T-LEVELS | Institute for Apprenticeships & Technical Education

T Level Technical Qualification in Science

Employer set project (ESP)

Lab Sciences

Project brief

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NCFE CACHE

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Contents

Guidance for students

Student instructions

- read the project brief and the task guidance carefully before starting your work
- you **must** work independently and make your own decisions on how to approach the tasks within the employer set project (ESP) - your work should:
    - be in an Arial font 12pt, within standard border sizes, however you may choose to hand write your work – if you choose to hand write your work, this should be in black ink
    - clearly show where sources have been used to support your own ideas and opinions
    - clearly reference all sources used to support your own ideas and opinions
    - reference any quotations from websites
- you **must** clearly name and date all of the work that you produce during each supervised session
- you **must** hand over all of your work to your tutor at the end of each supervised session
- you **must** not work on the assessment in between supervised sessions

Student information

This ESP will assess your knowledge, understanding and skills from across the core content of the qualification.

In order to achieve a grade for the core component, you **must** attempt both of the external examinations and the employer set project. The combined marks from these assessments will be aggregated to form the overall core component grade (A* to E and U). If you do not attempt 1 of the assessments or fail to reach the minimum standard across all assessments, you will receive a U grade.

Your tutor will explain how the assessment time is broken down per task and will confirm with you if individual tasks need to be completed across multiple sessions.

At the end of each supervised session, your tutor will collect all assessment materials before you leave the room. Yo**u must not** take any assessment material outside of the room (such as via a physical memory device). You **must not** upload any work produced to any platform that will allow you to access materials outside of the supervised sessions (including email).

You can fail to achieve marks if you do not fully meet the requirements of the task, or equally if you are not able to efficiently meet the requirements of the task.

Plagiarism

Plagiarism may result in the external assessment task being awarded a U grade. For further guidance refer to the plagiarism guidance, and maladministration and malpractice policy located on the NCFE website.

Presentation of work

- any work not produced electronically must be agreed with your tutor, and the evidence you produce should be scanned and submitted as an electronic piece of evidence, for example a digital photograph; your tutor will arrange for any digital photographs to be taken
- all your work should be clearly labelled with the relevant task number and your student details and be legible (for example front page and headers)
- electronic files should be given a clear file name for identification purposes (see tasks for any relevant naming conventions)
- all pages of your work should be numbered in the format page X of Y, where X is the page number and Y is the total number of pages
- you must complete and sign the external assessment cover sheet (EACS) – declaration of authenticity form and include it at the front of your assessment task evidence
- you must submit your evidence to the tutor at the end of each session.

Scenario: Researching methods for the determination of white blood cell count in patient samples

Introduction

Autoimmune disorders are a result of the body's immune system mistakenly attacking an individual's own tissue. As a result of the body attacking itself, patients with autoimmune disorders often have elevated levels of white blood cells (WBC). WBCs are key parts of the immune system and are used to fight infection, or in the case of autoimmune disorders, mistakenly fight the body's own cells.

Brief

As part of your job as a laboratory technician for a pharmaceutical company, you have been sent some blood samples from immunocompromised patients as part of a clinical trial for a steroid you are developing. The patients have been exhibiting joint pain and stiffness. The clinical trial is looking at investigating whether the steroid would be useful in the treatment of autoimmune disorders with these symptoms, and so the blood samples need to be analysed in order to identify whether the patients would be eligible or not for this trial. In order to aid in this analysis, WBC counts need be performed. You will need to carry out the WBC counts as part of your role and report your findings to the head of your laboratory.

You must complete the following steps:

- researching
- producing a plan for investigation
- analysing and evaluating the effectiveness of the investigation
- reporting on your findings to the wider team
- participating in a group discussion
- reflecting on the process

Complete the tasks below to guide you through these steps.

Task 1: research a strategy

(22 marks)

What you have to do

You have been provided with a database containing a range of potentially relevant sources for your project. All the resources are linked to WBCs and carrying out WBC counts. The trial also requires an explanation of how the potential steroid might be helpful in this context, as well as a description of other potential treatments for autoimmune disorders. Some sources will be more relevant or reliable than others.

