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**TEACHING CHRISTIAN VALUES AND SPIRITUAL LESSONS  
IN  
THE BIOCHEMISTRY CLASSROOM**

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## **Teaching Christian Values and Spiritual Lessons in the Biochemistry Classroom**

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***"Hear, O Israel: The Lord our God, The Lord is one! You shall love the Lord your God with all your heart, with all your soul, and with all your strength. And these words which I command you today shall be in your heart. You shall teach them diligently to your children, and shall talk of them when you sit in your house, when you walk by the way, when you lie down, and when you rise up. You shall bind them as a sign on your hand, and they shall be as frontlets between your eyes. You shall write them on the doorposts of your house and on your gates". Deuteronomy 6:4-9.***

***" Prophets schools were intended to serve as a barrier against the wide-spreading corruption, to provide for the mental and spiritual welfare of the youth, and to promote the prosperity of the nation by furnishing it with men qualified to act in the fear of God as leaders and counselors". White, E. Education p. 46:2***

### **INTRODUCTION**

God created man in his image using chemical elements present in earth to give form to his body (Gen 2:7).

The human body was created in a wonderful form (psal.139: 13-16), and was designed to function perfectly, following the laws established by God. Upon all created things is seen the impress of the Deity. Nature testifies of God. The susceptible mind, brought in contact with the miracle and mystery of the universe, cannot but recognize the working of infinite power. Not by its own inherent energy does the earth produce its bounties, and year by year continue its motion around the sun. An unseen hand guides the planets in their circuit of the heavens. A mysterious life pervades all nature--a life

*that sustains the unnumbered worlds throughout immensity, that lives in the insect atom which floats in the summer breeze, that wings the flight of the swallow and feeds the young ravens which cry, that brings the bud to blossom and the flower to fruit.*

*The same power that upholds nature, is working also in man. The same great laws that guide alike the star and the atom control human life<sup>1</sup> The laws that govern our physical organism, God has written upon every nerve, muscle, and fiber of the body. Every careless or willful violation of these laws is a sin against our Creator<sup>2</sup>.*

*God gave human beings a vegetarian diet for sustenance ( Gen. 1:29), which contains biomolecules and minerals indispensable for life.*

These biomolecules like water, carbohydrates, proteins, nucleic acids, lipids, vitamins and minerals play an essential role mutually allowing the body to function as an integrated system. This system needs a constant exchange of biomolecules to maintain the vitality and the adequate function of each organ, and/or cell.

Man received from the Creator what he needed to maintain life and health, by offering him the fruit of the tree of life and the diet he should follow to maintain his body in optimum conditions of health and vigor.

These foods that have complex structure, during the digestion process are degraded to their respective molecules, which are absorbed and transported to the cells where biochemical reactions take place in order to maintain the vital functions of the organism in an integral way.

Biochemistry is defined as the medical and biological science that studies the chemical constituents of live organisms, its functions and its transformations, as well as the processes that control them, in addition to the understanding of cellular biology, microbiology, nutrition and pharmacological interaction of the live organisms<sup>3</sup>.

This science is dedicated to understanding the molecular basis of life and is derived from physiology, that studies the functions of live organisms, vegetable or animal, and its coordination with the distinct processes that have occurred in the organism itself<sup>4</sup>.

It is known that the functions of the cells and organs, even the complete organism depend on the molecules that form them and their interaction, that is to say, the biochemical processes that they manifest.

Given the diverse processes that take place in a live organism, particularly in the cell, it is important to know which are the basic elements that satisfy the demands of energy and nutrients that can sustain and prolong their life, giving the capacity to live and multiply or to alter its structure and die when these elements do not fulfill their specific function. For this it is indispensable that the nutrition obtained through these substances formed by chemical elements called foods supply needs and requirements of every living organism. In other words, Biochemistry is nutrition.

Nutrition is defined as the process by which an organism selects, ingests, digests, absorbs, transports, utilizes and excretes the necessary substances for its maintenance<sup>5</sup>.

The study of nutrition requires knowledge of the metabolic pathways that appear when the nutrients obtained from foods are utilized. Therefore the student registered in Biochemistry is required to recognize man as created in the image and likeness of God and at the same time designed according to the diversity of biomolecules that allow him to be a complete being. It also requires that the student be able to identify the mechanisms that allow man to use the diverse nutrients obtained from the foods ingested (water, carbohydrate, protein, fat, vitamin and mineral), and the interaction that

exists between them. Further more , it explains that the alterations at the cellular level, that give way to disease, are a result of sin. It is understood that most diseases have a molecular cause.

