Project Planning aspects:
Ethics
Measurables
Risk management

What is ethics?

- Moral principles that govern a person's behaviour or the conducting of an activity:
- the principles and rules of conduct governing an individual or a group
- a belief that something is very important

Ethics

Resources:

Royal Academy of Engineering:

http://www.raeng.org.uk/policy/engineering-ethics/ethics

Statement of ethical principles

1. Accuracy and rigour

Professional engineers and technicians have a duty to ensure that they acquire and use wisely and faithfully the knowledge that is relevant to the engineering skills needed in their work in the service of others. They should:

- always act with care and competence
- perform services only in areas of current competence
- keep their knowledge and skills up to date and assist the development of engineering knowledge and skills in others
- not knowingly mislead or allow others to be misled about engineering matters
- present and review engineering evidence, theory and interpretation honestly, accurately and without bias
- identify and evaluate and, where possible, quantify risks

Statement of ethical principles

2. Honesty and integrity

Professional engineers and technicians should adopt the highest standards of professional conduct, openness, fairness and honesty. They should:

- be alert to the ways in which their work might affect others and duly respect the rights and reputations of other parties
- avoid deceptive acts, take steps to prevent corrupt practices or professional misconduct, and declare conflicts of interest
- reject bribery or improper influence
- act for each employer or client in a reliable and trustworthy manner

Statement of ethical principles

3. Respect for life, law and the public good

Professional engineers and technicians should give due weight to all relevant law, facts and published guidance, and the wider public interest. They should:

- ensure that all work is lawful and justified
- minimise and justify any adverse effect on society or on the natural environment for their own and succeeding generations
- take due account of the limited availability of natural and human resources
- hold paramount the health and safety of others
- act honourably, responsibly and lawfully and uphold the reputation, standing and dignity of the profession

Statement of ethical principles

4. Responsible leadership: listening and informing

Professional engineers and technicians should aspire to high standards of leadership in the exploitation and management of technology. They hold a privileged and trusted position in society, and are expected to demonstrate that they are seeking to serve wider society and to be sensitive to public concerns. They should:

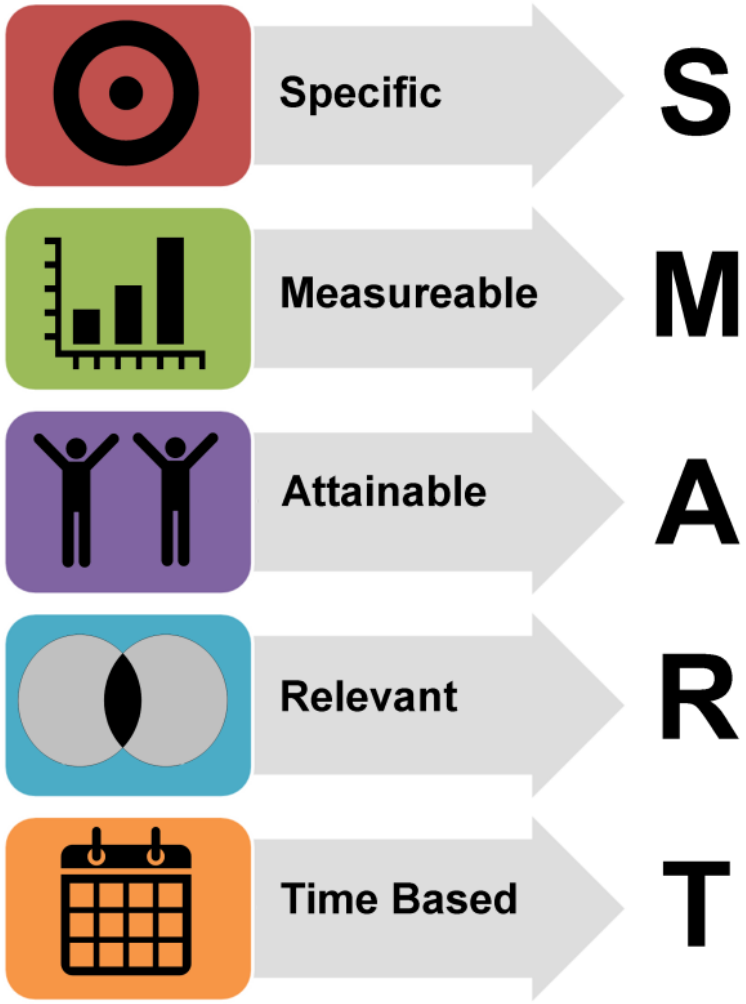
- be aware of the issues that engineering and technology raise for society, and listen to the aspirations and concerns of others
- actively promote public awareness and understanding of the impact and benefits of engineering achievements
- be objective and truthful in any statement made in their professional capacity

