

Launch-a-Lab

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Launch-a-Lab

STS Contract Analysis (established in 1974) is tendering for a large contract with Midshire River Authority for the analysis of organic pollutants in ground water.

You are part of the STS management team.

Your task is to ensure that the company can deliver a high quality service with a suitable profit margin if they win the contract.

Launch-a-Lab

SCIENTIFIC SKILLS

- industrial chemistry
- economics
- analytical methods
- validation
- accreditation standards
- instrumentation

TRANSFERABLE SKILLS

- working with others
- CV writing
- interviewing
- communication
- decision making
- analytical/critical thinking
- independent learning
- time management



Choosing an Instrument (1)

STS Contract Analysis was established in 1974 as an analytical service to external companies and organisations. The Managing Director has decided to expand the business of water and soil analysis. The company is tendering for the Midshire River Authority contract for the organic analysis of polluted ground water. The organics include polyaromatic hydrocarbons (PAHs), phenols, ketones, hydrocarbons (oil, diesel, petrol etc.) and pesticides (e.g. diquat, etc.).

Your task is to recommend one new instrument that could be used for ROUTINE analysis of PAHs at sub-ppb levels.

You might consider: -

- Comparing GC and HPLC for PAH analysis.
- The type of column that would give the required resolution.
- The detector that would be appropriate for ROUTINE analysis to sub-ppb levels.

Once these have been considered, you must recommend a manufacturer and an approximate price for your recommended instrument.

The MD suggests that <http://www.mediabrain.com/client/LabGuide/> may be a good starting point.

Produce your recommendations on one overhead transparency and be prepared to present this to the Managing Director at your next meeting.

Notes

The options for the instrumental technique are:

- High pressure liquid chromatograph with C-18 reverse phase column.
Normal phase column.
- Gas liquid chromatograph with
Packed column.
Capillary column.

The detector must be able to detect down to sub-ppb levels and be suitable for routine analysis. The options are:

- UV-vis spectrometer
- Diode array detector
- Flame ionising detector
- Fluorescence
- Mass spectrometer



Choosing an Instrument (2)

STS Contract Analysis was established in 1974 as an analytical service to external companies and organisations. The Managing Director has decided to expand the business of water and soil analysis. The company is tendering for the Midshire River Authority contract for the organic analysis of polluted ground water. The organics include polyaromatic hydrocarbons, phenols, ketones, hydrocarbons (oil, diesel, petrol etc.) and pesticides (e.g. diquat, etc.).

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Notes

The options for instrument are:

High pressure liquid chromatography

- HPLC with fluorescence detector (HPLC-fluorescence)
- HPLC with diode array detector (HPLC-diode array)
- HPLC with tandem mass spectrometer detector (HPLC-MS).

Gas liquid chromatography

- GLC with flame ionising detector (GLC-FID)
- GLC with tandem mass spectrometer detector (GLC-MS).



Costing and Pricing

STS Contract Analysis was established in 1974 as an analytical service to external companies and organisations. The Managing Director has decided to expand the business of water and soil analysis. The company is tendering for the Midshire River Authority contract for the organic analysis of polluted ground water. The organics include polyaromatic hydrocarbons, phenols, ketones, hydrocarbons (oil, diesel, petrol etc.) and pesticides (e.g. diquat, etc.).

Your task is to consider the elements involved in the cost of the analysis of polyaromatic hydrocarbons (PAHs) in polluted ground water by HPLC-fluorescence. What pricing strategy would you use with various customers?

You might consider: -

- Fixed costs within an analytical laboratory.
- Variable costs of carrying out an analysis in a laboratory.
- The price for one off analysis.
- Charging a different price if you were providing a regular analysis of PAH in water for a customer.

Produce your recommendations on one overhead transparency and be prepared to present this to the Managing Director at your next meeting.

Notes



Accreditation Standards

STS Contract Analysis was established in 1974 as an analytical service to external companies and organisations. The Managing Director has decided to expand the business of water and soil analysis. The company is tendering for the Midshire River Authority contract for the organic analysis of polluted ground water. The organics include polyaromatic hydrocarbons, phenols, ketones, hydrocarbons (oil, diesel, petrol etc.) and pesticides (e.g. diquat, etc.).

