

Lesson Plan Handbook

For Inspire Engineering Mentoring Programme Mentors



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Summary

This booklet contains lesson plans for 10 mentoring meetings, which are split into two setups:

Meetings 1-7

These lesson plans are very structured, and cover subjects relevant to personal and professional development – the main objectives of the programme. Please follow these lesson plans closely, as they are meant to cover topics important to all students.

You may find that you do not need all the materials provided. For example, you may not need information on what each section of a CV entails if you are already comfortable writing CVs. However, information like this has been included so that you may use it if you wish. It may also help you to better communicate these ideas to your mentees.

Meetings 8-10

The last three meetings of the programme are open-ended so that you may cover whichever topics you believe will be most beneficial to your mentees. If you are comfortable and willing to develop your own lesson plans for these meetings, please do so. Activities such as job shadows and guest speakers are highly recommended if you are able to arrange them. However, at the end of this booklet you will find four optional lesson plans that may be used for these meetings if you would prefer. Note that some of these plans include homework assignments that should be done before the meeting, so look at the lessons ahead of time if you plan to assign these.

For meeting 10, it is highly recommended that you follow the included lesson plan for a wrap-up session. This plan includes a brief mentee presentation, which would need to be assigned during meeting 9. If you choose not to follow this plan, ensure that you leave 15-20 minutes at the end of the meeting for the students to fill out evaluation forms.

Meeting Themes:

These lesson plans are grouped thematically:

- Meetings 1-3 provide an overview of engineering: what engineering is, what the different types of engineering are, and how it affects our daily lives.
- Meetings 4-7 cover topics relevant to professional development: career paths, CV writing, and interviews.
- Meetings 8-10's optional lesson plans cover topics relevant to personal development: communication, problem solving, etc. However, these meetings should focus on whatever topics would be most beneficial for the mentees.

Reflection Sheets

At the end of each lesson you will find a reflection worksheet. This sheet will ask you questions about what went well during the lesson, any issues or questions you encountered, and how the lesson could be improved in the future. Please fill these sheets out immediately after each lesson. These sheets, which will be handed into the programme coordinator, will provide valuable feedback for shaping lesson plans in future years. Please be honest with your feedback. These sheets are also intended to help you articulate your thoughts about the lesson and write them down while the meeting is still fresh in your mind. This will enable you to better discuss the lesson at your next check-in meeting.

NOTE: All times found in these lesson plans are approximate and do not need to be followed exactly.

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Meeting Objectives

Meeting 1

Objectives: In groups, explain what engineering is and how it applies to the world around us.

Get students comfortable with asking questions

Activities: What is Engineering?, A Day in the Life, Introductions, Quiet Questions

Meeting 2

Objectives: Explore interests in a specific engineering field. Learn to talk about engineering and apply it to the real world.

Activities: Quiet Questions Answers, Everyday Engineering

Meeting 3

Objectives: Real world example of students and professionals in exact fields of interest

Activities: Everyday Object Presentation, Problem Solving Project, Quiet Questions

Meeting 4

Objectives: Explore all the paths of entering the engineering industry

Activities: Career Path Overview, Career Path Matching Activity, Quiet Questions

Meeting 5

Objectives: Professional development through CV writing and critiques

Activities: Quiet Questions Answers, How to Write a CV Overview, Sample CV Critiques, Brainstorming Session, Write your CV (HW)

Meeting 6

Objectives: Building confidence

Activities: Elevator Pitch Activity, Interview Prep

Meeting 7

Objectives: Professional development through mock interviews

Activities: Mock Interview, Quiet Questions

Meetings 8-9

Objectives: Decided by mentor

Activities: See optional lesson plans

Meeting 10

Objectives: Conclude Programme

Activities: Presentation, Final Discussion, Evaluation Form

Meeting 1: Introduction to Engineering

Meeting Agenda

A Day in the Life of an Engineer Activity (30 minutes)

Icebreakers (20 minutes)

Quiet Questions (10 minutes)

A Day in the Life of an Engineer

Objectives

In this section of the programme, you will help participants:

- Understand what an engineer does on a day-to-day basis
- Understand what engineering means to different people

Lesson Background

There are many misconceptions about what an engineer does. Some students think engineering is all fieldwork – they believe it is only construction work, etc. Our goal here is to give students a general idea of what engineers actually do. They can manage projects, work in an office, work in the field, or a combination of all of these. Seeing the wide variety of jobs that fall under an engineer's day-to-day tasks helps to break down many of the stereotypes that drive students away from these fields.

Activity (30 minutes)

Ask (5-10 minutes): What do you think engineering is?

Explain (10-15 minutes):

Introduce yourself and what your job or position is. Explain what engineering means to you.

Things to think about:

- Problem solving
- Helping people
- Introduce why you became an engineer

Explain what you do on a day-to-day basis.

Things to think about:

- Do you work in the field?
- An office?
- Do you work with other people or other types of engineers?

NOTE: If possible, tie your work back to real world experiences and how what you do affects the everyday lives of the community.

Discuss (10 minutes):

Ask: Are you surprised by any of my explanations?

Icebreakers

Lesson Background

Icebreakers are activities that can help young people become comfortable in a group environment. A comfortable setting can be established during an icebreaker, which can enhance your teaching by introducing co-operation and participation. Icebreakers will also encourage listening and teamwork, which are important qualities for the mentees to have so that they may be successful both in the programme and in the workplace. This is also a great way to improve the mentees' social skills.

Icebreakers and you

Below are a few points to keep in mind during the icebreaker to help it be successful:

- Always stay enthusiastic and excited throughout the activity
- If a mentee does not want to participate in an individual icebreaker activity (e.g., 20 questions), do not force them to participate.
- If the mentees are not enjoying the activity, do not try to extend it. Just move on to the next section, especially since the icebreaker session is only 20 minutes long.
- Choose the icebreaker activity that you feel will be most effective in creating a comfortable environment for the group.

Icebreaker Activities (20 minutes)

Have each mentee introduce themselves quickly and say a hobby or fun fact about themselves.

Below are three possible icebreaker activities; please choose one to do with your group.

Option 1: Skittles

Necessary Materials: Bag of Skittles

Pass around a bag of Skittles, instructing each mentee to take a small handful. Have the mentees eat all but one of the skittles that they took. Each colour Skittle represents a different question for the mentees to answer:

- Green: Where would you go on your dream vacation?
- Red: What is your favourite food?
- Orange: What's your favourite TV show?
- Purple: If you had one wish, what would the wish be?
- Yellow: What is your favourite animal?

This is a great activity to learn some fun facts about the members of the group.

Option 2: 20 Questions

Have a member of the group think of an item that describes them (e.g., a guitar for a musician). The mentor and other two mentees will then try to guess the item by asking questions that can only be answered with "yes" or "no". The mentee must give truthful answers for the game to work. Repeat this for all three mentees. This is a great way to allow everyone to learn about each other's interests.

Option 3: 2 Truths and a Lie

Have each member of the group (including the mentor) think of two true facts and one lie about themselves. Have one member say the three "facts" about themselves, and then have the other three members of the group attempt to identify which of the three statements is a lie. Repeat for each person in the group.

Quiet Questions

Objectives

In this section of the programme, you will help participants:

- Openly ask questions they may be too shy to ask.

This will allow you:

- To have time to think about the questions your mentees are asking
- Gauge the types of things your mentees need from the programme

Activity (10 minutes)

Materials

- Paper or note cards

At the end of your first meeting, have students write down on paper or notecards any questions they may have for you or things they want to learn about during the programme. Have them hand these into you at the end of the session.

After the meeting, read over the questions and see which ones you already know answers to. Be ready to give these answers during your next meeting. Of the questions you do not know the answer to, determine which ones are worth researching. You may also ask other mentors to see if they have these answers. If students ask questions about topics that will be covered later in the programme (e.g., career paths for engineers), during the next meeting tell them that you will be answering this question later on.

Meeting 1 Reflection

Did anything go particularly well during this meeting?
Why do you think so?

Were there any issues or questions you need answered?

What improvements could be made for this meeting?

Meeting 2: Everyday Engineering

Meeting Agenda

Quiet Questions Answers (10 minutes)
Engineering Descriptions (20 minutes)
Engineering Chocolate and Music Activity (30 minutes)

Materials

The two posters that follow (see page 13), provided by Tomorrow's Engineers, are provided in the student handbook and represent everyday items that multiple types of engineers collaborate on.

Objectives

In this section of the programme, you will help participants:

- Understand how many engineers might collaborate for one product
- Understand how engineering impacts their everyday lives.

Quiet Questions Answers (10 minutes)

Begin the meeting by answering as many of the student's quiet questions from their last meeting as possible. Note that more questions may result – it is okay if you do not know how to answer these.

Engineering Descriptions (20 minutes)

Go over the engineering descriptions (found on page 11) for different types of engineering with your mentees. Talk about what each type of engineer does and the types of projects which that type of engineer might work on. Try to turn this into a bit of a discussion by asking the students what kinds of projects they think each type of engineer works on before giving them the answers.

Engineering Chocolate and Music (30 minutes)

Explain (5 minutes):

Engineering is used in many stages of a product. Talk to your mentees about each of the following stages:

- | | |
|-----------------|----------------|
| ❖ Design | ❖ Maintenance |
| ❖ Manufacturing | ❖ Improvements |
| ❖ Testing | ❖ Repairs |

Ask (5 minutes):

How is chocolate made? Think about all steps including development, flavouring, production, packaging, and shipping.

Brainstorm (10 minutes):

In a group, have your mentees brainstorm the types of engineers they think are involved in the development of chocolate and live music. Have them refer to the poster once they are done.

Discuss (10 minutes):

There are many possible answers additional to the ones shown. Talk about these – and any others you can think of – with your mentees:

Industrial engineer – An industrial engineer could be part of the packaging portion of chocolate engineering or part of the instrument production associated with musical instruments. **(Continued on next page.)**

Materials engineer – Material engineers could have produced or manufactured the carbon fibre-reinforced composite that many guitars are made of.