Measurables

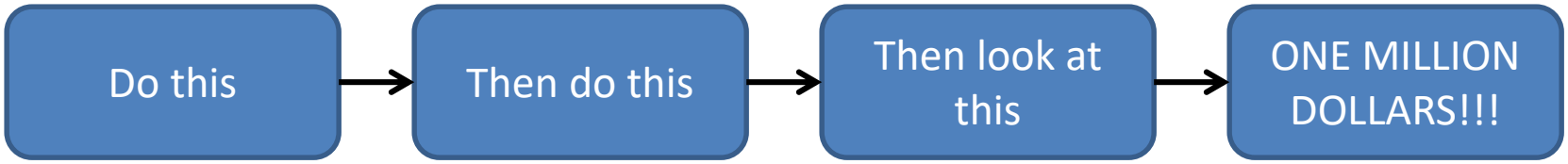
Risk management should be a integral part of the planning and operation of a project:

- Analyse
- Plan and implement response
- Track risks and dependent activities
- Develop mitigation strategy

If it goes wrong versus when it goes wrong



How students typically view a project

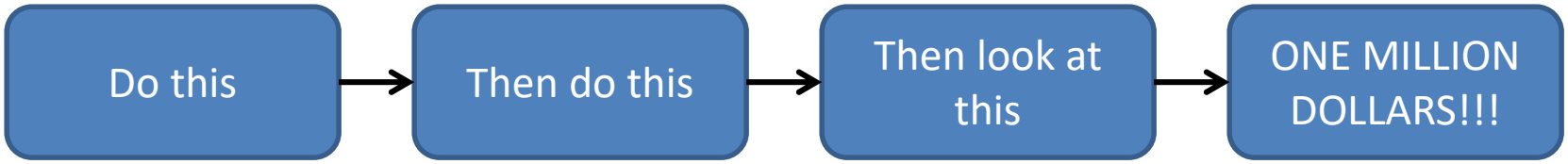


Decision point in risk management:

What do I do if something goes wrong?

Why is this wrong?

How students typically view a project



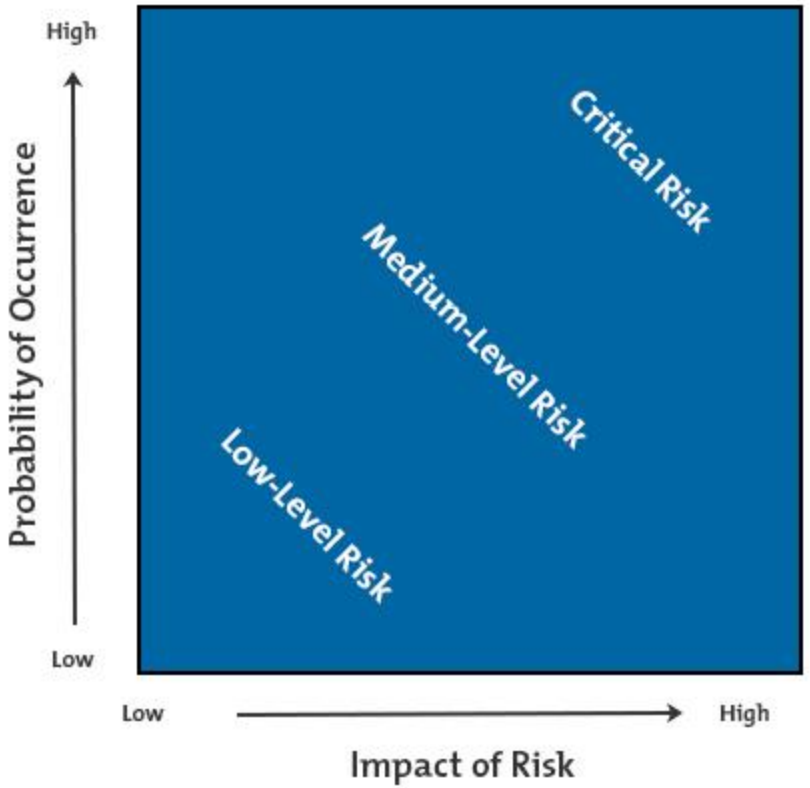
Decision point in risk management:

What do I do WHEN something goes wrong?