Accreditation standards may be defined as the formal recognition that a laboratory meets certain specified international standards. The Managing Director requires an update on these standards and has suggested that United Kingdom Accreditation Service (UKAS) [<http://www.ukas.co.uk/>] might be a good starting point.

Your task is to identify suitable accreditation standards required for this laboratory.

You might consider: -

- The importance of accreditation standards.
- What is required to obtain such standards.
- Differences between environmental and pharmaceutical analysis.
- Becoming actively involved in proficiency testing schemes between laboratories.

Produce your recommendations on one overhead transparency and be prepared to present this to the Managing Director at your next meeting.

Notes



Validation of Methods

STS Contract Analysis was established in 1974 as an analytical service to external companies and organisations. The Managing Director has decided to expand the business of water and soil analysis. The company is tendering for the Midshire River Authority contract for the organic analysis of polluted ground water. The organics include polyaromatic hydrocarbons, phenols, ketones, hydrocarbons (oil, diesel, petrol etc.) and pesticides (e.g. diquat, etc.).

The Managing Director is concerned about the validation of some of the analytical procedures currently used. He has suggested www.vam.org.uk would be a useful starting point for this investigation.

Your task is to state why validation of a method is essential and to identify the steps required in the validation of the pre-concentration of polyaromatic hydrocarbons from polluted ground water using solid phase extraction (SPE).

You might consider: -

- The grade of solvents used.
- Number of data points on a calibration graph.
- The role of reference materials in the validation procedure.

Produce your recommendations on one overhead transparency and be prepared to present this to the Managing Director at your next meeting.

Procedure for SPE of PAHs in Water Samples

A solid phase extraction (SPE) cartridge looks like the barrel of a syringe with some packing material. The sample is passed through under gravity. This concentrates the analyte and removes some of the impurities before analysis. The method below is based upon the Environment Protection Agency (EPA) method 525.

Apparatus

1 litre brown glass sample bottle, 250 ml volumetric flask, SPE cartridge.

Reagents

De-ionised water, methanol, toluene, 50 : 50 toluene: methanol mixture.

Method

The total analysis time for this procedure is 30-40 minutes.

Sample preparation

1. The sample of water is collected in a 1 litre brown glass sample bottle.
2. Store below 5 °C until required.

Conditioning

3. The SPE cartridge is secured to a stand.
4. Pour about 6 ml of 50:50 toluene : methanol onto the SPE cartridge and discard the eluent. Then repeat this procedure again.
5. Pour about 6 ml of methanol onto the SPE cartridge and discard the eluent.
6. Finally pour about 6 ml of de-ionised water onto the SPE cartridge and discard the eluent.

Sample extraction

7. Take sample out of the fridge.
8. Pour 250 ml of water sample into a 250 ml volumetric flask and pour this then through the cartridge at about a flow rate of about 10 ml/min

Sample elution

9. Dry the SPE cartridge in a 105 °C oven for between 5 and 10 minutes to remove the water.
10. Elute the PAHs from the cartridge by running 1 ml of 50:50 toluene: water through the SPE cartridge and collect the extract. Repeat again and combine the extracts.



Design a Laboratory

STS Contract Analysis was established in 1974 as an analytical service to external companies and organisations. The Managing Director has decided to expand the business of water and soil analysis. The company is tendering for the Midshire River Authority contract for the organic analysis of polluted ground water. The organics include polyaromatic hydrocarbons (PAHs), phenols, ketones, hydrocarbons (oil, diesel, petrol etc.) and pesticides (e.g. diquat, etc.).