Communications engineer – If the live music is being broadcast (either over radio or recorded to be broadcast later), a communications engineer may oversee the process.

Chemical engineer – Chemical engineers help to mass produce flavourings and ingredients designed by chemists that can be used in chocolate.

Materials/Environmental engineer – Biodegradable packaging found on many food products was designed and tested by materials and environmental engineers.

As part of their homework, the students will choose a new product and present it at your next meeting. A homework worksheet is included in their student handbook.

Engineering Descriptions

This document is meant to serve as a brief description of several major fields of engineering. It is important to realise that engineering is a very broad field and encompasses many types of work. For more extensive descriptions of these and other types of engineering, it may be helpful to review the materials available at http://www.prospects.ac.uk/types_of_jobs_engineering.htm.

Aerospace engineering

Aerospace engineers design, develop, and make all components of air and space crafts. This can include everything from airplanes and helicopters to military planes and missile systems to rockets and spaceships. The engineers work to design, develop, and test these kinds of machines and the technology designed for them. They also may work to make these technologies more cost-effective and environmentally friendly. Suggested video: <http://www.youtube.com/watch?v=E9PszKehWhY>

Automotive engineering

Automotive engineers work on designing, developing, and manufacturing automobiles such as motorcycles, cars, buses, and lorries. They also work to develop these automobiles' components – their bodies, engines, electrical systems, exhaust systems, etc. Automotive engineers may also be responsible for making these automobiles faster, more efficient, or more environmentally friendly. Suggested interview: <http://icould.com/bkarticle/my-job-explained-automotive-engineer-at-jaguar-land-rover/>

Biomedical (clinical) engineering

Biomedical engineers work on designing, developing, and testing medical equipment and new medical technologies. Biomedical engineers use knowledge from several fields, including biology, chemistry, mechanical engineering, and electrical engineering. Biomedical engineers may work to develop artificial body parts such as pacemakers, prosthetic limbs, or mechanical joints. They can also work to develop new medical technologies such as magnetic resonance imaging (MRI) or robot-aided surgery. Suggested video: <http://icould.com/videos/james-g/>

Chemical engineering

Chemical engineers primarily work in an industrial setting, using chemicals and raw materials to produce usable products. Chemical engineers may work to develop large-scale productions of certain materials, such as pharmaceuticals, paper, plastics, or petroleum. They may also work to develop new products, which can vary from things like toothpaste and hair care products to dyes for blue jeans and synthetic fabrics. Chemical engineers may also work to analyse large-scale productions to ensure that they are environmentally friendly. Suggested video: <http://icould.com/videos/vanessa-w/>

Civil engineering

Civil engineers are versatile engineers who design, plan, and monitor structural and environmental construction projects. They may work to build transportation-related structures such as bridges, roadways, and railroads, or buildings such as airports, athletic stadiums, and hospitals. They may also be responsible for designing and building sewage and water treatment facilities. Suggested video: <http://icould.com/videos/barbara-r/>

Communications Engineering

Communication engineers work to design, develop, and test communications systems. These can include computers, satellites, teleconferencing equipment, GPS devices, television broadcasts, and radio. In addition to developing the systems' electrical components, communication engineers are also generally responsible for maintaining these systems and ensuring that they work properly. Suggested video: <https://www.army.mod.uk/rolefinder/role/34/communication-systems-engineer/>

Electrical engineering

Electrical engineers work to design and build electrical components. This can be on a large scale – such as the power lines that keep electricity flowing to homes and businesses – or on a small scale, such as developing the components of electronic devices. Electrical engineering also includes the major subfield

of computer engineering, which includes things like the development of more powerful computers or smaller and lighter laptops. Suggested video: <http://www.youtube.com/watch?v=hqIN1L4BG6I>

Environmental engineering

Environmental engineers work to protect the earth and the organisms living in it. This involves developing new ways of managing waste, recycling used materials, minimising pollution, and protecting wildlife. Environmental engineers work to prevent environmental hazards and also to manage ones that have already become a problem. They may also work on civil engineering-related projects, by designing things like water supply and wastewater treatment systems.

Suggested video: <http://www.youtube.com/watch?v=cwgiKGb8pEI>

Industrial engineering

Industrial engineers are able to design and maintain a complex system in order to optimise the overall factors of production. Industrial engineers may do things like oversee assembly lines or design procedures to increase the productivity of laptops. They may focus on how to make a factory more productive or how to make a production system as a whole more cost-effective.

Suggested video: http://www.youtube.com/watch?v=TB_a-nvJL2o

Materials engineering

Materials engineers work to develop and produce new materials, using a knowledge of chemistry and how materials interact on a molecular level. These materials can be used for a wide variety of applications, meaning that materials engineers are needed in a broad range of fields and at many different companies. Because of this, materials engineering can overlap with many other types of engineering, including aerospace, biomedical, electrical, mechanical, and structural.

Suggested: <http://icould.com/bkarticle/my-job-explained-mechanical-integrity-and-materials-engineer/>

Mechanical engineering

Mechanical engineers create effective machinery solutions for anything from small machines like game consoles, smart phones, and headphones to large machines like automobiles, and locomotives. They may also work on things like making robots, manufacturing, automated machinery, or mechanical joints.

Suggested video: <http://icould.com/videos/aidan-l/>

Software engineering

Software engineers work to design and develop the programmes that have become so important for our daily lives. These can include operating systems for computers, computer programmes, or smartphone applications. Software engineers focus primarily on writing the programme's code (lines of information that make up the details of the programme's execution) and designing algorithms (rules that dictate what the programme should do) for a programme.

Suggested video: <http://icould.com/videos/stuart-w/>

Structural engineering

Structural engineers work to develop safe, sturdy, and aesthetically pleasing structures. These structures can include buildings or other structures like bridges and oil rigs. Structural engineering is closely related to the fields of civil engineering and architecture. In addition to designing new structures, structural engineers may also work to maintain pre-existing structures to ensure that they stay safe, taking into account any new environmental issues that have arisen since the structure's construction.

Suggested video: <http://icould.com/article/making-structures-stand-up-life-as-a-structural-engineer/>

Transportation engineering

Transportation engineers (also known as transport planners) work to maintain currently-existing transportation systems, in addition to designing new ones. These systems primarily include roads and railways, but may also include systems designed for buses, cyclists, aircraft, and pedestrians.

Transportation engineers are also responsible for researching current traffic patterns, using computer models to analyse them, and predicting what effect new developments may have. Suggested website:

<http://www.tomorrowsengineers.org.uk/transport/>

ENGINEERING CHOCOLATE

Tomorrow's Engineers

Download details of this and other tasty activities for 11-14s from our website... and find out more from the engineers who think their job is a treat!



Raw cocoa beans
The starting point for chocolate



Cocoa powder
For drinks and cooking



Unwrapping the chocolate
Getting ready to eat!



A chocolate factory
Rolling out the chocolate



Rachel Cooke, Chemical Engineer
Chemical Engineers are involved in many stages of chocolate production. They help to develop and design processes and equipment used to make, mix, cook and package ingredients and products.



Ian Walsh, Environmental Engineer
Environmental Engineers make sure all processes are efficient and environmentally friendly. That includes reducing waste and pollution, and trying to save energy.



Balal Habib, Packaging Engineer
Packaging Engineers work out how best to package chocolate. They need to make sure it doesn't get damaged when its taken to the shops - and they make sure it looks attractive enough to buy.



Andrew Green, Biochemical Engineer
Hygiene is extremely important when making any food. Biochemical Engineers use scientific principles to make sure that the chocolate isn't contaminated by bacteria during production.



Visit www.tomorrowsengineers.org.uk/careers

ENGINEERING LIVE MUSIC

Download details of this and other activities for 11-14s... and hear from the engineers whose jobs are music to their ears!



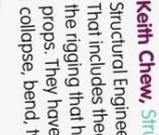
Ben Corbett, Sound Engineer
Sound Engineers are responsible for the sound quality of a live music concert. Microphones, amplifiers, speakers and mixers must be set up so everyone experiences the best sound possible.



Helen Leathern, Lighting Technician
Lighting Technicians set up and operate lighting equipment. Their work is really important at a live music concert. Colours, effects and movement help to create the right atmosphere.



Elisha McGeehan, Electrical Engineer
Electrical Engineers design and calculate how to connect everything electrical at a concert. That includes all electrical appliances and lights – sometimes the stage even has electric moving parts.



Keith Chew, Structural Engineer
Structural Engineers design structures. That includes theatres, stages and all the rigging that holds up the lights and props. They have to make sure they don't collapse, bend, twist or vibrate too much.



An outdoor festival
Belfast Botanic Gardens



The Fall band
Grand Opera House, Belfast



Preparing the stage
Waterfront Hall, Belfast



Using light filters
Ulster Hall, Belfast

© Photos - Stephen Wynn



Visit www.tomorrowsengineers.org.uk/careers

Tomorrow's
Engineers

Meeting 2 Reflection

Did anything go particularly well during this meeting?
Why do you think so?

Were there any issues or questions you need answered?

What improvements could be made for this meeting?

Meeting 3: Solve an Engineering Problem

Meeting Agenda

Everyday Engineering Homework Presentations (15 minutes)

Solving Transport Problems (45 minutes)

- Option 1: Design a Beam of a Bridge
- Option 2: Design a Bicycle
- Option 3: Design a Train Station Platform

Everyday Engineering Poster Presentation (15 minutes)

For homework, each mentee will have prepared a poster to present to their group similar to the ones used last week (chocolate and live music). During their presentation, the students should explain which engineers were involved in the process of making the object they have chosen. Have the other mentees ask the student questions about the object and also brainstorm other engineers that the presenting student did not mention. Try to ask the student some questions as well, including things like:

- Why did you choose this object?
- How is this object important to our daily lives?
- How would our world be different if we didn't have this object?
- How would the object be different without the work of a/an ____ engineer?
- If you had to make an improvement to this object, what would it be?