The sources are shown in appendix 1 of this assignment brief document. You will need to:

- carry out a literature review of the methods available to count WBCs and how to determine whether the patient's WBC count is within the normal range, as well as the effects of steroids on WBC count as a treatment of autoimmune disorders in comparison with other treatments.
- justify why you have chosen specific sources and rejected others - your justification should be based on:
  - how reliable you think the source is and why
  - how relevant you think the source is and why
- use an academic referencing technique when citing or referencing literature

Add any notes about your work in your project diary. These notes will not be marked. They are to help you to complete task 6 which is a reflective evaluation.

Resources

- project brief
- computer access
- NCFE provided literature database (appendix 1)
- guidance on capturing browsing history
- research a strategy template pro forma
- project diary

Assessment objectives

AO2: Apply core knowledge and skills to the development of a scientific project (18 marks)

AO4: Use English, mathematics, and digital skills as appropriate (4 marks)

Core skills

CS2: Researching

CS7: Reflective evaluation

The evidence I have to submit for this task

A literature review.

Internet browsing history.

Submission

The following filename convention should be used for all materials produced:

(Provider_number)_(Student registration number)_(Surname)_(First name)_Task1_Research_Strategy

Note: Please request your provider and student number from your tutor.

How the evidence will be assessed

This will be externally marked by examiners.

Time for completion of task 1

3 hours. Plus 30 minutes for completion of project diary.

Task 2: plan a project

(36 marks)

What you have to do

Use the sources that you selected in your literature review to complete a project plan.

The project plan must:

- outline a method for determining the WBC count of the patient samples and how to determine whether the count falls outside of the normal range
- include all appropriate risk assessments relevant to the investigation
- identify the data or information you need to collect prior to the investigation in order to be able to conduct it
- identify the data you would expect to collect throughout the investigation in order to confirm that each step has been successful
- describe how you will collect the required data and who you will report these findings to

Add any notes about your work in your project diary. These notes will not be marked. They are to help you to complete task 6 which is a reflective evaluation.

Resources

- project brief
- NCFE provided literature database (appendix 1)
- literature review (from task 1)
- project diary
- risk assessment form template
- risk matrix

Assessment objectives

AO1: Plan their approach to meeting the project brief (12 marks)

AO2: Apply core knowledge and skills to the development of a scientific project (12 marks)

AO4: Use English, mathematics, and digital skills as appropriate (4 marks)

AO5: Realise a project outcome and review how well the outcome meets the brief (8 marks)

Core skills

CS1: Project management

CS2: Researching

CS3: Working with others (risk assessment)

CS4: Creativity and innovation

CS6: Communication (written)

CS7: Reflective evaluation

The evidence I have to submit for this task

Your project plan.

Submission

The following filename convention should be used for all materials produced:

(Provider_number)_(Student registration number)_(Surname)_(First name)_Task2_Plan_Project

Note: Please request your provider and student number from your tutor.

How the evidence will be assessed

This will be externally marked by examiners.

Time allowed for completion of task 2

3 hours. Plus 30 minutes for completion of project diary.

Task 3: analyse data

(34 marks)

What you have to do

Due to the limitations of time and resources, you are not required to carry out the investigation you have planned.

Therefore, you have been provided with a raw data pack, obtained from an organisation that developed and carried out a similar plan to investigate the effect of steroids on patients' WBC count. The raw data pack is in the form of a laboratory information management system (LIMS) spreadsheet. You may also find the statistical techniques booklet useful in deciding which statistical tests are appropriate – you are **not** required to use them all.

In the trial, 40 patients with an autoimmune disorder, which results in a raised WBC count, were recruited. The patients were randomly assigned one of four steroid treatments to suppress their immune system and bring down their WBC count. Each patient's WBC count was measured before treatment began and again after 6 months of continued use of the steroid treatment.

The aim of the research was to determine which of the four steroid treatments was most effective at bringing the patients' WBC count within the normal range.

You must:

- analyse the data provided to measure the effectiveness of the plan used during the trial
- produce a report of your analysis, to include:
  - presentation of data to enable peer review
  - selection of appropriate statistical techniques
  - application of appropriate statistical techniques
  - justification for your conclusions

Add any notes about your work in your project diary. These notes will not be marked. They are to help you to complete task 6 which is a reflective evaluation.

Resources

- project brief
- computer access
- access to NCFE provided LIMS spreadsheet
- project diary
- statistical techniques guidance document

Assessment objectives

AO2: Apply core knowledge and skills to the development of a scientific project (16 marks)

AO3: Select relevant techniques and resources to meet the brief (6 marks)

AO4: Use English, mathematics, and digital skills as appropriate (6 marks)

AO5: Realise a project outcome and review how well the outcome meets the brief (6 marks)

Core skills

CS4: Creativity and innovation

CS5: Problem solving

CS6: Communication (written)

CS7: Reflective evaluation

The evidence I have to submit for this task

Your analysis report including any charts and graphs.