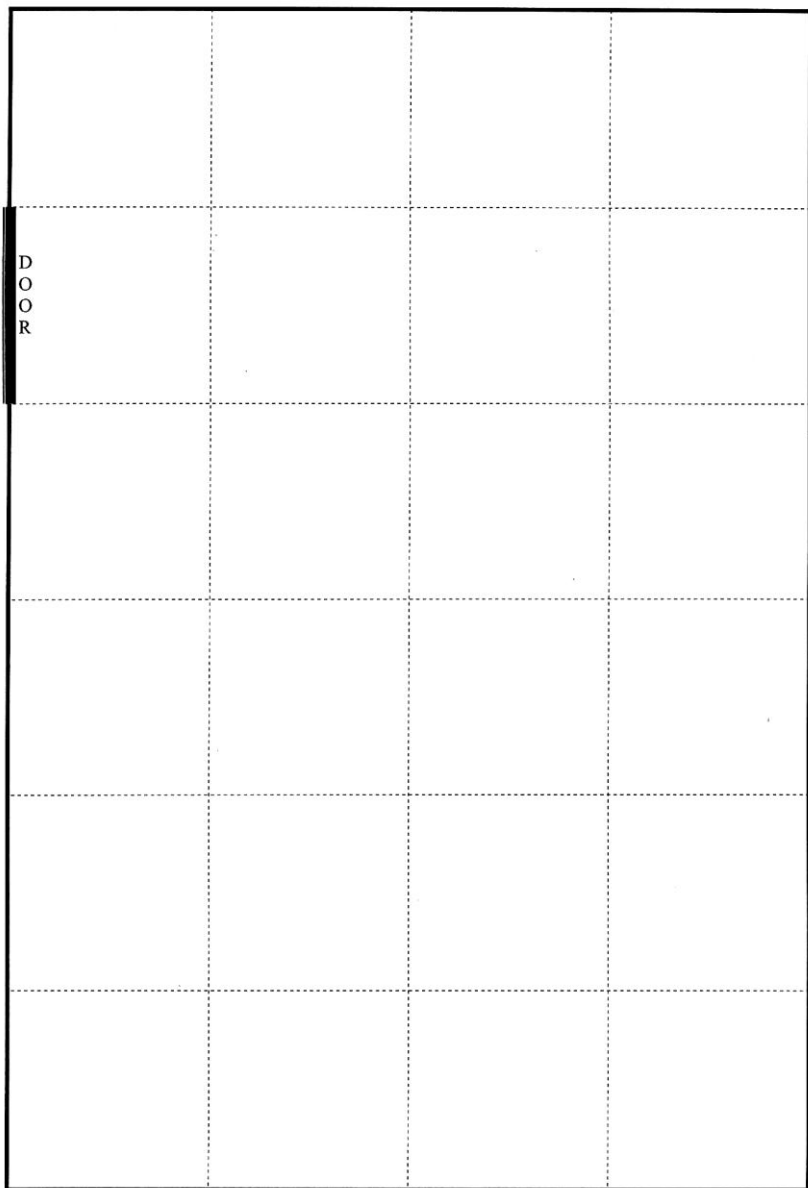
It has been decided to convert the old storeroom (6 m by 4 m) next to the new instrument laboratory into a sample preparation laboratory. The door is 1 m wide on the NW corner. The window (2 m) is south facing. Standard bench width is 90 cm. Cupboards and fume cupboards come in standard 1 m and 2 m widths.

Your task is to design this new laboratory for sample preparation for organic analysis.

You might consider: -

- The services required.
- Type and number of benches and cupboards.
- Whether fume cupboard(s), fridge(s) or freezer(s) would be required.
- Number and type of sinks.
- Type of floor covering.