Risk Management

Risk management should be a integral part of the planning and operation of a project:

- Analyse
- Plan and implement response
- Track risks and dependent activities
- Develop mitigation strategy



ELEC6211

Project Preparation

Part II: The Project Plan

Dr Nicolas Green

The Project Plan

5 page document

1 page:

- Aims/research question
- Objectives

1 page:

- Proposed research methodology summary
- Proposed analysis methodology summary

1 page:

- Research plan Gantt chart (or similar)

1 page:

- Ethical statement

1 page:

- Legal and commercial aspects

The Project Plan

Start with a title ☺. Does not have to be the final one. And don’t forget your name

Aims/research question and Objectives

Lay out the main aim(s) of the project, sometimes referred to as the research question. Make sure that this is relatively realistic and achievable and explained in sufficient detail as to be unambiguous.

Present the objectives of your work. These would, in principle, form the basis of the work activities that you intend to carry out. The objectives should also inform the plan of work presented in chart form in the plan.

Objectives should be outcome based. For example: “to demonstrate the operation of a digital synthesiser with a output level of 25 Volts”, should really be “to demonstrate an output level of 25 Volts”. The first part is likely to be the aim of the work or to be a separate objective in a series.

Proposed methodology

This is a simple summary of the practical research methods and analytical methods you are proposing to use or investigate.

There is no requirement for detail here. This should be a rough outline only, demonstrating that you have a good idea of what methods and techniques are suitable/ideal/possible, with a brief discussion of why you think this is so.

This is a basic form of an experimental or research design framework and will allow you to discuss these matters with your supervisor.

Proposed plan chart

Using a Gantt chart or any similar form, lay out a rough idea of the plan of work you intend to follow in your project.

Focus on demonstrating the relative lengths of each aspect and any inter-relationship between activities.

Highlight objective end points or milestones and any follow on aspects which may arise.

Also use some method to indicate optional or “it would be nice” aspects to the work.

Obviously at this stage, this will be a rough guess compared to when you are actually doing the project. Keep this in mind when defining the activities, laying out realistic times and endpoints. Provide more detail for the beginning three-four weeks as well.

Ethical statement

The application of technology always has ethical implications. They may be generic and difficult to define.

For those projects with direct ethical issues, such as those that involve human data, this statement is straightforward. It should lay out those issues, the controls which you are including in your methodology and how you are going to make your application for ethical approval from the University.

For those projects and the remaining ones, the ethical statement should cover the ethical implications of the work presented in your project in the area of application which you have identified. Summarise those implications, any aspects which would have an effect on the development of the project work in the future and any effects the project work would have for ethics in related areas.

This should be informed by discussion with your supervisor, particularly if you have to make an ethical approval for your project.

Legal and commercial statement

This should be a short description of the commercial potential of the research project you are undertaking, what commercial influences there are likely to be and what legal aspects and/or frameworks are likely to apply.

It should focus on the likely endpoint of the research rather than the specific endpoint of your project. However, it may be that the project has an actual demonstrable output, which would make this an easier topic to write about.

This again is only supposed to be a summary discussion. You should focus on writing a clear and easy to follow statement but there is no need to have an indepth investigation. This should be informed by your ongoing discussions with your supervisor.

ELEC6211

Project Preparation

Part III: The Poster

Dr Nicolas Green

Introduction

The purpose of this coursework is to allow you to demonstrate knowledge and understanding of your project subject. This will take the form of a poster presentation in a conference style format.

You will prepare a poster according to the basic formatting rules given below. The topic of the poster will be related to the topics of the Project Preparation module. Specifically the poster should cover the following points:

- The aim(s) of your project
- Why the project matters
- What you are going to achieve (potentially)
- What the outcomes of your project will mean (potentially)

The poster therefore is not about the project but about the motivation for the project and its aims.

