

Module 1

Infectious Diseases	
Overview	
Giving teachers a range of ideas on how to approach a topic.	
Scheme of Work	
Suggested scheme of work for teaching the topic.	
Antibiotics:Role Play	Activity
In this role play students have to explain the uses and limitations of antibiotics in their own words. It is best done at the end of the topic to reinforce ideas.	
Broad Street Pump	Activity
In this field visit you look more closely at one of the important scientific studies which led to better understanding of the spread of disease (epidemiology) and sanitation in London in the nineteenth century.	
Cells: animal cells, bacteria and viruses	Activity
This is a simple activity which students could carry out for homework to revise the structure of animal cells, bacteria and viruses.	
Dengue Fever	Activity
In this activity students are given background information on an infectious disease, and they are asked to produce a graph and a chart in Excel to represent data they have found on a website. The activity may be suitable for assessment of ICT key skills, and requires access to computers so may be most suitable as a homework assignment.	
Development of the Germ Theory of Disease	Activity
This activity could be used as a summary at the end of the topic or as a revision exercise. It could be used as a paired class activity or as homework,	
Germ Theory of Disease – John Snow	Activity
This activity is for use in class with alternate reading and discussion of questions. It teaches an interesting and important story in the history of the Germ Theory in Disease. It also introduces some key ideas about how a scientific theory develops. These will be expanded and reinforced later in the course.	
HIV discussion statements	Activity
These statements are a good way of starting a study of AIDS. They have proved very effective in stimulating interest and discussion.	
Infectious Diseases in the News	Activity
This is an introductory homework activity which encourages students to begin to use newspapers and magazines to complement their SPU classes.	
Semmelweiss	Activity
This extract from 'The Century of the Surgeon' by Jurgen Thorwald is a full version of the story of Semmelweis. The activity expects the student to read a substantial passage, and then answer some questions.	
Spread of infections disease	Activity
This simple model allows students to visualise the spread of an infectious disease and to see how different parameters can affect the rate and extent of the spread.	
Website List	Web links & other resources
Addresses of websites where useful information can be found.	

Other resources List of relevant publications.	Web links & other resources
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Health Risks	
Overview Giving teachers a range of ideas on how to approach a topic.	
Scheme of Work Suggested scheme of work for teaching the topic.	
Ordering Health Risks Students are asked to rank health risks in groups. A follow-up discussion on the perception of risk could examine the reasons why the order is distorted in some cases.	Activity
Prevention of Cancer The main activity is discussion in small groups, to evaluate information of reducing cancer deaths and to reach decisions on priorities.	Activity
Xeno day – risk This activity is adapted from the session run by Robert Doubleday at the SPU Xenotransplantation conference in Feb 2002. The separate sections could be run as successful short activities in their own right. The main activity is a role play of a government committee advising the Secretary of State for Health on applications to hold clinical trials of xenotransplantation.	Activity
Website List Addresses of websites where useful information can be found.	Web links & other resources
Other resources List of relevant publications and videos.	Web links & other resources