At the beginning of the Biochemistry course, the Creator of the Chemistry of life is given recognition. The path of the food is described from ingestion to absorption till it reaches the cell to be utilized.. The creative power of God is stressed as the designer of each part of the body.

In Biochemistry the following topics: Water, carbohydrates, fats, proteins, vitamins and minerals are studied, The physical and chemical properties of food components are explained, the metabolic path of intermediate metabolism is described and analyzed, as well as the interaction between them during the production of energy for the organism in good nutritional condition and in the state of inanition. Circumstances or diseases where biochemical imbalance exists are identified. The student can recognize the marvelous creative work and support of God, as he studies the biochemical reactions in the cell.

The study of Biochemistry involves formulas, application of lab techniques in the diagnosis of diseases or in scientific research. This makes it a technical area in which it is difficult to integrate faith and learning. However, if biochemical reactions are studied as part of a whole, it is possible to perceive spiritual values and lessons.

This essay's purpose is to describe how to integrate the Christian values that Montemorelos University has selected to inculcated in the students: excellence, justice, mercy, obedience, respect, responsibility, honesty, gratitude, service, cooperation, and compassion. Further more, I propose the integration of some spiritual lessons in teaching Biochemistry which are imparted to students of the fifth semester of bachelor in science of Nutrition and Medical Technology.

The groups are formed of 10 to 25 students their ages are between 17 and 20 years, occasionally there are students older than 25 years..

The conclusions are mentioned at the end of this essay .

#### **I. Values in The Teaching of Biochemistry.**

When the children of Israel left Egypt, they were led to the promised land through the dessert passing through diverse difficulties. God desired to take away the paganism that existed so that they would understand the principles of His government. He gave them His Holy law which is a reflection of His character. By His grace they would have this norm and be a special people to show the other nations who He is. In order to fulfill this, God gave them instructions of how their education in the home should be. In Deut.6:4-9 it says *"Hear, O Israel: The Lord our God, The Lord is one! You shall love the Lord your God with all your heart, with all your soul, and with all your strength. And these words which I command you today shall be in your heart. You shall teach them diligently to your children, and shall talk of them when you sit in your house, when you walk by the way, when you lie down, and when you rise up. You shall bind them as a sign on your hand, and they shall be as frontlets between your eyes. You shall write them on the doorposts of your house and on your gates"*.

God desired that his people have present with them principles such as: loyalty, fidelity, respect for life, for parents, honesty, obedience, justice, etc., their thoughts and actions should manifest that their life was guided by His divine law. Another way in which God tried to teach his people was through the schools of the prophets. These schools had the objective of serving as a barrier for the corruption that was spreading

every where, and to care for their mental and spiritual well being, and stimulate the prosperity on the nation providing men to fear God and be directors and counselors<sup>6</sup>.

Today, SDA institutions should have the same purpose that the schools of the prophets had to transmit Christian values- Those values should be reflected in the course plans, the extra curricular activities and in our daily interaction with students. 1<sup>st</sup> Tim. 4:12 says: "Be an example to the believers in **word, in conduct, in love, in spirit, in faith, in purity**".

Montemorelos University has established in its policies the teaching of values in each one of the courses. These values are fundamental in the educational philosophy and Christian principles sustained by the S.D.A. church. These values are to be integrated in an intentional and planed way during the development of the course, and also by the teachers modeling in her daily dealing with the student. The course plan, document handed to the student at the beginning of the course, is designed in such a way that the student becomes acquainted with the Christian worldview of the subject, what is expected of him/her, what he/she can expect from the teacher and the evaluation system.

### **Activities.**

#### **1. Designation of the student of the week.**

As I mentioned before, biochemics groups vary between 10- 25 students .depending on the number of students is the program. The activities are carried at during 15 weeks of the semester. The student of the week is the leader and attends the

academic, the spiritual and social matters of his companions during the week that corresponds to him.