Solving Transport Problems

Objectives

In this section of the programme, you will help participants:

- Gain exposure to an engineering problem as they work through problems and solutions

Key Questions

- What problems are present?
- What solutions do you believe could address these problems?
- What engineers would resolve these problems?

Overview

There are three different activities that the group can do, depending on which one is most interesting to the group. The three choices are to design a beam of a bridge, a bicycle, or a train platform. All mentees in the group should be working on the same activity so that the group is collaborating.

For this lesson, go through the introduction for the activity that the group has chosen and then refer back to this page for specific steps to follow. Each option gives specific information about problems and solutions for the activity, which can be used to guide the students. This activity is meant to be discussion-based as the students work through the problems, create solutions, and identify different engineers that could help.

1. 10 minutes: Have the students identify the possible problems present as they design
2. 15 minutes: Have the students meet in a group to discuss the problems they see that need to be solved, and to think about possible solutions to those problems.
3. 10 minutes: As a group, have the students discuss the types of engineering that will be involved in solving these problems and decide on broad solutions to them.

Note: Please refer to the worksheet in the student handbook for brainstorming these ideas with your mentees.

Discuss (10 minutes)

To broaden the mentees' experience of how engineers work in a team, ask them questions such as:

- How did the group work at the beginning? Did someone take the lead? If so, how did it work when someone took the lead and how did it work for the others?
- How was speaking broken up in the group? Did people feel they were able to get their points across and say what they wanted to?
- How did work actually get done in this activity? Did the group work together to get specific tasks done or was it split up?

Option 1: Design a Beam of a Bridge

Introduction

The city of London has recently approved the construction of a bascule (commonly known as a drawbridge) over the Thames River. This bridge will allow for cars and pedestrians to cross the river, as well as for boats to continue down the river. As an engineer, you are hired to construct the supporting beams for the bridge. Identify the possible problems you will encounter as you design different aspects of the beam. Create solutions to these problems and work towards the overall design of the beam of the bridge. Also identify the different engineers that will be useful in solving these problems. (Please emphasise that these problems should be specific to the beams, not the bridge as a whole.)

The following are the answers to what the students should be discussing.

Identify Problems

- Weight/loads on the beams
- Corrosion of the beam
- Negative effect on living organisms near the bridge
- The lifting of the bascule
- Controlling the bascule

Solutions

- Materials for the Beam
 - Steel
 - Concrete
 - Reinforced concrete (cheapest material for strength and workability)
 - Pressure-treated and water-resistant wood
 - Brick

Make sure all the beam materials will not contaminate the waters, thus having less impact on the environment around the bridge.

- Mechanism for bascule
 - Install motor to move the counter balances needed to lift the bridge
 - Install sensors on the beam to identify when the bridge does not need to be raised anymore, which will then stop raising the bridge
 - Install sensors on the beam to identify when the bridge is horizontal to stop the lowering of the bridge

Types of Engineering Involved:

- Civil/Structural – Engineers must design the beams, roadway, rails, etc. to support the bridge and keep all of the occupants safe.
- Environmental – Engineers must identify the impact the bridge will have on the environment and minimise the damage to the systems around the bridge.
- Material – The materials used to construct the bridge will have to be designed to withstand the weather, cars, and river throughout the lifetime of the bridge.
- Mechanical – Since it is a bascule, motors and mechanisms will have to be installed on the beams in order to raise the bridge for ships.
- Electrical – Sensors will need to be installed in some of the beams in the bridge. They will monitor the movement of the bridge as well as remotely start and stop the rising and falling of the bascule.

Option 2: Design a Bicycle

Introduction

There are numerous ways to travel throughout London, one of which is riding a bicycle. Since so many people travel via bicycle, the city of London is looking to develop a new bike that can be used efficiently and safely, while also being inexpensive and easy to store. As an engineer, you are hired to design and build a bicycle that is cost-effective and is able to maintain the safety of all. Identify the possible problems you will encounter as you design different aspects of the bicycle. Create solutions to these problems and work towards the overall design of the bicycle. Also identify the different engineers that will be useful in solving these problems.

The following are the answers to what the students should be discussing.

Identify Problems

- The weight of the people on the bicycle
- The gears controlling the bicycle
- The brakes stopping the bicycle
- Lighting the bicycle
- Materials used for safety and cost

Solutions

Design

- The only limit is the students' imagination. The seat and two wheels can be designed as the student sees fit to allow it to travel efficiently and store easily.
- Brakes: Can be placed on the front, back, or both wheels and can be used from the handlebar.

Materials

- Frame: Typically made of steel, but other metals are possible. The goal is to have a material that is strong enough to hold a person but still lightweight. Possible solution: bamboo
- Wheels: Usually rubber treads
- Gears and chains: Metal

Additions

- Lighting: Put lights or reflectors on the front and back of the bike for safety

Types of Engineering

- Mechanical – Engineers must design the bicycle, gears, wheels, and the way it drives.
- Materials – Engineers must evaluate and choose the best materials for the main shaft of the bicycle and the wheels. They must also understand which materials are the safest and most cost-effective.
- Environmental – The environmental impact of the materials and manufacturing of the bicycle must be identified.
- Electrical – Any lighting or digital components of the bicycle can be designed to make the bike safer.

Option 3: Design a Train Station Platform

Introduction

The city of London is looking to improve the current structure of its underground platforms at various train stations. Transport for London is looking to begin work on Jubilee line stations to improve the safety, aesthetics, and efficiency of the train platforms. As a TfL engineer, you are contracted with designing and improving a platform for TfL. Identify the possible problems you will encounter as you design different aspects of the platform. Create solutions to these problems and work towards the overall design of the platform. Also identify the different engineers that will be useful in solving these problems.

The following are the answers to what the students should be discussing.

Identify Problems

- The weight of the ground above the platform
- The size and speed of the trains coming into the station
- The size of the platform needed for people and ways to improve the experience
- Connecting information between the platform, train, and station controls
- The lighting and technology needed to provide safety at the station

Solutions

- Use steel supports to support the ground above the platform. Make it aesthetically pleasing by using a unique design.
- Know the size of the trains coming into the station and of trains that will be built in the future.
- Evaluate how many people will be coming into the station and base the design upon this.
- Connect the platform to the train via cameras on the platform, sensors of how many people are there, or communication from the control centre.
- Light the area efficiently by using overhead lights, signs showing the way out, and signals for the train conductor
- Use glass doors, speakers, and other equipment to ensure the safety of travellers.

Types of Engineering

- Transportation – Engineers must understand how the train will come into the station and what is necessary for a safe arrival and departure.
- Civil/Structural – The complete structure of the platform must be designed so that it supports the ground above it and so that the platform is safe for passengers.
- Environmental – The environmental impact of the platform on the surrounding land and the sustainability of the station must be identified.
- Electrical/Signalling – Any lighting or digital components of the station must be designed, including lighting and communication to and from the train.

Meeting 3 Reflection

Did anything go particularly well during this meeting?
Why do you think so?

Were there any issues or questions you need answered?

What improvements could be made for this meeting?

Meeting 4: Career Path Guidance

Meeting Agenda

- Career Path Overview (20 minutes)
- Career Path Matching Activity (20 minutes)
- Discussion (20 minutes)
- Quiet Questions (5 minutes)

Objectives

In this meeting, you will help the mentees:

- Understand the options available to them for entering the engineering industry
- Understand what each of these paths entails
- Think critically about the path they plan to take

Career Path Overview (20 minutes)

Using the included worksheet (see next page), introduce the mentees to each of the three main paths for entering the engineering industry: university, apprenticeships, and vocational qualifications. Review what each entails (it may be helpful to discuss the included career route map with the students), and also briefly explain what chartered and incorporated engineers are (see page 24). Do your best to answer any questions that the students may have, but don't worry if you cannot answer all of them.

Career Path Matching Activity (20 minutes)

Cut apart the cards included at the end of this packet (see page 58), keeping each page's cards separate (i.e., don't mix the cards from the first page with those on the second page).

On a table, take one page's worth of cards and lay out the three engineers' cards. Scramble each of the statement cards and place three below each engineer.

Have one student attempt to match each of the statements to their corresponding engineers. The other mentees should not assist the one doing the matching; however they should be close enough that they can see the cards and form their own opinions.

When the student is happy with their selection or after five minutes (whichever comes first), review their matches and give them the correct answers. Repeat this for each mentee, giving each cards from different pages.

Career Discussions (20 minutes)

Ask: Why did you match the engineers the way you did?

Have each student try to explain their reasoning, and guide them to explain the assumptions that they made while trying to match the statements to the proper engineers.

Ask: What is something new you learned today? What has surprised you?

See if the overview and activity have changed the students' opinions of different career paths.

Ask: Which career path do you think you want to take?

Emphasise that this is not a high-pressure question. Just ask the students to share their thoughts after having seen the different paths. Have them explain why they think this path would be best for them.

Quiet Questions (5 minutes)

Have the students write down questions, just like they did in meeting 1 (see page 7 for instructions).

Career Path Overview Information

Career Paths Available to the Students

University

Students may choose to continue on to university to study engineering in depth. Engineering courses vary in their requirements, but students will generally need to have A-levels in maths and physics. University is usually quite expensive but leads to more career options and higher earning potential. It takes 3-4 years to earn a bachelor's degree or 4-5 years to earn a master's degree, which can sometimes include a year working in the industry. After university, students can go on to become incorporated or chartered engineers (see next page).

Apprenticeships

The premise of apprenticeships is that the student will learn while working, meaning they can begin to earn money immediately after college. Apprenticeships take 1-4 years to complete, and vocational qualifications are usually earned during this time. There are three types of apprenticeships: intermediate (for students with D-G level GCSEs or level 1 vocational qualifications), advanced (for students with A*-C level GCSEs or level 2 vocational qualifications), and higher apprenticeships (for students with A-levels or level 3 vocational qualifications). To be competitive for apprenticeship positions, students will generally want to have at least 5 A*-C level GCSEs. Apprenticeships can lead to students becoming engineering technicians or incorporated engineers.