Submission

The following filename convention should be used for all materials produced:

(Provider_number)_(Student registration number)_(Surname)_(First name)_Task3_Analyse_Data

Note: Please request your provider and student number from your tutor.

How the evidence will be assessed

This will be externally marked by examiners.

Time allowed for completion of task 3

3 hours. Plus 30 minutes for completion of project diary.

Task 4: present outcomes and conclusions

(28 marks)

What you have to do

4(a) Use your project plan from task 2 and your report from task 3 to produce an A2 scientific poster to describe your findings. The poster may be produced and displayed electronically rather than printed.

Your poster must describe:

- the problem being addressed/investigated
- the results of your analysis, including any graphs and charts
- your conclusion

4(b) Produce a presentation to summarise the main points from your poster to your tutor. Your tutor will make observations on your presentation and ask questions if further detail is needed. The presentation will be recorded by video.

Add any notes about your work in your project diary. These notes will not be marked. They are to help you to complete task 6 which is a reflective evaluation.

Resources

- project brief
- computer and printer access
- access to NCFE provided LIMS spreadsheet
- your analysis report from task 3
- A2 paper, various coloured markers, scissors and glue, and/or IT software/applications to create poster (or parts of) for printing, and printing facilities
- project diary

Assessment objectives

AO2: Apply core knowledge and skills to the development of a scientific project (12 marks)

AO3: Select relevant techniques and resources to meet the brief (6 marks)

AO4: Use English, mathematics, and digital skills as appropriate (4 marks)

AO5: Realise a project outcome and review how well the outcome meets the brief (6 marks)

Core skills

CS4: Creativity and Innovation

CS6: Communication (written and verbal)

CS7: Reflective evaluation

The evidence I have to submit for this task

Your A2 scientific poster.

Video recording of presentation.

Submission

The following filename convention should be used for all materials produced:

(Provider_number)_(Student registration number)_(Surname)_(First name)_Task4_Present_Outcomes

Note: Please request your provider and student number from your tutor.

How the evidence will be assessed

This will be externally marked by examiners using the video recording and assessor commentary.

Time allowed for completion of task 4

4(a) 3 hours.

4(b) 1 hour. Plus 30 minutes for completion of project diary.

Task 5: group discussion

(9 marks)

What you have to do

You have been provided with an email from a patient (see appendix 2) who has an autoimmune disorder and has been signed up to the next phase of the clinical trial. They will need to give a blood sample to allow for a WBC count to be performed and the patient would like further information about how their WBC count will be determined, as well as the effect of steroids in the treatment of their autoimmune disorder.

In your allocated group, discuss the questions the patient has raised and how it would be best to respond to these concerns. You will need to refer to your research notes to contribute effectively to the discussion. It is suggested that 10 minutes are allocated to this at the start of the discussion.

Each group member will then take it in turns to make suggestions and to agree on an approach. It is suggested that groups consist of a maximum of 6 individuals to allow sufficient time for discussion in 40 minutes; this will allow ample time for individuals to give their opinion and respond to others. Your group discussion will be recorded.

Take notes during the team discussion. Write down any valid points and suggestions made.

Following the discussion, you will need to (individually) draft an email to the patient to respond to the concerns raised. This email response can be handwritten or produced in suitable word processing software it does **not** need to be written in an email client. Usual exam conditions apply during this part of the task (max 10 minutes).

There is an overall time limit of 1 hour for this task. In this time, you will:

- be asked to read the email from the patient in your groups (see appendix 2)
- be given 10 minutes to familiarise yourself with your literature review, your plan, your data analysis and scientific poster
- discuss your suggestions for responding to the patient
- be given 10 minutes to draft an email to the patient to respond to the concerns raised

Student resources required

- project brief
- your literature review (task 1)
- your project plan (task 2)
- your data analysis and report (task 3)
- your A2 scientific poster (task 4)
- email (appendix 2)

Assessment objectives

AO2: Apply core knowledge and skills to the development of a scientific project (4 marks)

AO3: Select relevant techniques and resources to meet the brief (2 marks)

AO5: Realise a project outcome and review how well the outcome meets the brief (3 marks)

Core skills

CS3: Working with others

CS4: Creativity and innovation

CS5: Problem solving

CS6: Communication (verbal)

CS7: Reflective evaluation

The evidence I have to submit for this task

Your recorded discussion.