At the beginning of each class the student has 3 minutes to tell a story that will illustrate the value that is being emphasized that week. He also has the opportunity to plan a short get-together promoting the group unity or a spiritual type of meeting: prayer groups, Sabbath reception, continuous prayer meeting, or an agape. In this form, students have the opportunity to participate actively in integrating values, stimulating self respect and a desire to be useful.

## **2. Medical teams**

Like the first is the second commandment, "Thou shall love thy neighbor as thyself." Mark 12:31. The law of love calls for the devotion of body, mind, and soul to the service of God and our fellow men. And this service, while making us a blessing to others, brings the greatest blessing to ourselves. Unselfishness underlies all true development. Through unselfish service we receive the highest culture of every faculty <sup>7</sup>.

The school of Health Science, in its program of activities includes the Medical Brigades in which students participate together with teachers with the objective of incrementing their academic development and offer support to the community.

The activities they participate in are related to their professional development with the purpose of offering health education to different groups of the population.

Activities by academic areas:

ACADEMIC AREAS	ACTIVITIES
Medicine	<ul style="list-style-type: none"> <li>✓ Health education</li> <li>✓ Out patient</li> <li>✓ Help with minor and major surgeries</li> </ul>



Nursing	<ul style="list-style-type: none"> <li>✓ Health education</li> <li>✓ Out patient</li> <li>✓ Maternal child care</li> <li>✓ Blood pressure</li> </ul>
Nutrition	<ul style="list-style-type: none"> <li>✓ Health education</li> <li>✓ Nutritional education</li> <li>✓ Diet therapy</li> <li>✓ Nutritional evaluation</li> <li>✓ Follow up</li> </ul>
Medical technology	<ul style="list-style-type: none"> <li>✓ Health education</li> <li>✓ Lab analysis</li> </ul>

The majority of students who participate in these activities are in their senior year. The purpose is for them to develop professional skills in their respective areas, Finally, an analysis of the activities is done and a follow up is done on patients who require to be referred to the hospital that is situated on the University campus. This provides an excellent opportunity for the student to develop and acquire values such as excellence, compassion, and service as they relate to their fellow human beings whether they are patients or classmates.

### **3. Lab practices.**

In lab practices, *in vitro* & *in vivo* experiments take place. Human blood & urine biological samples are used, as also mice and/or rabbits.

During this process, the following values are integrated

#### **a) Respect.**

The instructor and the student maintain an ethic attitude while experimenting.

Each analyzed sample represents one person, discretion and care being of maximum importance. When using animals, these are treated with consideration, avoiding unnecessary suffering .

**b) Excellence, responsibility and honesty.**

It is emphasized at the beginning and during the process the need to work in order and cleanness an influencing factor for the success of the practice. It is the students responsibility to finish the practice, and report the obtained data, making statements on the development of the experiment.

**c) Cooperation.**

Lab work is done in groups of 2 people. Group members know that a good result depends on their work and attitude. Groups are randomly formed , so students will develop the ability to relate with any of the classmates. In some situations, more capable students are assigned to help those classmates having difficulty with the subject.

**d) Justice.**

I try to give each one what he/she deserves by providing , equal opportunity , trying to be clear in the method and different aspects of evaluation.

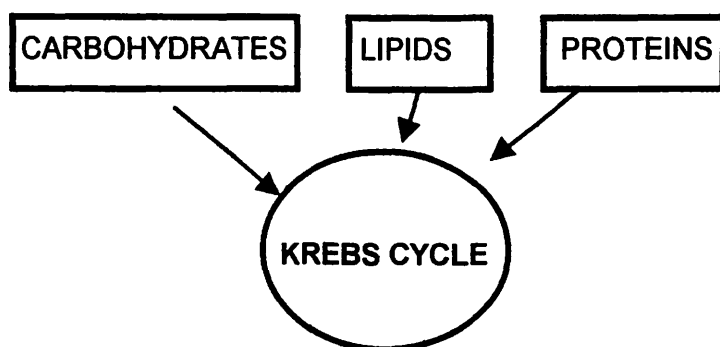
**4. Making a metabolic map puzzle.**

This map describes the metabolism (anabolism & catabolism) of carbohydrate, fat and protein integrated to the respiratory chain process and oxidative phosphorylation .This work is done by stages, in groups of 2 persons during the course.

Students develop diagrams, including the chemical reactions and the enzymes that catalyze them ; later they are assembled, so as to observe the interrelation between metabolic pathways. The work style is according to the students creativity . In his class

assignment, students are given the opportunity and stimulated to plan and work together.