You should prepare a poster of size A1 in portrait format. There are no specific formatting requirements as we will discuss momentarily.

What is a Poster?

A poster is a form of technical presentation where the information is presented logically in the same order as a technical article: Introduction, background, methods, results, analysis, discussion, conclusions, references.

This is then presented by the author at conferences or meetings, where they stand in front of it and answer questions. It is a more personal (and arguably better) form of presentation than an oral lecture style presentation as you are able to discuss the work in more detail. At conferences there is an extended period where all the posters are displayed and conference attendees wander around and read posters they are interested in.

It is highly visual and should appear attractive. It also DOES NOT need to explain everything as it is a PRESENTATION which has a presenter to explain in detail.

Format of a Poster

There are no specific formatting requirements but the poster must have a title, your name and the name of your supervisor, as well as which MSc programme you are studying.

What do you think?

Format of a Poster

Remember the following points:

- A poster presentation is a PRESENTATION, i.e. you present it. Information is a combination of what is on the poster and your response to questions.
- Follow roughly the same concepts as a written paper: introduction, method, results, analysis, conclusion… but do NOT write a lot of text.
- As for all scientific writing, language should be clear and unambiguous but above all, short, concise, brief, concise, succinct and concise.
- Posters have unique aspects which papers and oral presentations do not: first it is one-to-one – no other medium has that. Second, it is one-shot static. The poster has to cover it all.
- As a result, format and layout are critical:
  - Some people say you should follow the layout of a paper with boxes for each section laid out in columns – this is just an oral presentation with the slides stuck on in order
  - A poster is a highly visual mode of communication and you should use that to your advantage with graphics and colours which support the presentation and transfer of information – for example arrows can be used to guide the reader through the poster.
- The poster IS an ABSTRACT

Typical scientific examples

Get-Passives in Different Age Groups

Daniel Boyle and Eliza Lei

Abstract

This study examines how the preferences of using the *get*-passive (e.g. "It got stolen") or the *be*-passive (e.g. "It was stolen") differ in people of different age groups. We hypothesized that younger speakers would be more likely to use the get-passive than older speakers. Our hypothesis was supported by a survey, in that the 18-30 age group claimed to use the get-passive variation more than did the 30 and above age group.

Introduction

- "To be" has historically been the auxiliary used in English passive constructions.
- More recently, passive constructions using "to get" have emerged.
- This is typically considered to be a feature of informal speech.
- Younger speakers of English have been known to use informal forms in broader contexts.

Hypothesis

- Younger speakers are more likely to use get-passives in their speech than older speakers.

Method

- Participants were separated into two groups by age: 18-30 year olds (comprising 72 respondents) and 30+ year olds, comprising 21 respondents—8 of which were ages 30-50 and 13 age 50 and over.
- Data was collected by means of a survey in which participants were asked to self-analyze their use of be- and get-passives.
- Participants responded to 18 pairs of sentences, including 6 pairs of filler questions involving non-passive or ungrammatical uses of "to be" and "to get". Each pair of sentences was identical except for the auxiliary verb used.

Sample Questions

Check the answer that best applies to you in how you would use the verb in **bold**.

John and Mary **got** married in a chapel.

a. I could definitely say something like this.
b. I might say something like this.
c. I would never say something like this.

John and Mary **were** married in a chapel.

a. I could definitely say something like this.
b. I might say something like this.
c. I would never say something like this.

Results

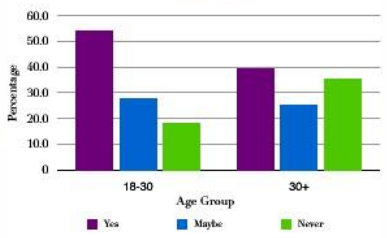


Fig. 1. Percentage of Answers to "Get" Questions By Age Group

- Calculated the percentage of "yes" (could say), "maybe" (might say) and "never" responses to get-passive sentences within each age group.
- Found a significantly higher preference for get-passives in the 18-30 age group (54.17% "yes" responses; 17.94% "never") as compared to the 30+ age group (39.29% "yes"; 35.32% "never"). Thus, the hypothesis was supported.