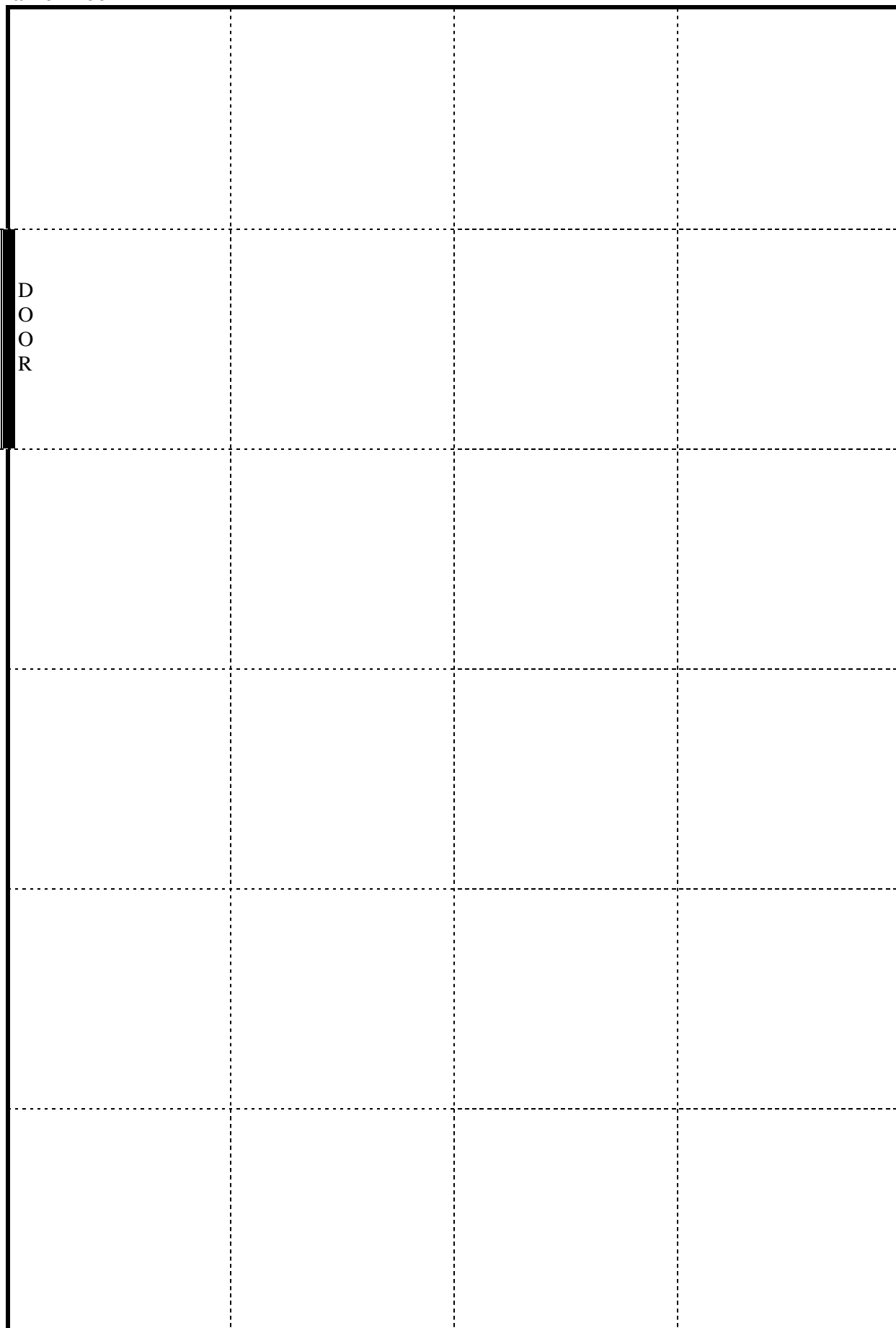
Produce your plan on one overhead transparency and be prepared to present this to the Managing Director at your next meeting.



D
O
O
R

Window

Plan of Room



Scale 1cm = 0.25 m

Window



Marketing

Midshire Water Authority has accepted the tender submitted by STS Contract Analysis. Your proposals for the analysis of PAHs in ground water have been successful. The Managing Director now wants to market the company in a bid to attract further lucrative contracts.

Your task is to design a two-page brochure to advertise STS Contract Analysis.

You might consider: -

- Who your potential competitors and customers are.
- How you would focus your advertising to particular client groups.

You should be prepared to present your design in the form of a poster at your next meeting. It should be both eye-catching and informative

Notes



Poster Presentation

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Group Name:	Assessor	Grade (10 marks)

You might consider the following: -

Visual Appeal

Professional / Adequate / Poor

Use of graphics, pictures, tables and illustrations

Effective / Average / Poor

Content

Good / Average / Poor

Organisation of material

Effective / Adequate / Poor

Text legible from 1 metre?

All / Some / None

Comments

STS Poster Presentation

Group Name:	Assessor	Grade (10 marks)
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You might consider the following: -

Visual Appeal

Professional / Adequate / Poor

Use of graphics, pictures, tables and illustrations

Effective / Average / Poor

Content

Good / Average / Poor

Organisation of material

Effective / Adequate / Poor

Text legible from 1 metre?

All / Some / None

Comments

STS Employing Staff

The new contract with Midland River Authority is to commence shortly. You have an urgent requirement for new staff to fulfil this contract.

Task 1

Each group must produce an advertisement for a new member of staff in one of the laboratories. The advertisement should outline the qualifications and qualities desirable in the new appointee and give details of the post and remuneration package. Each company should bring 6 copies of your word-processed advertisement with you next week.

