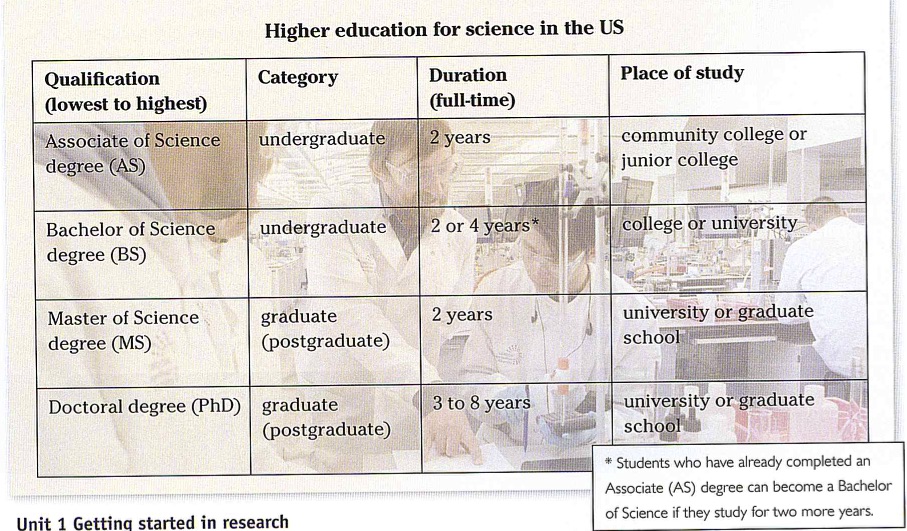
***Getting started in research***

***1. Many students pursue their education in other countries. The table below summarises tertiary (higher education) for science in the US. Read the information concerning the Romanian higher education system and examine the two systems by comparison (similarities/differences).*** *For the Romanian HE system* [*Click here*](https://www.studyinromania.gov.ro/fp/index.php?we=module.fp.articles&c=15&wtok=&wtkps=hZJbboMwEEX34v+kzMtju3uoKnUFqKQKaUloCKJJ1b2XRME8PuLPuRyOxxfygFn4bQIF05SFeW6CQDCyq6HNLTSt+6nLTzhW3ff50lIuF6j4yHsoz/kKtiI7Llcn253er6+CDaYo6v3r25MQslqLeM19b5zOwDfuJUFptCF7yZxVdbcHWTCLRO7CJDg6Sb0nR5LpgC6SwZkEJ05Q8JaER3SeRGcKHJtEInAIqveOZnNs8jE1aVLVijokHwuaJ7HJFDhuyNb130y8v589m+OGj6lxQwZlsg5ZhoMXybBhEpw4+98KETONdS+S6EyAGEy3Ga5VHYr2a7P+qNfbQ9Wnf/8=&wchk=bdb8469b1a42e98ce69410b5e9ebd4b45e172bf5)*; for other EU countries* [*click here*](https://ec.europa.eu/education/study-in-europe/country-profiles_en)

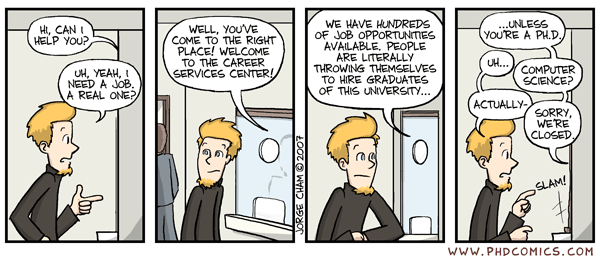
1. If you decided to study abroad, which qualification would be best for you? Where would you like to undertake your studies? Would you opt for direct enrolment or an exchange program?
2. While some European universities are bilingual, Romania offers Bachelors available in several languages. What is, in your opinion, the purpose of English language programmes in the field of Computer Science?



Listening practice

*1a. Eriko is from Japan and she will soon complete a PhD in CS in London. She is discussing the next stage in her career with her supervisor, Susana. Listen to part of their conversation and note the options that interest her and the options that do not apply.*

**1b. Work in teams**

****

***What are the advantages and disadvantages of working in academia or industry (also known as The Pipeline Effect)? Brainstorm and then feed back to the class.***

1c. Follow up

**First person - Asynchronous work**

*Write a short blog post (200-300 words) to lay out some of the advantages and disadvantages of working in academia or industry. Your post should help your target audience (Computer Science students/novice researchers/professionals) resolve the challenges of pursuing a career in academia or industry. You may consider the following examples to get started.*

<http://blogs.nature.com/naturejobs/2018/04/30/from-academia-to-silicon-valley-and-back/>

<https://towardsdatascience.com/the-post-academic-computer-science-job-market-d260668a9447>

<https://vijini.medium.com/what-should-you-do-after-graduating-academia-vs-industry-ac6f84df474b>

numerous transferable skills that can streamline career advancement in business.