Vocational Qualifications

Students may choose to pursue vocational qualifications during or after their time in college. As explained by icould.com, "Vocational qualifications are directly related to a particular job or area of work. They focus on learning skills and hands-on training, and often are assessed by practical assignments, rather than exams." These degrees generally lead to students becoming engineering technicians. There are many different kinds of vocational qualifications that can be awarded in the engineering fields. Some of the most common qualifications are:

- **BTEC Nationals** are qualifications that range from level 1 (entry-level learning) up through level 7 (professional learning). These qualifications are recognised by universities and employers in the related industry. They provide "real-world" training and can be taken at the same time or instead of GCSEs and A-levels.
- **NVQs** – National Vocational Qualifications – are qualifications which prepare students for a particular job. They are generally earned in the workplace.
- **HNCs and HNDs** – Higher National Certificates and Higher National Diplomas – generally are completed by working on them part-time for 1-2 years. After completing an HNC or HND, students can attend university to receive an honours degree. Students generally need good A-levels performances to earn these qualifications.
- **Foundation Degrees** are generally designed with the help of employers and are intended to prepare students with the skills necessary to work in those employers' fields. They are intended to combine academic study and work-based learning and generally take 2 years of full-time work to complete. Students with a foundation degree can attend university for one extra year to receive an honours degree.

This document developed using the following websites:

<http://icould.com/artide/choices-at-18-what-now/> (University)

<http://icould.com/artide/career-routes-into-engineering/> (University, Apprenticeships)

<http://icould.com/artide/understanding-vocational-qualifications/> (Vocational Qualifications)

<http://www.edexcel.com/btec/New-to-btec/BTEC-Explained/Pages/default.aspx> (BTECs)

<http://fd.ucas.com/FoundationDegree/About.aspx> (Foundation Degrees)

Career Path Overview Information Continued

Professional Registration Categories

There are three professional registration categories available to engineers in the UK: Engineering Technicians, Incorporated Engineers, and Chartered Engineers. According to the Engineering Council, all of these registrations provide the engineers with higher earning potential, more career options, recognition of their work, higher self-esteem, life-long learning, and letters after their name (EngTech, IEng, or CEng).

Engineering Technicians (EngTech)

The Engineering Technician registration is available to students who have completed an advanced apprenticeship or equivalent programme, or who have work experience and a level 3 BTEC diploma or equivalent qualification. Students without formal qualifications can also apply for Engineering Technician registration, but they will have to demonstrate that they have achieved the proper level of competence through work experience. According to the Engineering Council, engineering technicians “solve practical engineering problems. They are professionals with supervisory or technical responsibility, and apply safe systems of working. They contribute to the design, development, manufacture, commissioning, decommissioning, operation or maintenance of products, equipment, processes or services.”

Incorporated Engineers (IEng)

The Incorporated Engineer registration is available to students who have completed a bachelor’s or honours degree, an HNC or HND, a level 4 NVQ, or equivalent work. Incorporated Engineer status allows a person to be recognised internationally as a professional engineer. According to the Engineering Council, “Professional registration as an Incorporated Engineer (IEng) recognises your proven competence, commitment, skills and experience.” and “In particular, IEng registration shows your employer and peers that you have demonstrated a commitment to professional standards, and to developing and enhancing your competence.”

Chartered Engineers (CEng)

The Chartered Engineer registration is available to students who have completed a master’s degree or doctorate in engineering, or who have an equivalent level of competency. According to the Engineering Council, Chartered Engineers are part of a “technological elite” and they “develop appropriate solutions to engineering problems. They may develop and apply new technologies, promote advanced designs and design methods and introduce new and more efficient production techniques, or pioneer new engineering services and management methods. The title CEng is protected by civil law and is one of the most recognisable international engineering qualifications.”

This document developed using the following UK Engineering Council webpages:

<http://www.engc.org.uk/engtech.aspx> (Engineering Technicians)

<http://www.engc.org.uk/ieng.aspx> (Incorporated Engineers)

<http://www.engc.org.uk/ceng.aspx> (Chartered Engineers)

Getting into Engineering...

School
Science, Maths, D&T, ICT



6th Form / College
A levels (or equivalent)
BTEC level 2&3
HNC & HND, Foundation

Apprenticeships
Earn while you learn e.g. N/SVQ3



University
Bachelors (BEng)
Masters (MEng)



Work

Apprenticeship route

Sara Kieran Salim

Sara was selected for an apprenticeship after responding to an advert on the internet. She completed her Higher National Diploma (HND), studying one day a week whilst working. She is now employed as a fully qualified engineer and will shortly complete an engineering bachelor's degree (BEng).

"Being an apprentice was absolutely brilliant. Not only do you sit in the classroom and gain theoretical knowledge, but you have the opportunity of going out there and gaining real-life, practical experience whilst getting paid! I had fantastic and fully qualified engineers around to help me if I was ever struggling with something."



University route

Philip Deakin

Philip completed A levels (including maths and physics) and studied for four years at university where he obtained a master's degree (MEng). Phillip now works as a Wellsite Drilling Engineer on a North Sea oil rig.

"I've test driven an Aston Martin round a track at 170 miles per hour; had the chance to have a flight in a Eurofighter Typhoon; and had dinner with the Red Arrows pilots. These were all amazing experiences for me which shows there are really exciting sides to engineering that young people don't hear about."

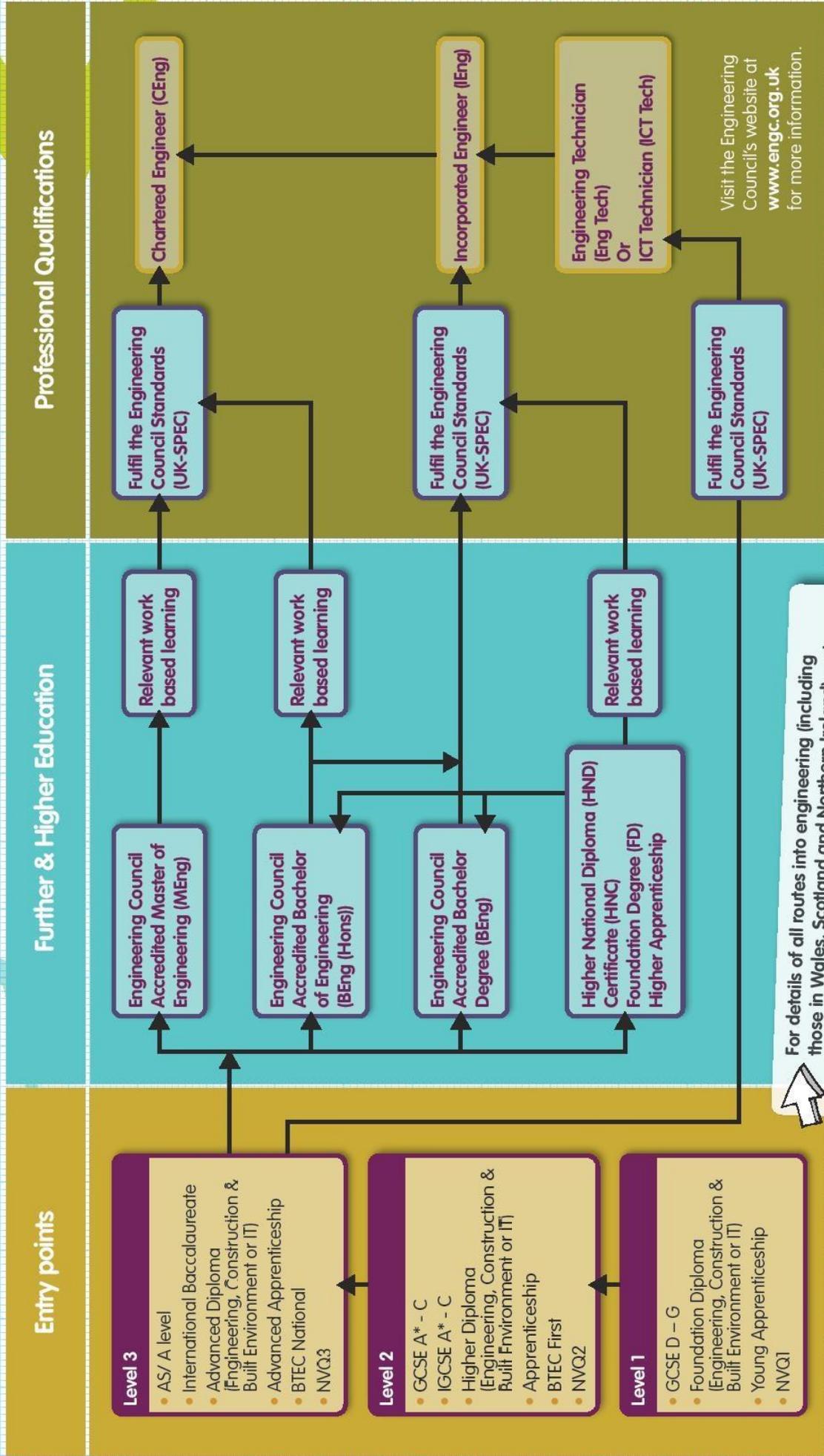


www.tomorrowsengineers.org.uk

Career Route Map

for Engineering in England

Tomorrow's Engineers



For details of all routes into engineering (including those in Wales, Scotland and Northern Ireland) go to www.tomorrowsengineers.org.uk/careers