When we study the metabolic pathways of biomolecule we can observe that they constitute a unit in all the system, every path has its typical reaction, but they all converge in Krebs cycle, as the next diagram shows:



The Krebs cycle (citric acid) becomes the final path of the utilisation of carbohydrates, lipids and proteins<sup>6</sup>. This unity is similar to what exists in the Deity, three persons with different functions, but with one and the same objective, constituting the one and only God.

One of the characteristics of the metabolic paths is that they are not in equilibrium, there is always displacement of molecules towards the production of energy:

$A \rightarrow B \rightarrow C$ , and/or towards biosynthesis of essential molecules. Each molecule (metabolite) is **useful** in the formation of another, there is an ordered and precise sequence that is determined genetically. In the metabolic paths we may observe values such as: **unity, cooperation, and service**. All the molecules cooperate so as the metabolic processes may occur, each molecule serves to produce another, and the whole makes the body function like an integrated system. These same values we can illustrate with the miracle that Jesus performed when He fed the five thousand with five

loaves and two fishes. (Mat. 14:13-21). The disciples took the loaves and fishes to Jesus and they were multiplied in His hands, then the disciples in an organised group and sequential manner received the food from the hands of Jesus and distributed it to the waiting crowd. We can observe the values of unity, co-operation, and service, in this action in which many people participated in order to obtain one objective: satisfy the hunger of the people. This working team through the service it gave demonstrates that there can be unity in diversity, for “we are all members of one body” (Ef.4:25). “each helps the other and says to his brother, ‘Be strong!’”. (Isa. 41:6). E.G.White describes in beautiful words the law of service: ***“All things both in heaven and in earth declare that the great law of life is a law of service. The infinite Father ministers to the life of every living thing. Christ came to the earth “as He that serveth.” Luke 22:27. The angels are “ministering spirits, sent forth to minister for them who shall be heirs of salvation.” Hebrews 1:14. The same law of service is written upon all things in nature. The birds of the air, the beasts of the field, the trees of the forest, the leaves, the grass, and the flowers, the sun in the heavens and the stars of light—all have their ministry. Lake and ocean, river and water spring—each takes to give”<sup>9</sup>*** .

Finally when the students analyse the finished task they can integrate the knowledge that was imparted by sections and accept that man could not appear by chance or as a result of evolution, rather a Creator exists who perfectly designed every organelle of the cell that allows processes at molecular level with such surprising order and precision that maintains the body with life and health.

## **II. Spiritual Lessons in The Teaching of Biochemistry.**

### **1. Water.**

Structurally water is formed by one atom of oxygen and two atoms of hydrogen united by covalent bonds. It has physical and chemical properties that allows it to function as an excellent solvent and water serves as a mechanism to transport nutrients and waste products between body tissues and organs<sup>10</sup>. It has the capacity to interact chemically with other similar molecules, or with different molecules using hydrogen as a bridge in ion-dipole interactions or hydrophobic interactions. It has the capacity to act as an acid or as a base.

Water is essential to life . No other substance is as widely involved in as many diverse functions of the human body as water. A water deficiency manifests rapidly, and symptoms occur with as little as 1 % hypohydration, with continued dehydration, the cardiovascular, respiratory, and thermoregulatory systems are compromised , and complete water deprivation leads to death in a matter of days<sup>11</sup>. In Scripture we find the case of Hagar and Ishmael in the desert of Beer-Sheba, where the boy got dehydrated and his mother feared for his life, but God supplied his need ( Gen, 21:14-19).

Approximately by weight, water constitutes 60% of the human male body and 50-55% of the female body, which has a higher proportion of fat<sup>11</sup>. All the biochemical reactions take place in an aqueous medium.”

### **Jesus as The Living Water. (John 4:7-18,25,26)**

When the Samaritan lady went to the well to get water, she was eager to satisfy her thirst, a basic need common to all humans, that has to be periodically satisfied in order to maintain an organism in good function. But Jesus led this woman to think of a deeper need, He presented himself as “**the living water**”, the water that can give eternal life. Jesus demonstrated that he knew her past life of sin giving her the opportunity to recognise her need of help. Her life-style had lead her to shame and to be

rejected by society, and she was trying to avoid the ridicule, getting water at an hour when the other women did not come. Jesus presented himself as the only person that can satisfy the needs of the human soul (Jn. 4:14). She found in Him acceptance and discovered the Messiah, in other words, salvation and eternal life.