Your email reply to the patient.

Submission

The following filename convention should be used for all materials produced:

(Provider_number)_(Student registration number)_(Surname)_(First name)_Task5_Group_Discussion

Note: Please request your provider and student number from your tutor.

How the evidence will be assessed

This will be externally marked by examiners.

Time allowed for completion of task 5

1 hour.

Task 6: reflective evaluation

(18 marks)

What you have to do

Write a reflective evaluation of your work. This should be based on:

- your literature review (task 1)
- the experience of developing your project plan (task 2)
- your data analysis and report (task 3)
- your A2 scientific poster (task 4)

Your reflections should include:

- an evaluation of your approach to each task, including the methods and tools used in your analysis
- any changes you would make to your approach to each task

Your notebooks and previous work can be used to support your evaluation

Resources

- project brief
- your literature review
- your project plan
- your data analysis and report
- your A2 scientific poster
- your project diary
- access to the NCFE provided literature database (appendix 1)
- access to the NCFE provided LIMS spreadsheet
- reflective evaluation template

Assessment objectives

AO2: Apply core knowledge and skills to the development of a scientific project (7 marks)

AO3: Select relevant techniques and resources to meet the brief (2 marks)

AO4: Use English, mathematics, and digital skills as appropriate (4 marks)

AO5: Realise a project outcome and review against the intended project aims (5 marks)

Core skills

CS6: Communication (written)

CS7: Reflective evaluation

The evidence I have to submit for this task

Your written reflective evaluation.

Submission

The following filename convention should be used for all materials produced:

(Provider_number)_(Student registration number)_(Surname)_(First name)_Task6_Reflective_Evaluation

Note: Please request your provider and student number from your tutor.

How the evidence will be assessed

This will be externally marked by examiners.

Time allowed for completion of task 6

2 hours.

Appendix 1: literature database

https://www.cancer.gov/publications/dictionaries/cancer-terms/def/white-blood-cell

https://www.healthline.com/health/leukopenia

https://www.healthline.com/health/food-nutrition/foods-that-boost-the-immune-system

https://bloodcancer.org.uk/understanding-blood-cancer/blood-cells/

https://orthop.washington.edu/patient-care/articles/arthritis/rheumatoid-arthritis.html#

https://www.topdoctors.co.uk/medical-dictionary/low-blood-count

https://www.nhs.uk/conditions/low-white-blood-cell-count/

https://www.ucsfhealth.org/medical-tests/wbc-count

https://www.medicalnewstoday.com/articles/327446#normal-ranges

https://www.abcam.com/protocols/counting-cells-using-a-haemocytometer

https://www.med.upenn.edu/robertsonlab/assets/user-content/documents/Cell%20Counts%20with%20a%20%20Hemacytometer.pdf

https://kidshealth.org/en/parents/labtest4.html

https://www.theguardian.com/science/2022/sep/15/scientists-hail-autoimmune-disease-therapy-breakthrough-car-t-cell-lupus

https://www.nhs.uk/conditions/steroids/#:~:text=Steroids%20also%20reduce%20the%20activity,system%20mistakenly%20attacking%20the%20body

https://www.news-medical.net/health/Treatment-Options-for-Autoimmune-Disease.aspx

https://www.stylecraze.com/articles/how-to-increase-white-blood-cells/

https://creakyjoints.org/living-with-arthritis/coronavirus/treatments/prednisone-steroids-immunosuppressing-coronavirus/

https://www.nps.org.au/australian-prescriber/articles/corticosteroids-in-autoimmune-diseases

Appendix 2: email from patient

Dear Scientist,

I have rheumatoid arthritis, an autoimmune disorder and have been signed up to the next phase of your trial testing the effectiveness of a steroid and I am looking for reassurance.

I appreciate your experience within the industry and how you keep up to date with regulations surrounding clinical trials into new steroid treatments for autoimmune disorders. I would, therefore, like to know a little more about the methods you use to gain accurate WBC counts from the participants in your trials, as well as the effect of the steroids in treating autoimmune disorders, to determine whether it is worth trialing the treatment.

Best wishes,

A curious patient

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