CATHOLIC SOCIAL TEACHING IN SCIENCE

	KS3	KS4	KS5
Human Dignity *All created in the image and likeness of God*	**Year 7 – cells unit** Teaches cells as the building blocks of life. **Year 7 life processes unit** Teaches about the roles of various organs and organ systems that we all have. **Year 7 – reproduction unit** Teaches basics of human reproduction from conception to birth **Year 7 – food & digestion unit** Key ideas on the digestive system, which is vital to human life **Year 8 – Genetics & evolution unit** Pupils to understand the difference in visible traits is due to differences in our genetic make-up. Each person is completely unique and special in their own right. **Year 8 – respiration unit** Ideas on respiratory and circulatory system, both of which are vital to human life. **Year 9 – cells unit** Evaluate the use of embryonic stem cells, considering the benefits they bring and the ethical issues involved. **Year 9 – organisation unit and homeostasis & control unit** Lots of ideas on different body systems, all of which are vital to human life.	**Year 10** – Stem Cells Evaluate the practical risks and benefits, as well as social and ethical issues, of the use of stem cells in medical research and treatments. **Year 10** – Blood Products Evaluate risks related to use of blood products. **Year 10** – The Brain Evaluate the benefits and risks of procedures carried out on the brain and nervous system. **Year 11** – Radiotherapy Students understand the risks and benefits of using science for cancer treatment, and the effects this has on health. **Year 11** – Contraception Show why issues around contraception cannot be answered by science alone. Evaluate associated personal, social, economic and environmental implications; and make decisions based on the evaluation of evidence and arguments. **Year 11** - Human Infertility Understand social and ethical issues associated with IVF treatments. Evaluate from the perspective of patients and doctors the methods of treating infertility. **Year 11** – Uses of EM waves Students should be able to draw conclusions from given data about the risks and consequences of exposure to radiation.	**Year 12** – Immunity The use of vaccines to provide protection for individuals and populations against disease. The concept of herd immunity. Students should be able to: discuss ethical issues associated with the use of vaccines and monoclonal antibodies evaluate methodology, evidence and data relating to the use of vaccines and monoclonal antibodies. **Year 12** – Farming Techniques Farming techniques reduce biodiversity. The balance between conservation and farming. **Year 13** – Energy Efficiency in Food Chains Students will appreciate the ways in which production is affected by farming practices designed to increase the efficiency of energy transfer by: simplifying food webs to reduce energy losses to non- human food chains reducing respiratory losses within a human food chain. **Year 13** – Biodiversity Students will evaluate data relating to common agricultural practices used to overcome the effect of these limiting factors. **Year 13** – Diabetes Students should be able to evaluate the positions of health advisers and the food industry in relation to the increased incidence of type II diabetes. **Year 13** – Stem Cells Evaluate the use of stem cells in treating human disorders. **Year 13** – Cancer Evaluate evidence showing correlations between genetic and environmental factors and various forms of cancer Interpret information relating to the way in which an understanding of the roles of oncogenes and tumour suppressor genes could be used in the prevention, treatment and

			cure of cancer. **Year 13** – Fission and fusion Students to consider the advantages and disadvantages of using fission for producing energy. Should the pursuit of Energy from fusion be encouraged given the possible consequences.
The Common Good *Whatever is needed for each person to flourish*	**Year 7 – Energy resources unit** Evaluate the advantages and disadvantages of using various energy resources, including renewables, fossil fuels and nuclear; focusing on which contributes most to the common good. **Year 7 food unit** The need for a balanced diet and how we can achieve that. Also the importance of gut microbes for good health. **Year 8 - environment unit** Food security is having enough food to feed a population. Teaching here is linked to pollinating insects, the decline in their numbers and how this could impact global food security. **Year 8 – waves unit** Use of ultrasound, including for checking the health of a foetus and for medical diagnosis & treatment **Year 9 – organisation unit** Ideas on how smoking can impact health and on various life choices that can affect the chance of developing coronary heart disease. **Year 9 – infection and response unit** Lots of ideas about health, different diseases, prevention and cure. **Year 9 – waves unit** Use of ultrasound for checking the health of a foetus	**Year 10** – Vaccinations Evaluate the global use of vaccination in the prevention of disease. **Year 10** - Testing new Drugs New medical drugs have to be tested and trialled before being used to check that they are safe and effective. **Year 10** - Monoclonal Antibodies Appreciate the power of monoclonal antibodies and consider any ethical issues. **Year 10** – Plant Deficiency Disorders The understanding of ion deficiencies allows horticulturists to provide optimum conditions for plants. **Year 10** – Energy resources Evaluate the advantages and disadvantages of using various energy resources, including renewables, fossil fuels and nuclear; focusing on which contributes most to the common good. **Year 11** - Food Security Food security is having enough food to feed a population. Biological factors which are threatening food security include: the increasing birth rate has threatened food security in some countries changing diets in developed countries means scarce food resources are transported around the world new pests and pathogens that affect farming environmental changes that affect food production, such as widespread famine occurring in some countries if rains fail the cost of agricultural inputs conflicts that have arisen in some parts of the	**Year 13** – Induced fission Appreciation of balance between risk and benefits in the development of nuclear power. Studying the safety aspects of nuclear reactors, considering workers replacing control rods and operating in the stations.