[**https://www.academiatoaffluence.com/industry-vs-academia/**](https://www.academiatoaffluence.com/industry-vs-academia/)

**Applying for research funding**

***1. Read the following extract from a scholarship offer program and then answer the questions***:

1. Can an organization apply for the scholarship?
2. Would you be interested in applying for ESRC? Why? Why not?
3. What information might you need to include in your application form?
4. How is providing money to (novice) researchers at the beginning of their careers seen as an “investment”?
5. What are the advantages of attracting scientists with ‘future potential for leadership in the field of computing’ to a country?

|  |
| --- |
| **About the project** |
| The ESRC Research Grant Civil Society aims to develop STEM Education in Wales by attracting outstanding professionals in the field of Computer Science to continue their academic track in a British university. The fellowship is funded by the University of South Wales as part of the university’s contribution to the new ESRC Research Grant Civil Society – Civic Stratification and Civil Repair awarded to the Wales Institute of Social and Economic Research, Data and Methods (WISERD) Research Centre.  ESRC fellowships are awarded to individual students worldwide with future potential for leadership in their field. Applicants should have a very good BSc (Honours) (First or Upper Second class) degree or a Master degree (with Distinction or Merit) in Computer Science or related disciplines. Successful applicants receive a 4-year grant covering salary, travel and relocation costs. |

**2. Extension activity: investigating a fellowship**

*2.1 Think about several additional questions that would help you obtain more information about the fellowship in Exercise 1a.*

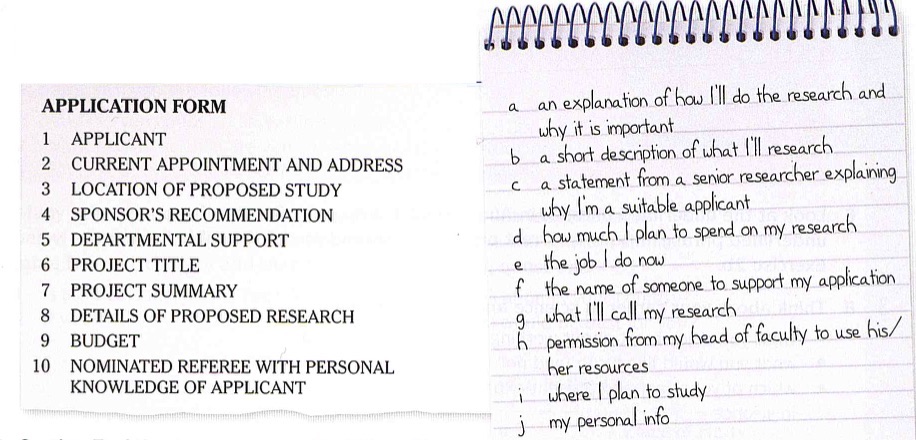
* Suggested questions:

1. Is there a particular area of research that is given priority?
2. Can candidates apply over consecutive years?
3. Will the fellowship committee help in obtaining a visa?

*2.2 Write an email to the fellowship committee asking your questions.*

* Also consider the following example, for more practice: <https://www.findaphd.com/phds/project/real-time-iot-analytics-at-edge/?p128999>
* To discuss more options regarding PhD offers, also see: <https://www.findaphd.com/phds/maths-and-computing/?10gw00&PG=2>

*2. Eriko has decided to apply to ESRC and has downloaded an application form. Look at the list of sections on the form (1-10) and match each one to Eriko’s notes on the information she needs to provide (a-j).*



*3. Section 7 of the of the form asks applicants to write a project summary of their research proposal. Think about a research area (eg Human Computer Interaction/Networks, Distributed Systems and Security etc.) and a research topic (eg. “Efficient page preloading for SGX enclaves”) that you consider worth pursuing. Discuss the following aspects in your description:*

- Research area/Research topic

- State of the art in the field (current research in an area/given topic)

- Why the topic is important

- What limitations do you see to your research

*4.Below you will read a completed project summary on Next-Generation Transport Protocols for Ultra-High Speed Networks***.**