Task 2

Whilst reasonably happy working for your current company, you have been looking around for new opportunities. You have seen a post advertised by a rival company, which would use many of the skills and knowledge that you have gained over the past few years. You decide to apply for the post. Next week you should bring with you 6 copies of your CV. If you don't have an up to date version you should prepare one.

Notes about CVs

The impact of your CV and your basic qualifications will probably influence whether or not your application is immediately thrown away! There are various styles of CV and you should find one that looks professional, concise and eye catching. To get an interview, your application will need to demonstrate concisely that you're special.

For example you will need:

- A covering letter that clearly states why you want this job and why you think you would be good at it
- A CV with, in addition to the standard information, a summary of the skills you have that are relevant to the job you want and backed up by evidence

It is likely that everyone who applied for the job has the relevant academic qualifications. Just getting, say a 2i from a certain university may not in itself be sufficient to get you through the interview door. Always try to highlight 'other skills' that you have developed. These may come through modules such as chemical and professional skills, your project, or from part-time work, student union activities etc. Highlight information technology, communication, team working, problem solving, organisational and interpersonal skills etc.

If an application form asks for 'any additional information' NEVER leave this blank. Always think of something to write about yourself. Blow your own trumpet – nobody else will! Overleaf is a very brief example of a (fictitious) CV. Yours will elaborate on many of the main areas covered but the basic headings should be included. It may be helpful to go through this CV and make suggestions for improvements before looking at your own.

Notes about Covering Letters

1. The opening paragraph should identify yourself, indicate the position for which you are applying and state where you have learned about the vacancy.
2. The second paragraph should state why you are interested in this work, briefly mention your academic background, relevant qualification, related work experience that qualify you for the position. Summarise your talents and how they might assist the employer.
3. The third paragraph refers to a CV or form and draws attention to any further points relevant to your application.

4. Final paragraph reiterates your interest, availability for interview and if necessary asks for further information. Close your letter with a confident statement that will encourage a positive response.

Curriculum Vitae

Name Eddie Einstein
Address 37 Brainewave Way
Beauport, BE2 3XA
DoB 1.1.1978

Education

1996-2000 University of Midshire
MChem Chemistry with French 2i
Final Year Project: '*Synthesis of 2,4-dimethyl chicken-wire.*'

1994-1996 Market Hampton 6th Form College
A levels - Chemistry A, Physics B, French C

1989-1994 St Gilbert's Comprehensive School,
Market Hampton
9 GCSEs grades A to C, including English,
Maths, French

Work Experience

Sept 1998- July 1999 Worked in France for my year in industry at
Chemie Francais in Lyon. Work involved
analysing samples and preparing reports.

June 1997- Aug 1997 Tomato picking at Tyson's Salads, Beauport.

Sept 1994- July 1996 Saturday job at Footie Sports, Market Hampton.

Additional Skills

During my time in France I not only became proficient in the French language but also learnt a wide range of analytical laboratory skills. I also had to make oral and written reports to senior managers. I worked as part of a small interdisciplinary team.

All of my work experience has enabled me to develop excellent time management and interpersonal skill, I am always punctual, conscientious and get on well with colleagues at all levels.

During my course at the University of Midshire I took several modules which focussed on the development of 'professional skills'. I developed further my oral and written communication skills and had to work as part of a team to solve complex problems. My final year project also enabled me to further develop these skills as well as become an independent researcher.

Other Interests

I enjoy many types of sports including football walking and competitive embroidery. I am a keen musician and enjoy jazz and blues music.

During my time at the University of Midshire, I was treasurer and captain of the university 1st XI football team. This experience has developed my leadership and negotiating skills.