		world which affect the availability of water or food.	
Solidarity *Not just doing things for other people but acting with them to build a more just world together*	**Year 8 - environment unit** Food security is having enough food to feed a population. Teaching here is linked to pollinating insects, the decline in their numbers and how this could impact global food security. Working to maintain insect populations to help maintain food security is vital for a more just world.	Sustainable methods must be found to feed all people on Earth. **Year 11** - Farming Techniques Understand that some people have ethical objections to some modern intensive farming methods. Understand how application of different fishing techniques promotes recovery of fish stocks.	**Year 12** – Heart Disease Students should be able to: analyse and interpret data associated with specific risk factors and the incidence of cardiovascular disease evaluate conflicting evidence associated with risk factors affecting cardiovascular disease recognise correlations and causal relationships. **Year 13** – Particle Reactors Benefits of experiments run in particles reactors
Participation *People have a right and duty to take part in shaping a more just and human society*	**Year 7 – skills unit** Looks at the wide range of jobs in science that students could aspire to work in, including medicine, environmental science, and meteorology, all of which could help shape a more just & human society.	**Year 10** - Non-Communicable Diseases Health is the state of physical and mental well-being. Diseases, both communicable and non-communicable, are major causes of ill health. Other factors including diet, stress and life situations may have a profound effect on both physical and mental health. Evaluate methods of treatment bearing in mind the benefits and risks associated with the treatment. Discussing the human and financial cost of these non-communicable diseases to an individual, a local community, a nation or globally Explaining the effect of lifestyle factors including diet, alcohol and smoking on the incidence of non-communicable diseases at local, national and global levels. Evaluate information around the relationship between obesity and diabetes, and make recommendations taking into account social and ethical issues. **Year 10** – Energy resources Students should consider examples of countries with poor resources, and what governments are doing to support populations. Analyse how these steps are for the benefit of different peoples around the world.	**Year 12** – Peer review Scientists have a right a duty to review other scientists work before publishing to benefit human society. **Year 12** – Development of Wave-particle duality Theory Appreciation of how knowledge and understanding of the nature of matter changes over time, and different scientists' contribution to this development.

Subsidiarity *As far as possible, decisions should not be taken at the highest levels but by the people who are most affected*	**Year 7 – energy resources unit** Consideration of what the best options for energy (renewable or non-renewable) are for different areas, including Chelmsford. Rural villages and the coasts may be the obvious answer for many sites, but this may not be to the agreement of the local communities. **Year 9 – global energy resources unit** A range of renewable and non-renewable ideas are considered, with pros and cons of all discussed. Impacts on those how live near a proposed new site should be considered and taken into account.	**Year 10** – Peer review Scientists from all over the world have to work together, reviewing each other's work before publication. **Year 11** - Recycling Rapid growth in the human population and an increase in the standard of living mean that increasingly more resources are used and more waste is produced. Unless waste and chemical materials are properly handled, more pollution will be caused.	**Year 13** – Gamma Radiation and the inverse square law Use of materials emitting ionising radiation affects people who have not made the decision to use it. Case study of Chernobyll.
Stewardship of Creation *We are called to care for creation as stewards, not just as consumers*	**Year 7 – acids and alkalis unit** Transport of hazardous chemicals, how this can be done safely and how spills are dealt with the try and protect the environment. **Year 7 – energy resources unit** Consideration of pros & cons of different energy sources (renewable or non-renewable) including potential environmental impacts. **Year 8 – environment unit** Ideas on how pests are dealt with and issues with different methods including bioaccumulation **Year 8 Earth and atmosphere unit** Ideas on the greenhouse effect & climate change and how human activity contributes to both of these. **Year 8 – plants and photosynthesis unit** Ideas on the importance of plants, their uses and the interconnectedness of all living things.	**Year 10** – Fracking/building wind farms in rural villages Although this would benefit a great amount of people, small communities would be negatively impacted. Students to analyse both sides of the debate, weighing the advantages and drawbacks of big new technology. **Year 11** – Earthquakes and seismic waves Due to an event in one part of the Earth, another part is negatively affected. **Year 11** - Global Warming Understand that the scientific consensus about global warming and climate change is based on systematic reviews of thousands of peer reviewed publications.	**Year 12 & Y13** – Evolution & Variation Students should be able to: use unfamiliar information to explain how selection produces changes within a population of a species interpret data relating to the effect of selection in producing change within populations show understanding that adaptation and selection are major factors in evolution and contribute to the diversity of living organisms. appreciate that advances in immunology and genome sequencing help to clarify evolutionary relationships between organisms. explain why individuals within a population of a species may show a wide range of variation in phenotype explain why genetic drift is important only in small populations explain how natural selection and isolation may result in change in the allele and phenotype frequency and lead to the formation of a new species explain how evolutionary change over a long period of time has resulted in a great diversity of species. **Year 13** – Ecosystem maintenance Students should show an