Medical Ethics	
Overview	
Giving teachers a range of ideas on how to approach a topic.	
Scheme of Work	
Suggested scheme of work for teaching the topic.	
Animal Ethics	Activity
This activity encourages students to develop an ethical position on the use of animals in xenotransplantation	
Clinical trials of new medicines	Activity
Why do researchers need to randomise the treatment and control groups when they are testing a new treatment? Can't they just give the treatment and see if people get better? This activity deals with the above questions, and includes a data handling activity on how scientists find out whether a treatment really works.	
Drug Development	Activity
Students order the phases of development of a new drug, and use discussion in groups to produce the correct sequence. This activity could follow on from a brain-storming of what the necessary procedures and regulatory bodies should be. The questions at the end could be set as a homework, but would benefit from discussion of some of these issues during the lesson.	
Ethics of Drug Trialling	Activity
This activity involves reading an article from New Scientist, and this could be done prior to the lesson. Students are asked to classify some of the arguments for and against paying volunteers for drug trials, and it is suggested that discussions in groups then feed into a whole class discussion.	
Is Xenotransplantation Ethically Acceptable?	Activity
This activity introduces 4 case studies that highlight some of the ethical issues involved in xenotransplantation. The students discuss these in groups and try to reach a decision, using ethical principles.	
ISCI – Sex in the Age of Mechanical Reproduction	Activity
Set up as (semi-)rehearsed reading, this exercise avoids many of the technical difficulties involved in role play while still encouraging the students to explore the motivation of those involved in a scientific development and its subsequent (ethical) technical use.	
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Other resources	Web links & other resources
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Alternative medicine	
Overview	
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Scheme of Work	
Suggested scheme of work for teaching the topic.	
Acupuncture and back pain	Activity
Some questions on a passage in the textbook, and some referring to the York Back Pain Trial website are a possible homework assignment examining the methodology of such trials.	
Complementary versus conventional medicine – what do you think?	Activity
Different therapies are regarded by the public and the health professions in different ways. This activity allows students to decide where on a 'continuum of convention' each of these therapies these lie. There is no 'right answer' to this exercise, time and fashion have probably as much to do with where they place each therapy as its effectiveness does. However the way the effectiveness of a therapy has been evaluated also counts. A check list reminds students of the methods.	
Discussion and Debate	Activity
Summary debate allowing students to weigh up in their own minds the value and efficacy of CAM therapies compared with conventional ones.	
Evaluating an Alternative medicine	Activity
Questions based on clinical trials carried out by researchers to test the effectiveness and the side effects of St.John's wort, as a herbal remedy for depression.	
Home remedies	Activity
All families have their own home remedies, some of which are widely used, others which may be particular to a certain ethnic or religious group or region of the country. A class discussion on what students and their families use at home can provide an interesting opening activity.	
Testing the placebo effect	Activity
The effectiveness of many CAM therapies is often ascribed by sceptics to the 'placebo effect'. In this activity students carry out a short experiment on their peers into the placebo effect.	
The principles behind CAM	Activity
Independent work to prepare a short presentation of the principles behind one alternative therapy.	
Therapy window shopping	Activity
Independent work to produce a poster summarising one therapy. These posters can be displayed in the classroom for other students to see and 'window-shop' from.	
What is health?	Activity
What do we understand by the term 'health'? Is it simply the 'absence of disease', or is it more than that? An understanding of the concept of health encompassing physical and psychological well-being is an essential pre-requisite for this whole topic, as many CAM therapies are holistic in their approach and emphasise psychological health. A short discussion activity.	
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Other resources List of relevant publications.	Web links & other resources
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Genetic Diseases	
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Designer Babies This activity explores the meanings of the term 'designer baby'. It provides a review of the techniques and the issues associated with the application of genetics to human reproduction. Students discuss their personal views and then go on to prepare and perform a short scripted debate about the ethical issues involved in the Hashmi case.	Activity
Genetic testing and screening This activity encourages students to read a text which provides a good overview of the issues involved in genetic testing. It will also teach them useful reading skills.	Activity
Human Karotypes In this activity a human karotype is made by cutting up a chromosome smear photograph. There are questions to stimulate the discussion of issues arising in prenatal screening	Activity
Huntington's Disease Questions refer to a family tree with Huntington's inheritance shown. The student is asked to give an opinion on decisions that the family need to make. This would be a good follow-up to a discussion on the scientific and ethical issues that such decisions involve.	Activity
Reebop This enjoyable activity is a hands on practical, which examines the important reason why meiosis is responsible for the tremendous variation that exists in every species. 'Reebops' are imaginary animals, made out of marshmallows, pins and cocktail sticks! They have an affectionate place in the homes of most students who make them, and they are fun to 'create'. Far from being an exercise suited to younger students, this has been proved to be very popular with Post-16 and older students.	Activity
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Genetic Engineering	
Overview	
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Genetic Engineering module	Activity
The final product of this activity is a summary of the arguments for and against genetically modified food. Students are asked to research and discuss the information before focusing on the main points of the arguments, so the research could ideally be done as homework before the lesson.	
GM Crops	Activity
This activity provides a useful summary of the main issues around GM crops and improves students' skills in identifying evidence needed to support an argument	
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The move-away from a human-centered view of the natural order	
Overview	
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Scheme of Work	
Suggested scheme of work for teaching the topic.	
Creation myths	Activity
A powerpoint with several creation myths from different cultures is available. These can be narrated by the teacher or a student with little introduction. The student sheet encourages discussion about these stories and their relationship with science.	
Evolution activity	Activity
These notes could form the basis of a teacher presentation of the development of ideas using a historic perspective. Alternatively students could be asked to research 1 or 2 of these landmarks in thinking, and create a group time-line display of evolutionary theory. The students could present the section they have researched to the rest of the class.	
Genetics of sickle cell anaemia	Activity
This activity is a 1300 word article about sickle cell disease with various DART activities to help students engage with the text. The article discusses science explanations including inheritance, genetic screening and evolution. The ethics of genetic selection, and how this is affecting current human evolution is discussed.	
Lamarck's theory	Activity
Some ideas for the teaching of Lamarck's theory including question and answer card game. The cards are designed so that they can be cut out folded in half and stuck.	
Natural Selection of Lake Malawi	Activity
In this short DART activity students are asked to distinguish explanations from evidence in a passage about the evolution of chichlid fish in Lake Malawi.	
Sickle Cell disease and selection	Activity
In this activity students simulate the selective pressures that exist in nature, which can change the frequency of a particular allele in a population. The example used is sickle cell anaemia, and the simulation uses beads to represent alleles.	
Simulating Evolution	Activity
The principles determining the changes in structure which occur during the evolution of organisms can be applied to any collection of specimens. These can be arranged into 'evolutionary trees', showing the order in which changes in structure probably occurred. The same kind of analysis can be applied to a collection of man-made artifacts, pretending that each is an organism and then determining the probable course of evolution. The phenomena of divergence of closely related forms, convergence of distantly related forms and parallel evolution can all be illustrated.	
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Module 1 Revision	
Evolution	This set of straightforward questions may be suitable as an end of topic test or for revision.
Genetics Revision	List of statements that are partly true or wrong to be rewritten plus a test on ethical principles.
Issues in the Life Sciences	35 questions on topic 1 that can be used as revision test or revision checklist. The test would take around an hour to complete.
Revision - Germ Theory of disease	Some questions to help revision.
Revision – Questions on infectious diseases and medicines	A set of statements that are wrong or only partly true. Many of them are similar to errors that students make in exam answers. Class discussion of what is wrong with each statement should revise these points and clarify some misconceptions.
Revision – testing medicines	List of stages in the development of a new medicine with questions.