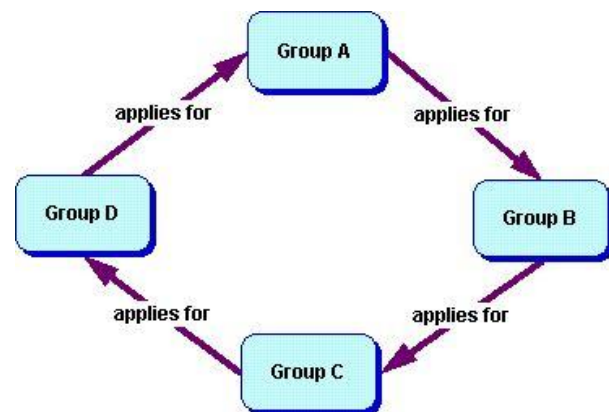
Referees

Dr Tina Overdone
Department of Chemistry
University of Midshire
Beauport BE6 7RX

Dr Marcel Evian
Chemie Francais
Lyon
France

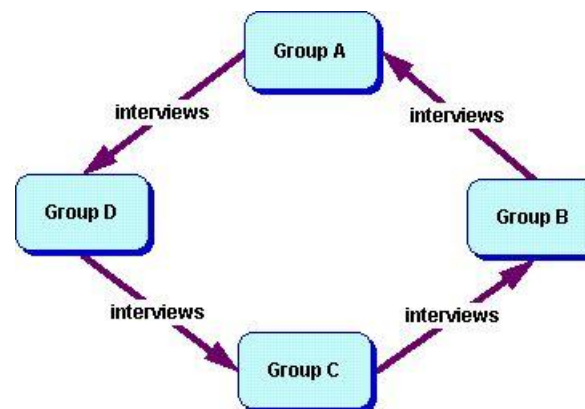
STS Applications and Interviews

Now that you have seen the job advertised and updated your CV you need to write a letter of application and apply for the new post. Your letter should indicate that you really want THIS job.



Put your application into tutor's pigeonhole by closing date. It should be in a sealed envelope clearly marked 'Application for post advertised by group X.' Each group should collect the applications for their post from the tutor the day after the closing date.

Look through the applications and familiarise yourself with them before the interviews. The schedule for interviews is:



Only the groups interviewing and being interviewed need to turn up.

Each person will have a 5-minute interview with the interview panel. At the end of the interviews the interview panel must make an appointment and provide feedback to each candidate.

Notes about Interviews

There are two messages you need to get across during any interview

- you want this job more than any other job
- you are the very best person to do this job

Remember that you are on interview for the whole time that you are on the employers' premises. Any member of staff may be asked to give an informal or formal opinion of you, from the receptionist who greeted you, to the junior manager who took you to lunch and the 'informal' chat with personnel.

Be aware that employers want to check/assess your: technical skills; problem solving abilities; organisational skills; managerial skills; interpersonal skills (team player or solo performer?), and communication skills. The interview(s) will be trying to assess all of these things. Good answers to questions about your ability at anything should include a specific example of when you successfully demonstrated that skill.

It is a good idea to have a few questions ready to ask the interviewers. This gives the impression that you are interested and on the ball. However, restrict your questions to the job you are about to be offered, promotion prospects etc. **DO NOT** ask about hours, holidays or salary at this stage! You can sort all that out when you get the offer.

And it should go without saying that you should look as if you have made an effort. That means best bib and tucker. Appearances **DO** matter!

For good advice on applying for jobs, CV's, interviews etc use your university careers service. Attached are some extracts from the University of Hull careers advisory publication *What Next* (2000).

Questions Asked by Employers during Interviews

Examples of Criteria Based Questions

Describe a situation where you have worked in a group or a team

- What was your role in the Group?
- How did this role link with other team members?
- In what ways were the efforts of the individual members co-ordinated?
- What part did you play in this?

Possible Criteria Being Investigated

Team working, persuasive skills. Ability to gain respect and confidences

Describe a situation where you have organised an activity that involved a deadline.

- What was the situation?
- What did you do?
- What was the outcome?

Ability to withstand pressure, planning, prioritising and organisational skills

Describe a situation where as leader of a group you set directions for them, gained their commitment and led them to achieve outstanding results.

- What was the task?
- What actions did you take?
- What was the outcome?

Organisational skills, team working, delegation, listening, awareness of group working.

Describe a complex problem you have had to think through.

- What steps did you take in tackling the problem?
- What help, if any, did you seek?
- What was the outcome and how did you feel about it?

Analytical skills, planning / prioritising, and weighing up alternative solutions.

Describe a situation where you have had to convince someone else of something that was important to you.

- What was the issue and why was it important?
- Who did you have to persuade?
- What did you do and what was the result?

Personal credibility, persuasive skills and prepared to take responsibility.

Describe a project you have completed.