***Jesus knew the wants of the soul. Pomp, riches, and honor cannot satisfy the heart. "If any man thirst, let him come unto Me." The rich, the poor, the high, the low, are alike welcome. He promises to relieve the burdened mind, to comfort the sorrowing, and to give hope to the despondent. Many of those who heard Jesus were mourners over disappointed hopes, many were nourishing a secret grief, many were seeking to satisfy their restless longing with the things of the world and the praise of men; but when all was gained, they found that they had toiled only to reach a broken cistern, from which they could not quench their thirst. Amid the glitter of the joyous scene they stood, dissatisfied and sad. That sudden cry, "If any man thirst," startled them from their sorrowful meditation, and as they listened to the words that followed, their minds kindled with a new hope***<sup>12</sup>.

Jesus as **the living water**, is essential for abundant life and eternal life, for without Him life is not possible.

## **2. Carbohydrates and Lipids.**

Carbohydrates along with fat and protein, are the macrocomponents of the diet the principal dietary sources of energy. The principal dietary carbohydrates are sugars and complex carbohydrates.

Carbohydrates are found basically in legumes, cereals, fruits, and in a lesser amount in milk. The lipids are found in oily seeds like sesame, corn, safflower, etc. and animal fat<sup>13</sup>

**Carbohydrates** are the organic compounds most abundant in nature, therefore

they are the most abundant elements in foods and their principal function is to give energy to the organism that it may realise its vital functions (one gram. of carbohydrates produces 4 Kcal), also during metabolism chemical components are produced that are essential for the formation of important new biomolecules, such as: glycogen, lipids, and nucleic acids <sup>14</sup>.

The energy derived from a normal diet, is normally comprised of 55 – 60 % of carbohydrates and 20 % of lipids, shows their importance in intermediate metabolism.

**The lipids** (triglycerides and/or cholesterol) are also a resource of energy for the organism ( 1gr. of fat produces 9 Kcal.), they are part of the cellular membrane structure, they aid the hormone synthesis, the transport of liposoluble vitamins (ADEK), they protect the organs and serve as an insulant for the control of body temperature <sup>15</sup>.

In bread making we can use different ingredients. In biblical times they used flour and oil as is indicated in 1st. Kings 17:11,12. These ingredients are mixed together to form a dough so that there comes an interaction between the components. The bread, after it is eaten, in the process of digestion, separates the biomolecules and they are transported by the blood to the cells of the liver and are biotransformed for the nutritional function. The digested bread forms part of our body.

### **Jesus as The Bread of Life ( John 6:33-35).**

The Israelites, when they were on their way to Canaan had the opportunity to feed on bread from heaven: the manna (Ex.16:4,15,31). This bread tasted like wafers made with honey.

Jesus revealed to his followers that the bread of God, the bread of life, that came from heaven was He himself (Jn.6:33-35). All who come to Him will never hunger. When a person accepts Christ as his Saviour, and receives his word daily as his spiritual food,

this becomes part of his life, it influences his thoughts and actions; it satisfies his fundamental needs: security, belonging, love and personal value. Jesus gives the strength and the energy to face all the challenges and difficulties that confront our lives.

***He said, "I am the bread of life." Only the day before, the great multitude, when faint and weary, had been fed by the bread which He had given. As from that bread they had received physical strength and refreshment, so from Christ they might receive spiritual strength unto eternal life <sup>16</sup>.***

### **3. PROTEINS**

The proteins are organic biomolecules formed by structural units called amino acids. Both animal and plant proteins are made up of about 20 common amino acids. Amino acids are required for the synthesis of body protein and other important nitrogen containing compounds, such as creatine, peptide hormones, and some neurotransmitters <sup>17</sup>.

The synthesis of proteins in our organism needs all types of amino acids, whose order and sequence in the molecular structure is genetically determined. These different amino acids are united by chemical bonds, and form an entity that fulfils vital functions in the organism.

Their functions in the organism are very diverse: immunity, hormones, transport of molecules, structure, biologic catalysis, etc. An interesting fact is that the proteins in our body suffer constant change permitting us to renovate and/or restore the organs and tissues of our body



In normal conditions, approximately 20 % of a young adult's diet is protein. In some situations the organism requires a larger amount of proteins (growth, cancer) and in others it requires a smaller amount (renal problems.)<sup>18</sup> .

