

**Course Title: CHEMISTRY IN OUR DAILY LIVES**

**Course Code: CHEM2402**

**Semester: I/II/Summer**

**Number of credits: 3 credits – no laboratory**

**Pre-requisites: CHEM1901/CHEM1902 or HOD permission**

### **Course Description**

The course will focus on the role of chemistry in necessities of daily life such as the chemistry of life, agriculture, food, housing, healthcare, clothing, transport and communications. In addition it will introduce various applications of chemistry in the area of arts, crime and law enforcement, consumer products, cosmetics, warfare, economics and politics.

#### ***Chemistry in the Kitchen:***

Butter and cooking oil – saturated and unsaturated fatty acids, hydrogenation of oil. Prostaglandins. Chemicals from our bodies – antioxidants and cholesterol. Chemistry of cooking – physical and chemical changes, stability of nutrients during cooking. Microwave cooking. Water purification. Food sterilization and preservation.

#### ***Chemistry in the Laundry:***

Soaps. Synthetic surfactants and their mode of actions. Laundry detergents – organic and inorganic builders, inert fillers, fluorescers, foam. Bleach – chlorine, sodium perborate. Washing in machines – solid and liquid laundry detergents – compositions, surfactants and their potentiation. Biodegradability. Dry cleaning and its effect on the environment. Other household cleaning agents.

#### ***Chemistry in Cosmetics:***

The skin and skin penetration drugs in cosmetics. Deodorants and antiperspirants. Sunlight on skin. Hair and hair products for bleaching, colouring, moisturizing. Lipstick, toothpaste and baby care products.

#### ***Chemistry in the Garden:***

Food for plants, nutrient deficiencies in plants. Fertilizers, composting, pesticides and their toxicities. Insecticides, fungicides. Biological control of weeds and pests. Genetically modified plants.

#### ***Chemistry in the Swimming pool:***

Chlorination of swimming pools. Effect of pH. Measuring the amount of chlorine in water. Super chlorination. Effect of sunlight on chlorine.

### ***Chemistry of Garments:***

Fibers, yarns, and fabrics. Flammability. Carpet materials. Leather materials – chemistry of tanning.

### ***Chemistry in the Medicine cabinet:***

Types of drugs in the cabinet and their chemistry and toxicity evaluation. Aspirin and analgesics, sulfa drugs, tranquilizers. Antidepressants, antihistamines. Generics replacing brand- name drugs. Drugs for chemotherapy.

### ***Chemistry of Energy:***

Energy we use and energy we need. Energy cost. Alternate energy – solar and fuel cell. Chemistry of the car – compression ratio; air: fuel ratio, fuel additives, lubricating oil, brake fluid, accumulators. Pollution from motor vehicles.

### ***Chemistry in the atmosphere:***

Pollution. Acid rain. Ozone layer. Global warming. Green chemistry. Relevant international conventions.

### ***Chemistry of Local Industries:***

Chemistry of the alumina, sugar and food industries and their implications in the community. Petroleum cracking. Ethanol production. The cement industry.

### ***Chemistry and sports:***

Cold packs. Hydration fluids, sports drinks, design of suitable materials for clothing and shoes for athletes. Design of materials to be used in sports equipment e.g. football/tennis ball, poles for vaulting, tennis racquets and golf clubs, spikes. Performance testing methods. Blood lactate level testing. Anti-inflammatory drugs. Anabolic steroids. Drug testing at sporting events.

### ***Chemistry of common appliances:***

TV/computer screens, printer inks, photocopying machines, cell phones, batteries, clocks. Stainless steel. Corrosion resistant materials.

### ***Chemistry at the crime scene:***

Drug testing. Ganja, Cocaine, crack. Breathalyzers. DNA analysis. Arson and analysis of explosives, soil at crime scenes.

### ***Chemistry of minerals:***

Limestone, ruby, sapphire, quartz, emeralds, diamond, topaz etc. Asbestos, talc.

### ***Ethical issues in chemical research:***

Chemical and nuclear weapons. Environmental issues. Integrity of scientific results, the welfare of research participants.

### ***Investigating the “myths”***

Public perceptions on issues such as “organic”, “natural” materials and foods. Bottled water compared to tap water. Mercury in dental amalgams. Cooking in microwave ovens. Validation of chemistry found on Wikipedia pages.

### **Teaching method/Approaches**

The teaching of this 3 credit course will be carried out using the following format:

Formal lecture course: 24 hours

Problem based classes and tutorials: 16 hours

Total contact hours = 40

### **Assessment Procedures/Methods:**

The course assessment will be broken into two components; a final examination worth 50% and a coursework component consisting of assignments worth 50%. (5 \* 10%). The assignments will take the form of 5 written reports with an associated 5 minute Oral presentation.

One (1) two-hour written examination            50%

Five (5) written assignments and presentations    50%

### **Materials/Bibliography/Reading List:**

Selinger, Ben: *Chemistry in the Marketplace* (5th ed.) Harcourt Brace (1998)

Karukstis, Kerry K. and Van Hecke, Gerald R.: *Chemistry Connections, The Chemical Basis of Everyday Phenomena*, Harcourt/Academic Press (2003)

Atkins, Peter: *Atkins' Molecules*, Cambridge University Press, 2nd Edition 2003,

Luning Prak, Dianne J. and Copper, Christine L., A Chemistry Minute: Recognizing Chemistry in Our Daily Lives, *J. Chem. Educ.*, 2008, 85 (10), p 1368

Moy Cheryl L., Locke Jonas R., Coppola Brian P., and McNeil Anne J. Improving Science Education and Understanding through Editing Wikipedia. *J. Chem. Educ.*, 2010, 87 (11), pp 1159–1162