- What problems did you meet? Planning, prioritising and realistic problem solving
- How did you overcome them?
- What have you learned from this"

Educational Record

1. Why did you choose your 'A' level subjects?
2. Why did you choose your degree subject?
3. If you could do so, how and why would you plan your academic study differently?
4. If you could make changes in your University, how and why would you do so?
5. Do you consider that your results, so far, indicate, your academic potential?
6. Could you explain what your project is about?
7. Do you have plans for further study?
8. What have you learned from participation in extra-curricular activities?
9. What other skills do you have? (E.g. numeracy, languages, computer skills, etc.)
10. What accomplishments have given you the most satisfaction at University?

Personal Characteristics

1. Describe your most rewarding experience.
2. Is there anything you dislike very much - what makes you feel angry?
3. How would you sum up your strengths and weaknesses'?
4. What motivates you to your greatest effort'?
5. How would you describe yourself?
6. How do you think a friend who knows you well would describe you?
7. Describe the most important problem in personal relationships that you have encountered and how you resolved it?
8. What is the most important mistake you've made and what did you learn from it?
9. What lessons have you learnt from holding positions of responsibility?
10. Do you prefer working alone or with others?

Interests/Activities

1. What has your membership of the cricket committee involved?
2. Have you had to deal with awkward people in organising these activities?
3. Do you enjoy being captain'?

Career Motivation

1. How has the University prepared you for a (e.g. business career)?
2. Why have you applied for this kind of work/career?
3. What do you see yourself doing in five/ten years' time'?
4. What short-term career goals have you set and why?

Questions to the interviewer

1. How do you define the training period for graduates?
2. Is finding accommodation for young graduates a problem – where do they live?
3. What has happened to graduates you have recruited?

4. What are your plans to expand the department?
5. Does your company support or have any involvement with the local community?
6. Is there a high turnover of graduates in your company?



Feedback from Interview and CV

Name of Applicant

.....

Please give examples of candidates strengths and indicate any areas for possible development

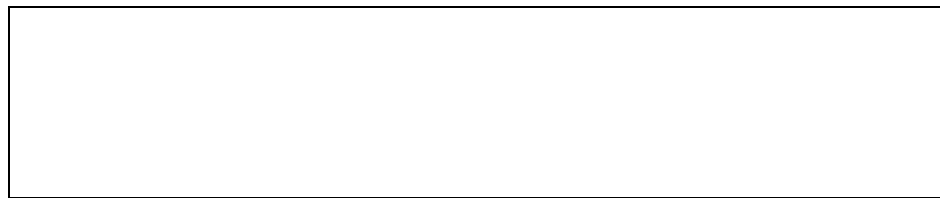


Feedback from Interview and CV

Name of Applicant

.....

Please give examples of candidates' strengths and indicate any areas for possible development



STS Interviews

Instructions to Interview Panel

1. Put applicant at their ease.
2. Introduce yourself, e.g. chairperson is
3. Use fair questions.
4. Know what they are looking for.
5. Keep the interview flowing.
6. Invite questions from the candidate.
7. Probe CV and other qualities,.

Applicant 1	
Comments	strengths/weaknesses
Score/10	

Applicant 2	
Comments	strengths/weaknesses
Score/10	

Applicant 3	
Comments	strengths/weaknesses
Score/10	

Applicant 4	
Comments	strengths/weaknesses
Score/10	

Applicant 5	
Comments	strengths/weaknesses
Score/10	

Applicant 6	
Comments	strengths/weaknesses
Score/10	

Successful Applicant is

Reasons



Tutor's interviewing record sheet

Group A	Score
1.	
2.	
3.	
4.	
5.	
6.	
Group B	
1.	
2.	
3.	
4.	
5.	
6.	
Group C	
1.	
2.	
3.	
4.	
5.	
6.	
Group D	
1.	
2.	
3.	
4.	
5.	
6.	

Author	Tina Overton, Simon Belt, Stephen Summerfield
Title	Launch-a-lab Problem-Based Learning Case Study
Classification	Case Study
Keywords	sfsoer, ukoer, chemistry, industrial, analytical, case study, problem-based learning
Description	Appendix A
Creative Commons Licence (url)	http://creativecommons.org/licenses/by-nc-nd/2.0/uk/
Language	English
File size	500 kB
File format	pdf