*Match the highlighted section in the summary (A-F) to the correct function (1-6) from the list.*

|  |
| --- |
| 1. State the aims of your research; 2. Define what the problem is/Identify the area for new work; 3. Explain why your topic/project is worth researching/endorsing; 4. Say what the expected outcomes (concrete goals and deliverables) of the research are; 5. Outline the procedure/methodology you will follow; 6. Outline how you will limit your investigation/the limitations of your project; |

**Next-Generation Transport Protocols for Ultra-High Speed Networks**

End-to-end data transfer rate requirements in the physics and astronomy scientific computation communities are soon to approach the terabit-per-second regime. Even for regular Internet, end-to-end transfer rate requirements of emerging digital media applications are likely to rise to at least the multi-gigabit regime. (A) However, data provided to date indicates that even when sufficient raw transmission capacity is available at individual links and routers traversed on an Internet path, such capacity cannot be made available to applications if the underlying transport protocols do not scale correspondingly. (B) Due to the prospective nature of the study and the highly restrictive paradigm of traditional research, the design framework of RTT-scale protocol operations was not included in our investigation. (C) We argue that a new approach will help design a novel paradigm of packet-scale congestion-control, in which the protocol operates at a frequency close to the frequency of packet transmissions. (D) This technology aims to develop the congestion-control timescale to be shrunk by several orders of magnitude over current protocols, especially in high-speed networks. (E) The innovativeness and nature of this project requires a research methodology that adopts both theoretical analysis and formal modelling, as well as practical system design, implementation, and experimentation on wide-area high-speed networks. (F) This project should produce a significant performance leap—while the best of current protocols are struggling to achieve 10Gbps transfer speeds, the paradigm enables comfortable operation at terabit- and-higher speeds. This is the first end-to-end congestion-control protocol for TCP/IP networks to achieve this scale.

5. *Complete the project summary by another researcher below using only the correct word or phrase from the box.*

|  |
| --- |
| the proposed research, although, the state of the art, to demonstrate, this project explores, tested and applied, however, to achieve this, adressed, existing methods, this model, aims to, this work, to mitigate |

Fluid phenomena play important roles in everyday life - jet streams, chemical dispersion, granular flows, et cetera. 1)\_\_\_\_\_\_\_\_\_\_\_ these phenomena are commonplace, mathematical models that describe them properly are nonlinear and lead to computational simulation processes that are very complex and challenging to perform efficiently. 2)\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the phenomena of high-energy fluid elastic solid interaction. 3)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ for this type of interaction are better suited for lower energy scales. 4)\_\_\_\_\_\_\_\_\_\_\_ this work 5)\_\_\_\_\_\_\_\_\_\_\_ capture shocks and other phenomena requiring compressible flows in a high-energy state. 6)\_\_\_\_\_\_\_\_\_\_\_\_\_\_, we employ a method known as *Residual Distribution Scheme* (RDS) for the fluid simulation [Roe 1987]. Our method has been 7)\_\_\_\_\_\_\_\_\_\_\_ to a number of challenging problems with applications in computer animation: (a) foggy air current speeding past an iconic bridge, rocking it back and forth, (b) a flow of solar particles passing over a space station suspended high above the Earth, (c) wind buffeting a skyscraper, causing it to bend and twist. 8)\_\_\_\_\_\_\_\_\_\_\_\_\_\_ the scalability of RDS, we have implemented our algorithm with the parallization facilities provided by OpenMP. 9)\_\_\_\_\_\_\_\_\_\_ of parallel computing is well-suited to the multi-core, shared-memory architectures commonly available on desktop workstations and laptops. 10)\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ will also be directly applicable to many-core architectures.

Asynchronous assignment

***6. Write a short summary (150-200 words) for the research you discussed in exercise 3 above. You may also use the phrases you noted in exercise 4 and 5.***

Asynchronous assignment

***6. Write a short summary (150-200 words) for the research you discussed in exercise 3 above. You may also use the phrases you noted in exercises 4 and 5.***

Extension activity

How to read a research paper

1. What do you do to stay on top of the research in a particular area?

2. How do you read a research paper?

3. What tips and trick do you have to accelerate your efficiency when you are reading research papers / field-related blogs etc.?

Watch the following [video](https://crossminds.ai/video/andrew-ng-how-to-read-research-papers-and-machine-learning-career-advice-600242af495ecadbf27b382e/) created by Andrew Ng, a professor at Stanford, the Department of Computer Science, and make notes on relevant advice on “ how to read a research paper”.

(3:00-8:15).