Matching Activity Answers

Page 1

Stephen Carr	Lesley Desport	David Millar
I completed a BTEC Higher National Diploma in Software Engineering	I graduated Strathclyde University with a BEng in Civil Engineering	I started my career as a Shipyard Welding apprentice
I currently have a dual role of Enterprise Architect and Web Consultant in Australia	I spent 18 months working in Glasgow as a Graduate Engineer	I have pursued 8 separate technical qualifications throughout my career
I started as a software engineer working on defence aviation projects	I currently work in the Kingdom of Bahrain as a Senior Design Engineer	I am currently the Managing Director of NST Welding

Page 2

Simon Leeming	Sara McGowan	Philip Hawtrey
I started my career as an underground surveying apprentice	I am an Associate Building Services Engineer	I am a Technical Manager of a 40 person group of lighting designers
I currently manage and maintain the accuracy of the GIS database used for coal mining reports	I started at the Chartered Institution of Building Services Engineers Graduate Training Programme	I started working in Cape Town, South Africa as a Student Technician and left as a Principal Engineer
I passed the Mine Qualification board and joined the Institute of Mining Engineers	I design systems that control internal environment within buildings e.g., heating and air conditioning	I worked as a Principal Lighting Engineer updating and revising road lighting standards and specifications

Page 3

Keith Winning	Melissa Riley	Paul Cozens
I started working for my current employer as a trainee draughtsman	I work as a project leader for a surface engineering group TWI. Ltd.	I was not originally considered an engineer and first worked as a Management Services Analyst
I went to school part time to earn my BEng and MEng in Mechanical Engineering Design	I completed a PhD on the use of magnetic systems in dentistry and did a post doc on surface-engineered surfaces for hip replacements	I currently work for the Environment Agency as a Technical Specialist providing advice on engineering
I have worked on pipeline projects in the UK, Europe, Thailand, and the Former Soviet Union	I graduated from Birmingham University with a Medical Science degree in Biomaterials	I was a part of a pilot study for the review of flood defence maintenance operations

Meeting 4 Reflection

Did anything go particularly well during this meeting?
Why do you think so?

Were there any issues or questions you need answered?

What improvements could be made for this meeting?

Meeting 5: CV Writing

Meeting Agenda

Quiet Questions Answers (10 minutes)

CV Development Activity (50 minutes)

Objectives

In this section of the programme, you will help participants:

- Build confidence in personal qualities and achievements
- Create a professional CV

Quiet Questions Answers (10 minutes)

Begin the meeting by answering as many of the student's quiet questions from Meeting 4 as possible.

CV Development Activity (50 minutes)

How to write a CV overview (25 minutes):

Talk to the students about what a CV is and why it is important (see below).

What is a CV? (developed using information from <https://www.kent.ac.uk/careers/cv.htm#is>)

- An outline of your career and education history
- Allows you to “sell” yourself to a company by showing them the skills, experience, qualifications, etc. that you have which could benefit them

Why is having a good CV important?

- It is a potential employer's first impression of you. If you make a poor first impression, it will likely be the employer's *only* impression of you.
- It allows you to quickly demonstrate that you have the skills and qualities that the company is looking for, and that you are genuinely interested in the company.

Explain the different sections of a CV (personal details, objective, education/qualifications, work experience, interests, skills, and references) and what should be included in each, based on the template included on page 34. If you feel comfortable doing so, you may use your own CV as a sample to aid your explanation.

Review the Top 10 CV Tips document with the students. This document is included in their student handbook. Try to engage the students by asking them questions about why they think each section of the CV is important, why it is important to follow the tips provided, or by having them suggest additional tips.

Sample CV reviews (15 minutes):

Have the students review the sample CV provided in their handbook so that they get a better idea of what theirs should look like. Then have them make corrections to the second sample provided, which is an example of what the students should *not* do. (Note that the included text box comments for the incorrect CV have only been provided to the mentors and not the students.)

Brainstorming Session (10 minutes):

Have the students individually begin to brainstorm what they should include on their CV. There is a worksheet included in the student handbook for this brainstorming session. If they already have a CV, have them think of ways to improve it. For homework, have them write their CV so that they have it ready for their upcoming mock interviews. In their handbook, the students will have the same template that is found on page 34. Explain that they may use this as a guide if they wish, but that they are not required to follow it exactly. Encourage the students to meet together before the next meeting to peer-review each other's CVs.

Top 10 CV Tips

Your CV should **include the following sections:**

- **Personal details** (name, address, phone, email)
- **Education and qualifications***
- **Work experience***
- **Interests**
- **Skills**
- **References**

*List in reverse chronological order (most recent first)

Tailor your CV to the job you are applying for.

Emphasise the skills and experiences you have that are most relevant to the job you are hoping to get. This shows the company that you are genuinely interested in them and that you understand what they do.



Use **action words** to describe the things you've done. These make you seem more active and highlight your skills. Lists of these words can be found online. When applicable, you may want to use verbs like:

- Conducted
- Developed
- Evaluated
- Organised
- Presented
- Researched
- Trained
- Was responsible for

Be concise.

Make your CV complete, but avoid wordiness or long paragraphs of text. Use bullet points when possible.

If a CV is too dense, employers won't take the time to read through it.

Include references.

Include two references when possible. If you have a job, be sure to include your current employer. If you haven't worked, you may consider using teachers or other adults. Ask their permission first though.

Proofread!

Spelling and grammar errors make a CV look unprofessional, and may cause employers to immediately reject it.

Your CV should be **no more than 2 pages long** on typical A4 paper.

Any longer and employers won't take the time to read it!

Be honest!

Don't lie about your experiences or qualifications.

If employers find lies on an application, they will almost always reject it.

Use the interests section to highlight your skills.

Only include hobbies that demonstrate your ability to work with others or skills that are relevant to the job. Be sure to highlight any leadership positions you've held as part of these activities.

When making your CV, use a **clear layout** and an **easy-to-read font**. If a CV looks messy or cramped, an employer is not going to take the time to try and read it. Print your CV to make sure that it looks good on both a computer screen and on paper.



Sample CV (Example of a good CV with tips)

Adam Greys

Telephone: 07123 456789 Mobile: 07835 713355 Email: a.greys2023@nomail.com

23 School Lane
Higher Somerville
Shropshire
SP3 5TY

A concise, relevant profile can be included. Make sure this is tailored to the job you are applying for.

Highly numerate finance and accounting student with experience working in an international finance company. I am seeking a career in financial advice and planning.

Education

2010 – present

University of Ville

BSc in Finance and Accounting (predicted grade 2:1)

Highly numerate course, accredited by the Association of Financiers that has enabled me to develop:

- Competence to professional body standards in financial planning and budget control techniques.
- Excellent working knowledge of financial and statistical packages, including SPSS and Stata.
- Ability to communicate researched findings in writing and to groups of students.
- Competence in all Microsoft Office packages.

In addition I have achieved:

- Nomination for best finalist dissertation on Financial Planning in SMEs.
- Undertaken optional modules in International Banking and Investing in Pensions.
- Successful 6-week, in-course placement in Thrift Financial, working with teams managing new client communication, business forecasting and financial advice to new businesses.
- Election as course representative, involving communication with senior faculty staff on behalf of students during institutional audit.

2003 – 2010

The Academy High School

- **A-Levels:** Business studies (B), Economics (A), General Studies (A), Physics (C).
- **GCSEs** in ten subjects including Maths (B), English Language (A) and French (A).
- **Special achievements:** Duke of Edinburgh Silver award and captain of the cricket under-19s through which I developed leadership and teamworking skills.

Add previous qualifications and achievements if they demonstrate your ability to do the job you are applying for.

Be specific about relevant skills and competencies acquired on your course including general skills such as communicating with individuals and groups.

List relevant aspects of your course and how they relate to the skills you've gained that are appropriate to the job profile.

Use bold or italics to emphasise headings.

Use positive language such as 'successful' 'excellent' and 'achieved'.

Use work experience employers as referees.

Relevant work experience

2012 (Feb - Aug) Thrift Financial Services

Provider of full range of professional services to new and small businesses in the Somerville area.

Provide relevant examples of your experience and include level of responsibility.

Invited back to work through summer holiday following university-organised placement.

Three month paid summer work experience: reviewed company procedures in business planning and forecasting team and prepared report for CEO including recommendations for annual updating.

2010 – 2012
(Part-time evenings during term time)

The Student Food Stop

Late opening fast food service on campus.

Prepared microwave meals and snacks and was responsible for electronic debit machine, financial security procedures, cashing up and closure of premises. Involved completion of stock control inventories, re-ordering, cash accounting, as well as customer service and managing complaints.

2009 – 2010
(Full time)

Glittering Gifts

High street retail outlet for gifts, cards, stationery and toys.

Make sure your dates are easy to see.

Was responsible for cash register, wrapping goods sold and managing electronic payments. Being employed for a full 12 months developed my understanding of the cyclical nature of gift buying and the need to plan stock, display and customer communications accordingly. Developed skills in forward planning, anticipating customer needs and meeting deadlines.

Voluntary experience

2011 – present Volunteer first aid giver with St John's Ambulance.

2012 Student buddy/mentor during induction week.

2008 – 2009 Coaching under-14s hockey team.

Provide less detail for older or less relevant information.

Other competencies

First aid Trained to use resuscitation and acute response techniques.

Languages French: Excellent conversational and written French.
German: Good conversational German.

Include skills not mentioned anywhere else in your CV.

IT European Computer Driving Licence (ECDL).

Use two full pages.

Referee details available upon request

Sample poor CV

JOHNNY SMITH

1 LONDON ROAD, LONDON, UK Z05J 9NM

IAMAWESOME@EMAIL.CO.UK

Personal details:

- Email address should be professional
- It's a good idea to list two telephone numbers (mobile and home), but specify which is which
- Do not include a picture unless the company asks for it

012 3456 7890

123 4567 8910



OBJECTIVE

I HOPE TO BE HIRED BY YOUR COMPANY BECAUSE I THINK THE EXPERIENCE WILL HELP ME GREATLY IN MY PURSUOT OF A GOOD CAREER. I THINK I WOULD BE A VERY GOOD FIT FOR THE JOB.