			understanding of the need to manage the conflict between human needs and conservation in order to maintain the sustainability of natural resources
Rights and responsibilities When one person has a right, others have a responsibility to uphold that right		**Year 10** – Pollution New technologies and advancements in industry/uses of Earth's resources has consequences. **Year 10** – Atomic Structure Similarity between smallest and biggest things in the universe: atoms and solar systems. **Year 11** – Big bang theory Human Impact on the Environment, exploring the cause and effect & response. **Year 11** - Biodiversity Understand how the everyday use of hormones as weed killers has an effect on biodiversity Explain how waste, deforestation and global warming have an impact on biodiversity Evaluate given information about methods that can be used to tackle problems caused by human impacts on the environment. **Year 11** - Waste Management Rapid growth in the human population and an increase in the standard of living mean that increasingly more resources are used and more waste is produced. Unless waste and chemical materials are properly handled, more pollution will be caused. **Year 11** - Land use Humans reduce the amount of land available for other animals and plants by building, quarrying, farming and dumping waste. Understand the conflict between the need for cheap available compost to increase food production and the need to conserve peat bogs and peatlands as habitats for biodiversity and to reduce carbon dioxide emissions. **Year 11** - Deforestation Evaluate the environmental implications of deforestation. **Year 11** - Global Warming Understand that the scientific consensus about global warming	**Year 13** – Orbits of Planets and satellites Students are made aware of how even the smallest change in gravitational field strength would change the orbits of the most massive planets and stars. What (or who) made everything have perfect alignment for life on Earth to exist.

		and climate change is based on systematic reviews of thousands of peer reviewed publications. **Year 11** - Evolution Appreciate that the theory of evolution by natural selection developed over time and from information gathered by many scientists. **Year 11** - Selective Breeding Explain the benefits and risks of selective breeding given appropriate information and consider related ethical issues.	
Option for the poor *To choose to consider the needs of the poorest and most vulnerable people first*		**Year 11** - Genetic Screening Appreciate that embryo screening and gene therapy may alleviate suffering but consider the ethical issues which arise. **Year 10** – Stem Cells Evaluate the practical risks and benefits, as well as social and ethical issues, of the use of stem cells in medical research and treatments. **Year 11** - Cloning Explain the potential benefits and risks of cloning in agriculture and in medicine and that some people have ethical objections. **Year 11** - Gene Technology Make informed judgements about issues concerning cloning and genetic engineering, including GM crops.	**Year 13** – Fertiliser Use Student will understand the environmental issues arising from the use of fertilisers including leaching and eutrophication. **Year 13** – Four Stroke Engines Understanding of a four-stroke petrol engine cycle and a diesel engine cycle, and of the corresponding indicator diagrams. Do these engines still have a place in modern society with the need to reduce greenhouse gas emissions. What about in developing countries?
		Year 11 - Genetic Engineering (crops) Make informed judgements about issues concerning cloning and genetic engineering, including GM crops.	**Year 13** – Food Security Evaluate the ethical, financial and social issues associated with the use and ownership of recombinant DNA technology in agriculture, in industry and in medicine Balance the humanitarian aspects of recombinant DNA technology with the opposition from environmentalists and anti-globalisation activists