

## Online Research Seminar Syllabus

### 1. Overview

<b>Title</b>	Nanomaterials		
<b>Targeted Students</b>	University/College students undertaking a STEM subject, e.g. Engineering, Science, Computer Science, Materials		
<b>Prerequisites</b>	<b>High School Students</b>	Required course/Knowledge	Basic understanding of scientific principles
		Recommended Materials for preparing for the course	
	<b>College Students</b>	Required course/Knowledge	Basic understanding of scientific principles
		Recommended Materials for preparing for the course	

### 2. Program Introduction and Objectives

<b>Course Description</b>	<p>We will take a look at Nanotechnology in everyday use, gain an understanding of the basic underpinning principles and see where this exciting field is heading. We will start by looking at the origins of nanotechnology, deep in the mists of time when science thought it had all the answers, and then it became clear from one discovery after another that this was not the case. From Quantum mechanics to relativity, science was shaken at its roots over a century ago, and this led to the interest in all things small. We will then look at what nanotechnology really is, and how and why the properties of nanometer-sized objects are fundamentally different to larger things, and how we can take advantage of this. We will look at applications in Medicine, food and cosmetics. Students will have a final group project (groups of 3) which they will present on as a group, but write an individual report on their own findings. They will also have a short assignment every week.</p>
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### 3. Program Schedule

Week		Lecture	Mentor	Assignment
1	Topic	<b>Introduction to Nanotechnology</b>	Introduction to Nanotechnology	The group projects will be revealed and outlined at the end of the session. I will also set a series of short questions for students to answer
	Detail	In this session, we will explore what Nanotech is, where it came from, what it is all about and where it is applied.	Nanotechnology	
2	Topic	<b>Nanomaterials</b>	Nanomaterials	I will set a series of short questions for students to answer
	Detail	In this session, we will explore basic materials properties and how they translate to the nanoscale, with particular emphasis on mechanical, electrical and chemical properties of materials.	Chemical properties of materials	
3	Topic	<b>Nanomedicine</b>	<b>Nanomedicine</b>	I will set a series of short questions for students to answer
	Detail	We will look at nanomedicine, from the perspective of the use of nanomaterials in biological systems, diagnostics and characterisation of nano systems.	Nanomaterials in biological systems	
4	Topic	<b>Nanochemistry</b>	<b>Nanochemistry</b>	I will set a series of short questions for students to answer
	Detail	We will look at how chemical engineering has interacted with nanotechnology, and look at some examples from the cosmetic and food industries.	Cosmetic	
5	Topic	<b>Final Project Discussion Session</b>		
	Detail	We will spend our time looking at the projects the students have chosen, as an opportunity to answer questions from earlier in the course, and to help them find and understand the appropriate material		
6	Topic	<b>Final Project Discussion Session</b>		
	Detail	This will be a continuation of the previous session		
7	<b>Final Oral Presentation and Written Reporting</b>			

### 4. Final Oral Presentation

Oral Project Theme:

- 1. Nanotechnology in medicine – diagnostics & therapeutics

- 2. Nanomaterials in medicine - implants
- 3. Nanotechnology and the food industry – issues with nanoscale additives
- 4. The role of Nanoparticles in the cosmetics industry. Is enhanced absorption of nanoparticles necessarily a good thing?