Proofread!!

It's a good idea to have an objective, but tailor it to the company and job you're applying to. Also, make it specific! Why would you be a good fit?

EDUCATION AND QUALIFICATIONS

Greenwich Middle School, 2008-2012

Performed well in all my classes, particularly in maths and writing.

Greenwich College, 2012-2016

- A-Levels: History C, Psychology B, Physics C
- GCSEs: Physical Education A*, English B, Maths C, French D, Literature B, Geography F

Education:

- List in REVERSE chronological order
- Only include high marks
- Avoid long lists of GCSEs

WORK EXPERIENCE

TESCO express, 2011

Use action words and highlight the skills you gained from each job. Also, list how long you worked at the company.

Dealt with customers, used cash register, put products on the shelves, etc.

Greenwich Nursery, 2013

Worked with children. This was a very valuable experience as I was able to learn a lot from the other staff at the nursery. They were all quite helpful and patient with me as I was learning how to deal with the children. Things were quite hectic at times - with children running everywhere - so I learned how to multi-task very well. I also managed records and money which helped me to become responsible with sensitive information and money. This job helped me to grow a lot as a person and has made me realise how much I love children, even if they can be quite difficult at times. Even though I know this job is not particularly relevant to the job I hope to get with your company, I think many of the skills I learned from this job will help me succeed at your company as well.

Avoid wordiness/long text like this.

ACHIEVEMENTS

I won several awards while in college. I was also the captain of our robotics team, which was quiet successful at the competitions we attended.

List any significant awards received. Here, competitions attended and how the team ranked should also be listed.

INTERESTS

^Avoid mistakes that spell-checkers may not pick up on.

I enjoy watching TV and playing video games. These games have been essential in making me a team player. I also play guitar and am in a band with several of my mates who practice in my garage.

Only include interests that demonstrate useful and relevant skills. Make them sound as professional as possible.

SKILLS

I know some French - I can write it quite well, but am not very good at speaking it. I know how to use computers as I use email and Word daily. I also use other programmes like Excel and PowerPoint sometimes for school projects.

Here it would be best to use bullets. Explain at which level you are proficient in these skills (intermediate, advanced, etc.).

REFERENCES

References available on request.

When you have space to do so, include two references.

Use two full pages whenever possible. Also, use a font that is easy to read such as Arial or Times New Roman. Use reasonably-sized text (size 11 or 12 for the majority of text, and a size or two larger for headings). Also, avoid using multiple fonts.

Template CV (Sections Explained)

Ima Student

Home Address

Email address, home telephone, mobile phone

OBJECTIVE

Tailor this section to each job, company, or university that you apply to. State the exact position that you are applying for, and briefly explain why you would be a good candidate for the job.

EDUCATION/QUALIFICATIONS

Write this section in reverse chronological order, with your most recent schooling being listed first. Generally you would include the college you attended, along with universities if applicable. Mention any degrees or qualifications earned there. Briefly list any highly-marked or relevant A-levels or GCSEs, but avoid having long lists of every subject. If you have completed any major projects during your schooling, you may want to list them here.

WORK EXPERIENCE

Again, this section should be written in reverse chronological order. Include any jobs that you have had, and use your (brief) description of each to highlight the skills that you gained from them. This way, even if the jobs themselves are not relevant to the position you are applying for, the employer will see that you still have relevant skills.

ACHIEVEMENTS

This section is optional. If you have received any significant awards or have any other achievements that you think may be of interest to a potential employer, list them here.

INTERESTS

This section allows you to show that you are a well-rounded individual. It shows that you have skills outside of the classroom, and you should take advantage of that. List your favourite hobbies, but try to avoid any that are antisocial (don't involve interaction with other people). When possible, highlight how these hobbies help to develop skills that you will use in your employment – e.g., leadership or organisational skills. Volunteer work could be listed here as well, depending on the nature of the work.

SKILLS

Here you should list any other languages you speak, and to what degree (fluent, conversational, intermediate or advanced, etc.). List major software programmes that you have experience with (Microsoft Word, SolidWorks, etc.) and – if applicable – any computer programming languages that you have experience coding in. Any other notable skills like playing an instrument could be listed here as well. It is also common to include your driver's licence if you have a full and clean licence.

REFERENCES

Whenever possible, include two references. If you need the space, you may write “References available upon request,” but include good references when you are able to do so. If you have work experience, it is best to include references from your previous jobs. If you do not have work experience, you may use teachers or references from your hobbies. Always ask permission before listing someone as a reference on your CV.

Meeting 5 Reflection

Did anything go particularly well during this meeting?
Why do you think so?

Were there any issues or questions you need answered?

What improvements could be made for this meeting?

Meeting 6: Interview/Networking Preparation

Meeting Agenda

Interview Background (25 minutes)

Elevator Pitch Development (35 minutes)

Objectives

In this section of the programme, you will help participants:

- Prepare for an interview
- Develop an elevator pitch

Interview Background

How to prepare for an interview overview (25 minutes):

Talk to the students about:

The three types of interviews

Professional attire for an interview (information provided on next 3 pages).

What to do after an interview (information provided on next page).

Note: All interview background information is provided in the student handbook as well.

Elevator Pitch Development

What is an Elevator Pitch?

Why is having a good elevator pitch important?

Refer to the following elevator pitch materials.

What is an elevator pitch (10 minutes):

Have the students review the elevator pitch materials.

Have them think about the question

Tell me about yourself?

If you have an elevator pitch, present it to your mentees as an example.

Brainstorming Elevator Pitch Session (25 minutes):

Have the students individually begin to brainstorm what they should include in their elevator pitch. The attached worksheet in their student handbook has five sections. They should brainstorm qualities in each category on a sticky note and place it on their worksheet (provided in the student handbook). Have them reorder their sticky notes in order of importance to them. They should write a full elevator pitch at the conclusion of the brainstorming period and present it.

The five categories are:

- ❖ Skills and strengths
- ❖ Personal qualities and accomplishments
- ❖ Values/beliefs
- ❖ Career goals and academic performance
- ❖ Outside activities

For homework, have the students review the sample interview questions provided in this handbook and the student handbook. They should come to the next meeting prepared for a mock interview with well thought-out questions to ask the interviewer. You will be holding mock interviews during your next session in which they will be interviewing for a school, apprenticeship, or their dream job. Tell them that they should write their questions accordingly. It may be useful for you to review the meeting 7 materials before your next meeting.

Interview and Elevator Pitch Activity

Three types of interviews

- **Structured:** This consists of a list of specific questions asked in order.
- **Non-structured:** This style uses broad, open-ended questions designed to have you "open up" and talk about yourself. It is more conversational in tone than the directed interview.
- **Behavioural:** This interview style is based on the premise that the best predictor of future performance is how you have performed or acted in the past. Questions will ask about specific situations from your past and how you acted in those situations. Behaviour-based interviewing is an essential component to today's interviews. Employers want to know how you handled past situations since past performance predicts future behaviour. These questions relate to skills, qualities, and situations that the employer believes you will encounter on the job; you will want to answer these questions based on how you handled similar situations in the past.

Behaviour -Based Questions

1. Describe a time when you were forced to make an uncomfortable decision. What did you do?
2. Give me an example of a time you had to make a quick decision without supervision.
3. Tell me about a bad experience with working in a team environment. How was it resolved?

What to Wear

Appearance is very important in an interview. Your interviewer will develop a visual impression of you within the first 10 seconds of interaction.

- ❖ **Think about the company culture.** In most industries business professional attire will be appropriate.
- ❖ **Be conservative.** You want to present a professional image. It is better to be overdressed than underdressed.
- ❖ **Watch personal hygiene.** Make sure your nails are clean, use deodorant, and limit perfumes.
- ❖ **Rethink the unconventional.** Eliminate colourful or funky hairstyles and body piercings.

What to Do After the Interview

As soon as possible, provide information requested by the interviewer such as references, transcripts or credentials. Follow up with a "thank-you" letter for the interview. This is an opportunity for you to sell your candidacy again to the employer and provide any additional information that did not come out in the interview. Writing the thank-you does not conclude your activities to obtain the position. You need to be persistent in the follow-up until you receive an offer, secondary interview, or rejection letter.

Developing Your Elevator Pitch

An Elevator Pitch is a carefully-planned and concise introductory message about your professional self. It should define your skill sets, experience, and career hopes for the future. Your message should take about 60 seconds to deliver; the time it would take you to ride up an elevator. It should be focused on the specific and unique attributes that YOU can bring to an organisation/employer. An Elevator Pitch is also sometimes referred to as your 30 or 60 second commercial.

Why is it important?

Many times the first question an interviewer might ask you is, “Tell me about yourself.” Having a planned answer to that question will ensure you feel confident and comfortable right from the start of your interview. Also, you never know when you might find yourself meeting someone who could be a great potential networking contact. Having a well-prepared Elevator Pitch will ensure that you are ready to market your skills and experiences given any opportunity to do so.

When to use it?

- ❖ Networking events (Alumni dinners, Professional Organisation events, etc...)
- ❖ Company Information Sessions
- ❖ Interviews – in answering the question: “Tell me about yourself.”
- ❖ Any professional event where you are asked to introduce yourself.

Know Yourself

Take some time to do some self-reflection. Think about your key skills and experiences and what you have to offer a potential employer. Identify your career hopes for the future. Consider the following:

❖ Skills

Examples include:

- o Technical skills – Proficient with AutoCAD, MatLab, Linux, C++; experience with Gel Electrophoresis, protein extraction
- o Communication skills – written or oral
- o Research and analytical skills
- o Leadership skills

❖ Strengths (i.e. what are you good at?)