Discussion

- Given the informal nature of get-passives, respondents may have rejected some examples of get-passives that they would in fact use in everyday speech. It is thus possible that respondents would in fact use get-passives even more than was shown by the survey.
  - Survey was distributed almost entirely at the university or to university students.
  - May have skewed the results even further, as informal speech may be considered "less academic."
  - A different/less academic setting may yield different results.
- Some sentences (e.g. "The glass was shattered") could be interpreted as being passive (i.e. there was shattered glass everywhere) or active (i.e. someone/something shattered the glass).
  - Thus, respondents may have accepted such sentences as active sentences even if they would not have accepted them as passives.
  - However, this applied only to the "to be" sentences and so did not affect our hypothesis.
- It may have been beneficial to be clearer in the instructions, i.e. differentiating between what one would say (in spoken discourse) and what one would "use" (which may imply orally or written, or both).

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Carter, R., & McCarthy, M. (1999). The English get-passive in spoken discourse: Description and implications for an interpersonal grammar. *English Language and Linguistics*, 3(1), 41-58.

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Reed, L. (2011). Get-passives. *The Linguistic Review*, 28(1), 41-78.

Rubinstein, C. (2007). Lexical grammar: the get-passive as a case in point. *JCAME Journal*, 31, 111-127.

Shevchenko, T. (1997). The Place of the get-passive in the inflectional system of the English verb. *Movoznavstvo*, 2-5(182-188), 50-53.

SIMULTANEOUS RAMAN AND XRD

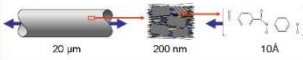
R. J. Davies, M. Burghammer and C. Riekel

ESRF

ID13 BEAMLINE

COMPLEMENTARY TECHNIQUES

Raman spectroscopy and X-ray diffraction can provide complementary information when applied to studies of materials. For example, they can probe different length scales within hierarchical systems and reveal quite different information about the sample under study. However, they also share many similarities, such as allowing data collection during in-situ deformation. This can give a unique insight into structure-property relationships as it reveals how stresses are transferred through a material's microstructure. Using this information, the origins of material properties can be better understood, allowing them to be tailored for specific applications.



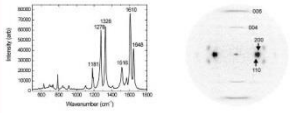
µXRD and µRaman as complementary techniques

- *Raman spectroscopy provides information on individual molecular bonds whilst WAXS and SAXS probe structures over longer length scales.*
- *Both techniques are non destructive and can be used in combination with other in situ methods (e.g. material deformation or hydration).*
- *Raman spectroscopy can collect information from all molecules within a material, whilst WAXS is often limited to the crystalline fraction.*
- *The techniques have differing penetration depths within many materials which means they can probe different morphological features simultaneously.*
- *Both µRaman and µXRD can be used with beam sizes down to 50 nm.*

HIGH PERFORMANCE FIBRE DEFORMATION

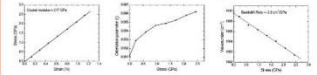
High performance fibres such as Kevlar (PPTA) exhibit remarkable mechanical properties. This can be attributed to their highly oriented and highly crystalline microstructure consisting of extended molecular chains. This means that macroscopic deformation results in direct stretching of the fibre's molecular backbone.

Using combined *µ*Raman and *µ*XRD, a single Kevlar fibre can be studied during in-situ deformation. This provides more meaningful data than can be obtained using both techniques ex-situ. The resulting phase sensitivity allows contributions from both the amorphous and crystalline fractions to be investigated.



A typical Raman spectra and a fibre diffraction pattern obtained simultaneously from a single PPTA (Kevlar®) fibre.

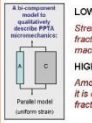
From the Raman spectra shown above, the position of the 1610 cm^{-1} Raman band can be related to stretching of the *p*-phenylene ring within individual PPTA molecules. Meanwhile, the diffraction pattern contains information on the degree of crystalline domain orientation and lattice distortion (crystal strain).



The relationships between applied macroscopic stress, the position of the 1610 cm^{-1} Raman band, Raman band broadening and longitudinal lattice strain (crystal strain).

In the above figures both Raman band shift and crystal strain are linear. This indicates that crystal lattice stretching and local stresses on the *p*-phenylene ring are in proportion to macroscopic fibre stress. By contrast, Raman band broadening is non-linear at low stresses and linear at high stresses (>1 GPa). In the case of PPTA, band broadening can be associated with differing mechanical properties between the amorphous and crystalline fractions.

