a programmer is not learning.

Describe AI as doing tasks that normally need human intelligence, often by learning from data.

"AI is bad for the environment because it uses electricity" is a one-mark answer. Say what uses the energy (training, data centres, cooling), and balance it against the savings AI can make.