Examples include:

- o Motivating others
- o Taking initiative
- o Time management

❖ Personal qualities

Examples include:

- o Hard worker
- o Enjoy working in teams

❖ Accomplishments

❖ Values/beliefs (i.e. things that would be important to you in your work life)

Examples include:

- o Creativity
- o Relaxed pace
- o Outside work
- o Team environment

❖ Career goals

Examples include:

- o Conduct cancer research in a laboratory setting
- o Work outside in a construction project management role

❖ **Academic performance**

Examples include:

- o Projects/work within your courses

❖ **Outside Activities**

Know Your Audience

Research your audience. Customise your Elevator Pitch to the individuals you will be speaking to.

- ❖ What are the perceived needs of that particular employer/ contact (i.e., what are they looking for in a potential candidate)?
- ❖ What immediate benefits can you provide?
- ❖ Why are you interested in the company or industry that person represents?
- ❖ Align your skills and experience with the needs of your audience.

Questions to Think About

This worksheet will help you identify key topics to include in your Elevator Pitch. Complete the questions below and then you will have created a first draft of your own Elevator Pitch.

1. What is your career goal?

2. What skills, strengths, or experiences do you have that would help you realise that goal?

3. What accomplishments prove you have those skills, strengths, or experiences? (Draw from all experiences – projects, internships, activities involved in, etc...)

4. What are you searching for in a job?

5. How can you immediately benefit the company?

Tips

- ❖ Write down and practice your Elevator Pitch.
- ❖ Ask for feedback from friends, teachers, mentors.
- ❖ It should not sound scripted – don't memorise it word for word. Focus on the key points/ideas so you can ensure to convey what is important to your audience.
- ❖ Make it conversational – don't feel that you have to get through your whole pitch when talking to someone. Allow for pauses and input from your listener.
- ❖ Consider recording your Elevator Pitch so you can hear what it sounds like.

Sample Job Interview Questions

Do not attempt to memorise answers to each of these. Instead, think of key points you want to make and how to put those points in a positive, concise answer.

- Tell me about yourself.
- Describe your ideal job.
- What can you offer us?
- What do you consider to be your greatest strengths? Weaknesses?
- Have you ever had any failures? What did you learn from them? How do you define success?
- What 3 accomplishments are you most proud of?
- Have you had difficulty getting along with a former professor/supervisor/co-worker and how did you handle it?
- What do you know about our organisation?
- What job related skills have you developed?
- Would you be successful working with a team?
- Are you able to work on several assignments at once?
- What are your long-range career goals?
- What are your three best qualifications for this position?

If you wrote it on your CV, be ready to talk about it. Many times employers will ask questions directly about experiences or projects you wrote down on your CV to judge how well you can explain a subject and the type of technical language you use.

Most novice interviewees think there is a "correct" answer to any question the interviewer asks. This leads to unnecessary anxiety. Remember, what the interviewer wants is information that ties into the company and job requirements.

Questions to Ask the Employer

Asking the interviewer logical, well thought out, pertinent questions indicates a high degree of interest in the company. The interviewer will know that you have taken a professional approach in preparing for your interview. Companies want to hire professionals.

Conversely, questions that are illogical, shallow, vague and asked just for the sake of asking questions tell the recruiter you did not prepare for the interview or really are not interested in the company. Before the interview you should read the organisational literature, talk to others who may have knowledge of the company, and research the company in databases.

Here are some examples of questions you may want to ask:

- Please describe the duties of the job for me?
- What kinds of assignments might I expect the first six months on the job?
- What products are in the development stage now?
- What do you like best about your job or company?
- Where does this position fit into the organisational structure?
- What is the next course of action? When should I expect to hear from you, should I contact you?

These are examples only. If you do use these questions, understand their meaning, be prepared to explain what you mean and be prepared to answer questions that will arise from your questions. It will be to your advantage to develop your own questions and express them in your own style. Lack of preparation will do more harm than good.

Documents adapted from Worcester Polytechnic Institute Career Development Center

Meeting 6 Reflection

Did anything go particularly well during this meeting?
Why do you think so?

Were there any issues or questions you need answered?

What improvements could be made for this meeting?

Meeting 7: Mock Interview Activity

Meeting Agenda

Mock Interview Activity (45 minutes)

Discussion (10 minutes)

Quiet Questions (5 minutes)

Objectives

In this section of the programme, you will help participants:

- Practice interviewing and improve professional development skills

Lesson Background

You will enter this meeting as if you were at an actual interview. The atmosphere should be professional.

Activity (45 minutes)

Hold separate mock interviews with each of your three mentees. The other mentees will observe each interview and point out things that were done well, as well as things to think about for improvement. There is a worksheet in the student handbook for them to note these observations.

Have each mentee give you their CV before you start and ask them “what” they are interviewing for (dream job, university, apprenticeship). Most of the questions below are general but you may use any you like. All mock interviews will be held in the same way with 4 questions. Questions 1 and 4 should remain the same. Questions 2 and 3 should be chosen from the list given. It is recommended that you change questions 2 and 3 for each mentee.

Questions to ask:

Question 1: Tell me about yourself.

Choose questions 2 and 3 from the following:

- Describe your ideal job.
- What can you offer us?
- What do you consider to be your greatest strengths? Weaknesses?
- Have you ever had any failures? What did you learn from them? How do you define success?
- What 3 accomplishments are you most proud of?
- Have you had difficulty getting along with a former professor/supervisor/co-worker and how did you handle it?
- What do you know about our organisation?
- What job-related skills have you developed?
- Would you be successful working with a team?
- Are you able to work on several assignments at once?
- What are your long range career goals?
- What are your three best qualifications for this position?

Question 4: Ask the mentee about something specific on their CV.

If they put it on their CV they should be able to talk about it.

Have them ask their questions

As homework the students have developed questions to ask you at the end. There is no need to answer them, but give feedback on whether they are well thought-out questions that show significant preparation for the interview.

Discuss (10 minutes)

Most novice interviewees think there is a "correct" answer to any question the interviewer asks. This leads to unnecessary anxiety. Remind them that most interviewers are simply looking for information about the interviewee that applies to the position they are applying to. Mentees should focus more on the good qualities they have (elevator pitch categories) that would qualify them for the position or entrance they are interviewing for.

Quiet Questions (5 minutes)

Have the students write down questions, just like they did in meetings 1 and 4 (see page 7 for instructions). Use these questions to guide what you choose to cover in meetings 8-10, as these meetings are open-ended and should focus on what your mentees want and need to learn about most. As much as you can, answer these questions during meeting 8.

Meeting 7 Reflection

Did anything go particularly well during this meeting?
Why do you think so?

Were there any issues or questions you need answered?

What improvements could be made for this meeting?

Optional Lesson Plans

The rest of the lesson plans in this packet are optional, and may be done with your group if you feel they would be beneficial for your mentees. Otherwise you may create your own lesson plans.

Current Engineering Events

Meeting Agenda

Newspaper Activity (40 minutes)

Materials

- 4-5 Newspapers

Objectives

In this section of the programme, you will help participants:

- Gain insight into what is currently going on in the world of engineering.
- Practice relaying and summarising information.

Newspaper Activity (40 minutes)

10 minutes

Have each student take a newspaper and look through it for engineering projects currently taking place in the city.

15 minutes

Once they have found an article they like, they will fill out the Current Engineering Events worksheet in their handbook.

15 minutes

Have each student present to the class the article they found, including a short summary of what it was about.

Ask

What did they find interesting?

Is it something that will affect them in the future?

What types of engineers do they think work on a project like this?

Communication

Meeting Agenda

Lesson Background Explanation (5 minutes)

Activity (55 minutes)

Objectives

In this section of the programme, you will help participants:

- Understand the importance of communication in a variety of situations
- Practice different communication skills

Lesson Background (5 minutes)

Communication encompasses what you say, how you act, what you write, who you talk to, and several other factors. These activities will go over a variety of skills that go into communication and can be related to the professional world and one's personal life.

Activity (55 minutes)

Choose the aspects of communication you think would be most beneficial to cover with your mentees
(45 minutes):

Body Language

As a group, discuss what good and bad body language looks like to you. After two minutes, continue the conversation but starting using good and bad body language. After 5 minutes of the conversation, stop acting and discuss what you observed in the different members. What were the good and bad traits you saw? How does your body language help or hurt what you are saying?

Emails

Communication in the professional environment is often done through emails. Write a professional email to a peer explaining to them what you did in the last mentor meeting while keeping the following professional traits in mind: 1) address them professionally, 2) get to the point quickly, 3) thank them for their time, and 4) be sure to follow up if anything else needs to be done.

Asking good questions

In the professional environment it is very important to ask good questions. People's time is very valuable, so you want to be sure you are making the most of your questions; however you also need to be clear on what you are doing so that you are making the most of your work time. Have the mentees ask the mentor a valuable professional question of their choosing. Give them feedback as to how they can improve the question.

Summarising

In the professional environment, people are typically most concerned with the end product or action that they desire. The smaller steps that were taken are not usually as important, which is why summarising is important way to update people while still moving things along. Have the mentees summarise what they have learned in this lesson in 3 sentences.

Knowing your audience

There are many different people in the professional environment from owners, managers, peer workers, workers under you, clients, and several others. When talking to these different people, it is important to remember what their knowledge is, what they are looking for, and what you can do for them. Do an activity where you role-play telling your teacher, parents, and friends what progress you have made on a school project.

Understand who you're working with

Similar to knowing your audience, when working or interacting in a group you should know who the members of the group are and what they can bring to the team. Other people have had different experiences than you; therefore they will know how to do certain things better and also may work in a different manner than you. Discuss your most recent group activity and how different members brought different knowledge and skills to the group.

Discussion (10 minutes)

Discuss what was learned during these activities. What goes into communication and what is important to keep in mind when communicating? How can you improve your communication moving forward?

Goal Setting

Meeting Agenda

Lesson Background Explanation (5 minutes)

Activity (35 minutes)

Objectives

In this section of the programme, you will help participants:

- Understand how to evaluate their present situation and formulate goals for the future
- Make goals to succeed in the future

Students will use a SWOT (Strength, Weaknesses, Opportunities, and Threats) analysis to evaluate what they currently have to work with. Students will then make SMART (Specific, Measureable, Achievable, Relevant, and Time Specific) goals for their personal and professional life.