These results suggest that deformation in PPTA can be qualitatively described by a bi-component uniform strain model corresponding to different micromechanical behaviours at low and high stresses. This can be explained in terms of heterogeneous strain hardening between the crystalline and non-crystalline regions at approximately 1 GPa.

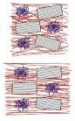


LOW STRESS

Stresses in the crystalline and amorphous fractions increase in proportion to macroscopic fibre stress

HIGH STRESS

Amorphous fraction is under-stressed as it is constrained by the 'stiffer' crystalline fraction (i.e. heterogeneous stiffening)



ACKNOWLEDGEMENTS

The authors acknowledge the assistance of technical staff on the ID13 Beamline, and Renishaw PLC in the collaborative design of the *µ*Raman system. This project was partly funded through the SAXIER FP-6 programme.

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2. R. J. Davies, M. Burghammer and C. Riekel, *Macromolecules* (2006), (14): 4834-4840

Format of a Poster

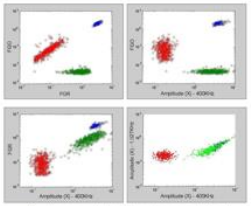
Where do people look when they first look at a poster?

Lab on a chip Technology for Marine Research

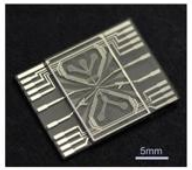
This research intends to develop integrated micro fluidic technologies for distributed in situ analysis of oceanographic chemical and biochemical parameters. These technologies can help us understanding the oceans' role in fuelling marine food webs and in controlling climate.

Droplet manipulation and combination

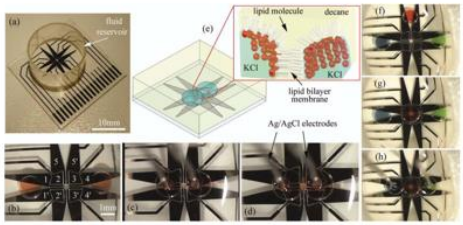
Systems intended for research in lipid membrane structure and membrane protein analysis. Additional interests in unconventional computing and coupled oscillators where droplet-droplet communication comes from chemical species diffusing through the interdroplet membrane

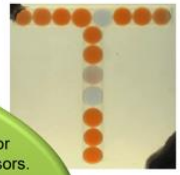


Simultaneous electrical impedance and optical fluorescence measurement of individual phytoplankton



Oceanographic algae monitoring and identification chip using optical and electrical detection methods

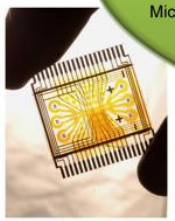




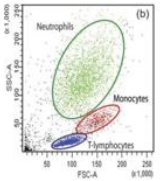
Micro or nano-structured systems to provide technological solutions for the Life Sciences, ranging from artificial life and systems biology to rapid diagnosis of disease. Core to the activity is the use of technologies that enable tiny amounts of fluid (nanolitres) to be manipulated and analysed on chip. These micro analytical devices (Lab on a Chip) systems are used for tissue engineering, drug discovery, cell manipulation and sorting, molecular diagnostics and implantable sensors.

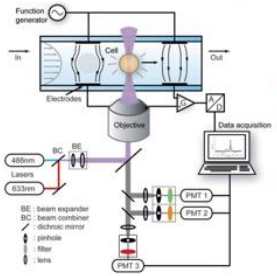
HYBRID BIODEVICES

Microfluidic devices are designed and created within the cleanrooms of the Southampton Nanofabrication Centre and developed in the Wolfson Laboratory for Hybrid Biodevices, comprising 300 m^2 of custom laboratory designed for analysing clinical samples, culturing biological organisms and performing chemical biofunctionalisation reactions. This laboratory, also contains a substantial suite of state-of-the-art optical and electrical instrumentation.

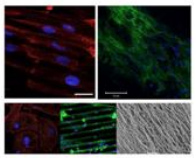


A device to conduct blood tests with only a pinprick sample.