Module 2

Using Fuels	
Fuels	Activity
These five activities examine the past, present and possible future of fuels. Discussion points are included which can be carried out in large or small groups, and weblinks in the weblinks section help guide the research activities.	
Future Energy Supplies	Activity
This activity should develop students' understanding of models, allowing them to look at the assumptions behind some models of future energy demand, and to see the effect of different starting assumptions on the outcome.	
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Electricity Supplies	
Blackout This individual activity highlights our dependence on electricity and shows the importance of a reliable supply. It is suitable for homework.	Activity
Electricity Quiz This activity is an introduction to the topic. It consists of a quiz followed by discussion of the answers.	Activity
How will the UK's electricity be generated in the future? In this activity students investigate two scenarios for future electricity generation in the UK. The scenarios show how both world energy prices and UK policy influence projections of which fuels will be used. Calculations of carbon dioxide emissions for the two scenarios give some unexpected projections. The activity ends with a consideration of key policies in the UK government White Paper of 2003, "Our energy future - creating a low carbon future".	Activity
Power Stations on the Map This internet activity is a good way of introducing students to the electricity supply industry in the UK.	Activity
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Air Quality	
Overview Giving teachers a range of ideas on how to approach a topic.	
Scheme of Work Suggested scheme of work for teaching the topic.	
Air Pollution This is a simple activity to summarise the effects of some of the components of air pollution.	Activity
Air Quality in Mumbai This exercise uses a news item about a policy change in Mumbai as a lead into a discussion about the quality of that decision and the use or abuse of evidence to critique the decision.	Activity
Website List Addresses of websites where useful information can be found.	Web links & other resources
Other resources List of relevant publications.	Web links & other resources

Fuels and the global environment	
Overview – not yet available	
Scheme of Work Suggested scheme of work for teaching the topic.	
Simple Climate model –cpdn	Activity
As an introduction to climate modelling the climateprediction.net resources include a very simple excel model of climate. Students can change a parameter and use the model to see how the average temperature changes.	
Earth's energy balance Activity The climateprediction.net site includes a powerpoint set which gradually builds up a diagram of energy flows entering and leaving the Earth's atmosphere and includes questions to focus attention on the factors affecting these flows.	
Examining evidence for the effect of carbon dioxide on the temperature – cpdn This activity on the climateprediction.net site presents four sets of evidence that indicate a correlation between rising carbon dioxide levels and the Earth's temperature. Students are asked to evaluate each set of evidence.	
Climateprediction.net results so far – cpdn	Activity
This activity presents some of the results of the climateprediction.net modelling research to introduce students to a more complex model of the climate and to show how the model is tested in three stages before being used to actually predict future climate. Students answer questions to interpret some of the results.	
Practical models pf climate factors – cpdn	Activity
The climateprediction.net site for Twenty first century science includes practical experiments using water flow to simulate energy and links to an experiment showing the different heat absorption of air and carbon dioxide.	
Feedback – cpdn Activity A worksheet Environment changes, climate change? Allows students to consider how different factors have feedback effects on global climate.	
Controversial Science? Investigating climate change online	Activity
In this exercise the teacher takes the role of advocate for the idea that there is nothing significant in global climate change that should be attributed to human activity.	
Global Warming	Activity
This activity is most effective if it is online so that the links to the websites are live. It is a substantial activity examining data measurements and causal links in addition to covering the topic of global warming, but it could easily be broken up into sections if needed.	
Modelling Global Changes	Activity
These six activities allow students to learn more about the use of computer models and their limitations. Students can use simple models on Excel spreadsheets to look at linear and exponential growth. They then manipulate a simple predator-prey simulation to show the effects of positive and negative feedback. There are two extension activities which allow a more detailed understanding of the role of feedback in simple systems. These modelling concepts are related to the complex system of climate change.	
Website List	Web links & other resources

