



BABCOCK UNIVERSITY

SCHOOL: EDUCATION AND HUMANITIES

DEPARTMENT: MUSIC AND CREATIVE ARTS

SEMESTER /SESSION: SECOND SEMESTER, 2016/2017 SESSION

COURSE CODE AND TITLE: GEDS 204 LOGIC AND CRITICAL THINKING DAY OF CLASS: SUNDAY (10am – 12pm)

NO OF UNITS: 2 CREDIT UNITS

TEACHER'S: NAME: OJUOLA, B. OLUSEGUN (M.A., PGDE)

OFFICE ADDRESS: HOD'S OFFICE, MUSIC AND CREATIVE ARTS

VENUE FOR CLASS: B 007 (SAT)

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OUR VISION STATEMENT

A first-class Seventh-day Adventist institution, building servant leaders for a better world

OUR MISSION STATEMENT

Building leadership through Christian education; transforming lives, impacting society for positive change

To achieve our mission, we are committed to:

- Achieving excellence in our teaching, research program, and service delivery
- Imparting quality Christian education
- Instilling Christ-like character to the members of our Community

OUR CORE VALUES

- | | |
|-------------------------------|-----------------|
| • Excellence | -Our Culture |
| • Integrity | -Our Promise |
| • Accountability | -Our Moral |
| • Servant Leadership | -Our Strength |
| • Team Spirit | -Our Dignity |
| • Autonomy and Responsibility | -Our Passion |
| • Adventist Heritage | -Our Commitment |

OUR PHILOSOPHY

Babcock University's philosophy is anchored on the harmonious development of the intellectual, physical, social, and spiritual potentials of our students, inspiring stable and noble character needed for effective leadership and service in the society.

CORPORATE IMAGE STATEMENT: A center of excellence for character development and scholarship; a socially responsive, responsible, and accountable institution in matters of commitment and action.

COURSE DESCRIPTION

This course will cover issues from classical and contemporary philosophy giving a broad introduction to the issue of concern to philosophers. Philosophy helps us to bring productive, critical and rational attitude to bear on our beliefs and assumptions. The course is to equip students with the skills of constant critical re-examination of beliefs and assumptions by keeping the imagination awake and encouraging efficiency of intellect and mental acuity. The course is one avenue of assisting students to be thinkers rather than mere reflectors of other people's thoughts. Specifically the course will emphasize the relevance of philosophical study to Christian life and critical reflection on student's own philosophical ideas. It will include practice in constructing logically sound arguments as well as analyzing those of others. Some study of informal fallacies is also included.

COURSE GOALS AND OBJECTIVES

The goal of the course is for the student to understand essential philosophical ideas, develop a questioning spirit, gain critical thinking skills, engage in doing philosophy and apply philosophical ideas to contemporary society. At the end of the course, the student should be able to

- i) Identify the various branches of philosophy and the questions addressed
- ii) Identify and explain some major philosophical ideas influencing human and social development
- iii) Examine day-to-day assumptions and beliefs and distinguish between meaningful and meaningless assumptions, knowledge and beliefs,
- iv) Have an increased self knowledge and practice in critical thought,
- v) Apply correctly the rules of reasoning for analyzing, identifying and evaluating arguments,
- vi) Identify and explain the fallacies in given statements
- vii) Engage in informed discourse on identified philosophical concepts and issues
- viii) Utilize the knowledge gained in the course to evaluate own experience in the world and to develop a personal worldview.

GENERAL COURSE REQUIREMENT

Grading will follow the general university system

Attendance and participation	5%
Quizzes	10%
Assignments	10%
Mid semester Examination	15%
Final Examination	60%
Total	100%

TEACHING METHODS

The class will be mainly collaborative exploration of philosophy through discussions, exercises, group work, and paired listening with lectures, reading and writing assignments.

COURSE SCHEDULE

WEEK 1

*What is Philosophy? Meaning and definition of philosophy: Branches of Philosophy
(Reading 1 – Food for thought: What do we know?)(Reading 2 – The problem of free will*

WEEK 2

Metaphysics and Epistemology

WEEK 3

Ethics, and Social Political Philosophy

WEEK 4

Logic as the Science of the Law of Thought

Readings 1&2 – Discussion/debate

(Reading 3- Philosophy is useful and meaningful)

(Reading 4- The case for gay marriage)

WEEK 5

What is Logic? History, types and relevance of logic

WEEK 6

Readings 3&4 – Discussion/debate

WEEK 7

Mid Semester Examination

WEEK 8

The nature of logic; truth and validity, deductive and inductive reasoning

(Reading 5- Letter from Birmingham City Jail)

(Reading 6- Night)

WEEK 9

Rules for determining validity or invalidity of syllogistic arguments

WEEK 10

Readings 5 & 6 Discussion/ debate

WEEK 11

Faulty and Fallacious reasoning

(Reading 7- Relationship between science and philosophy)

WEEK 12

The scientific method

Reading 7- Discussion and debate

WEEK 13

Revision

WEEK 14

Final Examination

Useful Resources for the Course

Omeonu, A.C., Ojuola, O., Filade, B. (2013) Introduction to Philosophy and Logic: Critical Thinking Approach. Lagos: Natural Prints Ltd.