Lesson Background Explanation (5 minutes)

Students will perform a SWOT analysis of themselves so they have a better picture of what goals are realistic. In addition to the note above, strengths and weaknesses are internal factors – such as being hard-working – while opportunities and threats are external factors – such as the education of Greenwich UTC.

Activity (25 minutes)

SWOT analysis (10 minutes): Mentees will perform a SWOT analysis of themselves by filling out two points for each of the four areas shown on their worksheet.

SMART goals (15 minutes): Mentees will make one personal and one professional goal and then give three steps of how they will reach those goals.

Discussion (10 minutes)

The students can discuss what they learned from the SWOT analysis and developing the SMART goals. The group should discuss the importance of revisiting these roughly every 6 months in order to stay on task, evaluate their progress, and reach new goals.

Problem Solving

Meeting Agenda

Lesson Background Explanation (5 minutes)

Activity (35 minutes)

Objectives

In this section of the programme, you will help participants:

- Understand what problem solving is on a day-to-day basis
- Practice different problem solving methods

The personal and professional world is filled with problems on a day-to-day basis. There are many different ways to solve these problems and the basic skill of problem solving will allow students to do a variety of jobs professionally and enhance their personal lives.

Lesson Background Explanation

This activity is meant to allow students to problem-solve through different situations and practice different methods (**25 minutes**), followed by a discussion on what worked well and what did not work for them (**10 minutes**). Go through as many situations as seems useful to you. Situations can be acted out several times and then discussed to see what methods were used and what was observed in the activity. The students are trying to solve the problem that each situation presents.

Activity (35 minutes)

- **Situation 1:** Person 1 is a store clerk at the local grocery store. Person 2 is a customer looking for specific kind of biscuit that the store does not have. Person 1 should work to solve the problem for person 2.
- **Situation 2:** It's a Saturday afternoon and person 1 needs to stay home and work on a school project. Person 2 calls person 1 and really wants to hang out with person 1. Both people should work to get their desired outcome.
- **Situation 3:** Person 1 is working on a group project with 2 other students. One of the other students does not do any work. What should person 1 do?
- **Situation 4:** Person 1 is working on a group project with 2 other students. One of the other students is willing to work, but does not want to do any work with the group. What should person 1 do?

Methods:

- **Trial and Error:** Keep trying different solutions and improve them based on mistakes.
- **Abstraction:** Chisel away the unnecessary parts of the problem and focus on the core details and then build up taking into account the other information.
- **Break and Conquer:** Break the problem down into smaller parts and solve those separate parts. Then put it all together.
- **Brainstorming:** Present many solutions and then either reason or discuss why certain ones may be best.
- **Research-Based Methods:** Research your problem to find previous cases, similar problems, or solutions. The research can be done via books, the internet, or even asking friends.
- **Attacking the Root Cause:** This method solves the deeper issue or meaning instead of just the problem that results from it.

Discussion (10 minutes)

Ask: What did you learn from this activity? What problem solving skills worked well for you? How can you use problem solving in school? How can problem solving be used in engineering?

Social Media

Meeting Agenda

Lesson Background Explanation (5 minutes)

Activity (40 minutes)

Objectives

In this section of the programme, you will help participants:

- Understand how social media can be used for and against them as a potential employee
- Understand and begin to develop what the mentee wants their image to be on social media

Lesson Background Explanation (5 minutes)

Students will begin to understand how social media can be used for them as potential employees to network, and also how negative content can be used against them. Students will think about and develop how they want to be portrayed on social media.

Activity (40 minutes)

There are four main points for the group to discuss. Bring up each topic and then facilitate the discussion to the intended takeaway which is listed directly below the discussion topic. The discussion on each topic should be between 5 and 10 minutes long.

- Discuss as a group the different social media mediums currently in use.
Takeaway: There are many different forms of social media including Facebook, Twitter, and LinkedIn. Students should understand that all of these can be used for and against them.
- Ask the group, how can social media be used positively as a professional?
Takeaway: Social media can be used positively by networking and staying connected with different people that can provide students with professional opportunities.
- Ask the group, how can social media be used against you as a professional?
Takeaway: Images or words that you use represent who you are and speak to your character as a person. Students should be the type of person that employers want to hire and whose social activities will not get in the way of professional work.
- Ask the group what they want to get out of social media and what personal image they want to portray to the world through their activity on social media.
Takeaway: Students should use social media to connect with people but should not allow their professional reputation to be damaged through its use.

Discussion

Students can discuss what they learned from these discussions and then complete the worksheet provided in the student handbook. This will help to recap what they've learned and to understand what they can do moving forward. This should take approximately 10 minutes.

Meeting 8 Reflection

What lesson plan did you follow? _____
(Include the title of which provided lesson plan you used, or a brief description if you developed your own.)

Did anything go particularly well during this meeting?
Why do you think so?

Were there any issues or questions you need answered?

What improvements could be made for this meeting?

Meeting 9 Reflection

What lesson plan did you follow? _____
(Include the title of which provided lesson plan you used, or a brief description if you developed your own.)

Did anything go particularly well during this meeting?
Why do you think so?

Were there any issues or questions you need answered?

What improvements could be made for this meeting?

Meeting 10: Final Meeting Wrap-Up

Section contents

Presentations (15 minutes)

Reflection (30 minutes)

Evaluation Forms and Farewell (15 minutes)

Instructional purpose

In this meeting, you will help the mentees:

- Practice presentation skills in an informal setting
- Discuss what they've learned from the programme
- Articulate their plans for moving forward

Presentations (15 minutes)

For homework, the students should have each prepared a 5-minute (or so) presentation about the programme. This may be about what they've gained or learned from the programme, what their plans are or how they've changed, something they want to learn more about, etc. Have them present this in front of the group, keeping the setting as relaxed as possible. Encourage the students making up the audience to ask questions at the end of the presentation.

Reflection (30 minutes)

Ask: What have you learned from this programme? How will you use this moving forward?

If students have already answered these questions in their presentations, have them reiterate their answers. Have them think more about what else they've learned over the 11 meetings, and how they will use these things as they move on from the programme. Also ask them about what surprised them and what they want to learn more about.

Ask: What was your favourite part of the programme and why?

Find out which parts of the programme really stood out to the students and why. Note that here you may find out which parts of the programme they *enjoyed* most, not necessarily the ones they learned the most from.

Ask: How has this programme influenced your view of mentoring?

Talk to the students about their experience with the programme. See if they found being mentored to be beneficial and if so, what they found the most helpful. Also ask if they would consider being a mentor as part of other programmes in the future.

Ask: What were your career plans at the beginning of this programme? What are they now?

Have the students talk about what they wanted to do at the beginning of the programme – what field of engineering they wanted to go into and which career path (university, apprenticeship, or vocational qualifications) they planned to pursue. Ask them if their plans have changed since then and how. Ask them which field of engineering they currently plan to go into and which career path they plan to take now that the programme has ended.

Evaluation Forms and Farewell (15 minutes)

Have the students fill out the provided evaluation forms about the programme.

When the students are finished, it will be time for the group to say farewell. If you have any last remarks or concluding advice you would like to give the students, this would be the time. Congratulations on successfully completing the programme.

Meeting 10 Reflection

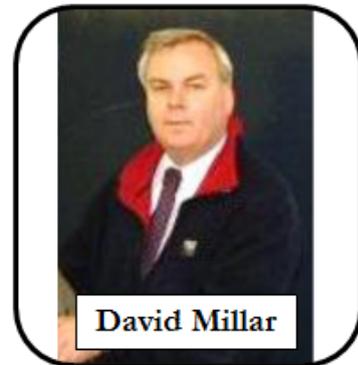
Did anything go particularly well during this meeting?
Why do you think so?

Were there any issues or questions you need answered?

What improvements could be made for this meeting?

Career Paths Matching Activity Cards

Page 1



I completed a
BTEC
Higher National
Diploma in
Software
Engineering

I graduated
Strathclyde
University with a
BEng in Civil
Engineering

I started my career
as a Shipyard
Welding
apprentice

I currently have a
dual role of
Enterprise
Architect and Web
Consultant in
Australia

I spent 18 months
working in
Glasgow as a
Graduate Engineer

I have pursued 8
separate technical
qualifications
throughout my
career

I started as a
software engineer
working on
defense aviation
projects

I currently work in
the Kingdom of
Bahrain as a Senior
Design Engineer

I am currently the
Managing Director
of NST Welding



I started my career as an underground surveying apprentice

I currently manage and maintain the accuracy of the GIS database used for coal mining reports

I passed the Mine Qualification board and joined the Institute of Mining Engineers



I am an Associate Building Services Engineer

I started at the Chartered Institution of Building Services Engineers Graduate Training Programme

I design systems that control internal environment within buildings e.g., heating and air conditioning



I am a Technical Manager of a 40 person group of lighting designers

I started working in Cape Town, South Africa as a Student Technician and left as a Principal Engineer

I worked as a Principal Lighting Engineer updating and revising road lighting standards and specifications



Keith Winning



Melissa Riley



Paul Cozens

I started working for my current employer as a trainee draughtsman

I work as a project leader for a surface engineering group TWI. Ltd.

I was not originally considered an engineer and first worked as a Management Services Analyst

I went to school part time to earn my BEng and MEng in Mechanical Engineering Design

I completed a PhD on the use of magnetic systems in dentistry and did a post doc on surface-engineered surfaces for hip replacements

I currently work for the Environment Agency as a Technical Specialist providing advice on engineering

I have worked on pipeline projects in the UK, Europe, Thailand, and the Former Soviet Union

I graduated from Birmingham University with a Medical Science degree in Biomaterials

I was a part of a pilot study for the review of flood defence maintenance operations