Addresses of websites where useful information can be found.	
Other resources List of relevant publications.	Web links & other resources

Sources and effects of radiation	
Overview – not yet available	
Scheme of Work Suggested scheme of work for teaching the topic.	
Mobile phones and the precautionary principle This activity uses class activity and news reports and considers the whole issue of uncertainty of evidence of harm and the use of the Precautionary Principle, in the context of mobile phones.	Activity
Nuclear research timeline This exercise consists of a timeline of the development of nuclear science. Questions ask for a fuller explanation of particular aspects relevant to the SPU specification, which may require further research.	Activity
Nuclear Waste Disposal This activity reminds students of the issues surrounding the disposal of nuclear waste and asks them to take the role of a number of different parties on the disposal debate.	Activity
Risks of Radon This activity is similar to the discussion in the textbook on pages 181-183 but includes more studies and more questions on decision making.	Activity
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Other resources List of relevant publications.	Web links & other resources

The move away from an Earth-centered view of the Universe	
A feeling for Fields	Activity
This activity explores some of the characteristics of 'field theories'. Students are encouraged to perform a simple experiment. The critical thing is for the students to explain the well-known data in terms of 'field'.	
Dialogue concerning the Origin of the Universe	Activity
This activity requires the students to consider the basic ideas of the Big Bang hypothesis in a novel form that links back to Galileo's dialogues.	
E.T. can't phone Home	Activity
Chapters 15 and 16 tell the story of humankind,s vision increasing in scope from the enclosed Universe of the ancients to the boundless Universe of modern science. This activity and the activity We should be so lucky, begin to consider the consequences of this view in relation to extraterrestrial life. In E.T. students are encouraged to use simple physics to critically examine some fictional scenarios as well as to consider what would happen if we really did contact extraterrestrials.	
Factors of Ten	Activity
This activity gives students an opportunity to consider the scale of the universe as described by modern science.	
Solar system timeline	Activity
In the first activity students construct a timeline based on the story of the geo/heliocentric debate, in the second the story is used to illustrate the scientific method as a process. The third activity is a fun multi-choice activity designed to bridge the solar system topic into the expanding universe topic.	
We should be so Lucky	Activity
This activity allows students to read an article about the possibility of extra-terrestrial life and to criticise some of the assumptions and arguments used in the debates.	
What did Galileo See?	Activity
This activity involves constructing a simple 'galilean' telescope, making observations of a lunar image, recording observations and answering questions on validity of observations.	
Overview – not yet available	
Scheme of Work	
Suggested scheme of work for teaching the topic.	
Website List	Web links & other resources
Addresses of websites where useful information can be found.	
Other resources	Web links & other resources
List of relevant publications and CD-Rom.	

Module 3

A critical account of scientific reading
Pilot reading list
Preparation activity You may like to use this preparation activity for the coursework element 'Account of Scientific Reading'.
Student checklist
Reading on genetic testing and screening

A study of a topical scientific issue
Preparation activity This activity is for preparation of the coursework element 'Study of a Scientific Issue'.
Website List Web links & other resources Addresses of websites where useful information can be found.
Student checklist
Evaluating web sites

Other Downloads (Headings are page titles)
Promoting the course Curriculum manager's and student's guides to help marketing of a course which may be offered to students outside the department which are running it.
Teaching the Course Notes on teaching the course. Student handbooks from Barnet College and Friesland School, Derbyshire
Teaching and Learning We have put together a set of ideas that have been successful with SPU classes. For each there is a brief outline of the suggested method and links to activities which use it.
Textbook Answers Answers to Module 1 (Chapters 1-8) Answers to Module 2 (Chapters 9-16) Answers to each chapter as a separate download.