In this essay I would like to emphasise two functions of proteins: transport of molecules and biologic catalysis. The activities of the proteins have to transport lipids from the liver to the tissues, and viceversa, permits the organism to use the lipids that it needs and to eliminate what it does not need.

In their function as biological catalyses, they allow biochemical reactions to occur at the rate required by the organism , facilitating the processes of synthesis and/or degradation. This biological activity is essential because when there are deficiencies in some enzyme, the metabolism suffers disorders, like when a person has lactose deficiency in the intestines he/she presents lactose intolerance to milk.

### **The Holy Spirit as a Restorator (Titus 3:5)**

The proteins fulfill their functions in the body in an imperceptable manner and their effects are perceived by the well functioning of the body.

The work of the Holy Spirit in the life of a person, purifies the heart, renews the mind in a quiet way and the evidence of its transforming power in our daily life making observable: justice, mercy, faith, repentance, goodness, honesty, and fidelity <sup>19</sup>.

The Holy Spirit was the highest of all gifts that He could solicit from His Father for the exaltation of His people. The Spirit was to be given as a regenerating agent, and without this the sacrifice of Christ would have been of no avail <sup>20</sup>.

During the time the students are in college, we have the privilege to see how God through He's Holy Spirit heals wounds and transforms their lives.

Counseling is one of the responsibilities I have as a teacher, during the semester I have the following activities with my students:

- a) I send them a short letter every week, challenging them to give the best of themselves, and include a message.
- b) Prayer meetings. These function as support meetings where we all participate in intercessory prayer for special requests.
- c) Interviews. When the student requests and/or the teacher requires it, interviews are held for orientation and counseling to support the student's initiative.
- d) Social gatherings. Once or twice a month we meet to have supper together or to celebrate a birthday. On these occasions we have the opportunity to strengthen the bonds of friendship, to share a new recipe and to talk about subjects of interest.

#### **4. Vitamins and minerals.**

Vitamins are organic molecules of low molecular weight, and are classified in hydrosoluble (B complex, ascorbic acid, folic acid, pantothenic acid), and liposoluble (A, D, E, K), that together with the oligoelements fulfil indispensable functions to maintain life. For example: the B complex vitamins participate as coenzymes in the biochemical reactions of intermediate metabolism, and help the enzymes in their catalytic activity. If there are vitamins and minerals deficiencies, metabolic disorders occur originating dehydration syndromes..

#### **Faith and Prayer.**

Our spiritual development requires essential elements: Bible study, faith and prayer.

Complete trust in God as our Creator and sustainer is essential in a Biochemistry course where the chemical reactions of vital processes are studied.

As a teacher I have the conviction that God, in an intelligent manner designed the human body and all processes that occur at a molecular level. The precision and exactness of all mechanisms demonstrate the actions of the Creator of the Universe, even when the enemy has tried to erase this with the apparition of disease .

For this reason, during the Biochemistry course, I emphasize the evidence that we have to develop faith and trust in our God; motivating the student to cultivate a love relationship with Jesus.

Faith and prayer are vitamins for the soul. The student has the opportunity of practising a life of prayer while participating in intercessory prayer .

Groups such as:

- a) The hour of power. It is a prayer meeting of 10 minutes at 9:20 AM with all the groups present.
- b) Prayer at the beginning of class.
- c) Counseling students.
- d) The work of prayer. This is programmed in the middle of the semester and. constitutes the maximum spiritual feast for all of the University community

## **CONCLUSIONS.**

The teaching of values is possible in all areas of study, these can be reflected in all the study contents, programs, and activities of the teaching process and learning process.

The values taught by the teacher should be built on Christian principles. It is of great importance that the teacher himself possess in his character these values, so that, in his daily work and in his relation with the students, he reflects them. As the apostle

Paul says in 1st. Tim. 4:12 "...***Be an example to the believers in word, in conduct, in love, in spirit, in faith, in purity.***"

Throughout the development of the Biochemistry course it is possible to lead the student to recognise God as his Creator and Redeemer. The student can strengthen his faith and his relation of love with Jesus, and develop the values that arise from the Law of God and the laws of nature.

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