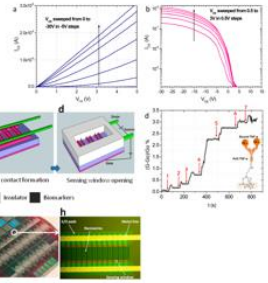




Synthetic Biology



Bio-realistic tissue models



Point of Care label-free Analysis

Current technologies provides blood test that may take up to two weeks for the patient. We are aiming at developing chips that can do simple differential blood count which can deliver the majority of results instantaneously in the doctor's office.

Nanowires for Health Biosensing

Developing silicon nanowire technology for routine biomarker analysis of blood, outside of clinical laboratories, using a unique method of fabricating arrays of silicon nanowires that are incorporated in an advanced microfluidic matrix. Will provide a cheap and cost effective finger prick means of regular screening for diseases allowing prevention and early intervention.

Your poster

Your poster will be presented at a poster conference on the 1st and 2nd June 2015. Students will be in groups of 5-ish and will peer assess using the marking scheme each poster other in your groups.

Marking Scheme

Fail to qualify	D (Fail)	C	B	A	A+/A*
0% - 35%	35% - 49%	50% - 59%	60% - 69%	70% - 79%	80% - 100%

Grade	Criteria for Poster (Marks Ratio)		
	Layout and Design (1/3)	Technical information (1/3)	Content and clarity (1/3)
A* **A+**	Neat and uncluttered poster, with excellent use of colour to engage and inform. Layout and visual elements capture the reader's attention and engage interest. Figures clear and illustrate the topic excellently. Number of pictures/figures balanced to the content.	Numerous details presented about the project plan and motivation. Presented information is clear and relevant to the topic. Questions when asked, were answered informatively and clearly.	Key aspects and motivation stated excellently, in precise language. No grammatical, spelling errors or ambiguous meanings. Details correct and written in an engaging way. The number of words on the poster was balanced with the visual elements.
A	Well-arranged poster. Use of colour in appropriate places to highlight parts. Layout and visual elements capture used to draw reader's attention. Good use of well-drawn figures which illustrate the topic. Number of pictures/figures was balanced to the content.	Clear details presented about the project plan and motivation. Good choice of relevant information. Good answers to questions.	Key aspects and the motivation stated well. No grammatical, spelling errors or ambiguous meanings. Details correct and well-written in clear sentences with descriptive phrases. Use of words on the poster well balanced with visual elements.
B	Some evidence of arrangement of information in poster or difficult to follow. Little or too much use of colour for effect. Some thought about the use of figures for illustration which illustrate the topic. Too few or too many pictures or figures.	Details presented about the project plan and motivation. Some relevant information presented but some unclear technical points. Some questions answered and/or answers unclear on some points.	Description of key aspects and the motivation stated. Few grammatical, spelling errors or ambiguous meanings. Sentences use short descriptive phrases. Too many or too few words compared with visual elements.
C	Little attempt at arrangement of information in poster or some confusion in presentation of elements. No colour in poster or far too much clashing use of colour. Little use of pictures or figures.	Little detail about the project plan and motivation. Little relevant information. Questions not answered well.	Little attempt at clearly stating and describing key information. Grammatical and spelling errors. Sentences have ambiguous meanings. Far too many words.
D (Fail)	No attempt at arrangement of information in poster. Straight replication of paper layout on poster. No colour in poster or far too much clashing use of colour. No pictures or images.	No detail about the project plan and motivation. Little relevant technical information. No useful answers to questions.	Sentences are confusing and do not present much information. Numerous grammatical and spelling errors. Far too many words.
Fail to qualify	Confusing presentation and arrangement of information. No use of colour or any other method of highlighting key points. No pictures or images.	No information about the project plan, motivation or technical details. Questions not answered.	Difficult to understand meaning in any of the written content due to confusing use of English or numerous grammatical and spelling errors.

Presentation at conference and peer assessment

The peer assessment form is below. Using the marking scheme, you will then assess each poster other in your groups.

Student name						Title:	
Criteria	Fail to qualify	D (Fail)	C	B	A	A+ A*	Comments and feedback
Layout and Design							
Technical information							
Content and clarity							
Overall							

This follows the straightforward form by ticking the appropriate box under the grade for each of the three criteria. Please also provide some positive and negative comments in the relevant boxes in **legible** handwriting.