Copi, I.M., (2000) Introduction to Logic. India: Prentice-Hall.

Bello, A.G.A(2007) Introduction to Logic. Ibadan: University Press PLC.

Madubuike, S.C. (2004) The Compass of Philosophy, Logic and Scientific Thought. Ibadan: Hope Publications.

Oyesile, A.O and Ugwuanyi, O.L. (1997) Elements of Philosophy and Logic. Ekpoma: Trust System.

COURSE REQUIREMENTS:

CLASS ATTENDANCE: - "Every student is required to attend classes regularly and punctually, unless ill or prevented by some recognized emergency. Students who absent themselves from class for more than three weeks during the semester shall merit an F grade. Authorized leave of absence from campus does not excuse the student from classes, or relieve the student of the required course work' (*BU Academic Bulletin 2012-2015 p.13*).

PARTICIPATION: -Students are to actively engage in topic discussion and sharing of ideas in class.

TARDINESS/CONDUCT OF STUDENTS IN CLASS: - Lateness to class is unacceptable; students are not allowed to operate their cell phones, iPods and other electronic mobile gadgets during classes, except with the permission of the teacher. Eating and chewing off bubble gums and drinking (water exempted) is also not allowed except with the permission of the teacher. Very importantly, students are required to dress in compliance with the university dress code and wear their identity cards while in class.

SHORT DEVOTIONALS/PRAYER: - Spiritual nurture is a part of whole person development, and team spirit is our strength; thus, every student is required to participate in the devotional exercise and prayer in class.

SUBMISSION OF ASSIGNMENT: Assignments could be turned in earlier, but not later than the deadline set by the teacher.

LATE ASSIGNMENTS: Assignments turned in later than the deadline set by the teacher will not be graded without stringent penalty.

GUIDELINE FOR WRITTEN WORK: Students will be required to do assignments, quizzes, tests and examination.

ACADEMIC INTEGRITY/HONESTY: "Babcock University has a zero tolerance for any form of academic dishonesty. Morally and spiritually, the institution is committed to scholastic integrity. Consequently, both students and staff are to maintain high, ethical Christian levels of honesty. Transparent honest behavior is expected of every student in all spheres of life. Academic dishonesty include such things as plagiarism, unauthorized use of notes or textbooks on quizzes and examinations, copying or spying the test or paper of another student (formal or take-home), talking to another student during examinations. Academic matter would automatically result in a failing grade for the examination, and suspension, or outright dismissal from the university. Academic dishonesty issues are referred to SPEAM (Senate Panel on Examination and Academic Misconduct) who investigates and makes recommendations to Senate. Penalties for examination and academic misconduct are spelt out in the *student's handbook* and in other regulations as published from time to time" (*BU Academic Bulletin 2012-2015 p.18*).

GRIEVANCE PROCEDURE

"Students who believe that their academic rights have been infringed upon or that they have been unjustly treated with respect to their academic program are entitled to a fair and impartial consideration of their cases. They should do the following to effect a solution:

1. Present their case to the teacher(s) concerned
2. If necessary, discuss the problem with the Head of Department
3. If agreement is not reached at this level, submit the matter to the School Dean

4. Finally, ask for are view of the case by the Grievance Committee

5. A fee is charged for remarking of scripts. If a student’s grievance is upheld after an external examiner has remarked the script, the grade would be credited to the student. The lecturer will be given a letter of reprimand and will be asked to refund the fees to the student. If the student’s grievance is not sustained, the student will be given a letter of reprimand and the original grade retained” (*BU Academic Bulletin 2012-2015 p.18*).

GRADE SCALE

Currently, the 5-point grading system adopted by the University Senate translates as follows:

Grades	Marks-Quality	Range Points	Definition
A	80-100	5.00	Superior
B	60-79	4.00	Above Average
C	50-59	3.00	Average
D	45-49	2.00	Below Average
E	40-44	1.00	Pass
F	0-39	0.00	Fail

INCOMPLETE GRADE: An incomplete grade may only be assigned to a student upon request, due to an emergency situation that occurred within that semester, which prevented completion of an/some assignments, quizzes, or examination. Such a student would complete a contract form, obtainable from the Registrar, after agreement with the teacher. The form must be signed by the teacher, the student, the HOD, the dean, the Registrar, and the Senior Vice President (SVP) before contract begins. The original copy of the incomplete form will be sent to the Registrar with copies to the teacher, the student, the HOD, the dean, and the SVP. An incomplete grade(I) reverts to the existing grade if contract is not completed by the end of the following semester (including summer semester, except for examinations), (*BU Academic Bulletin 2012-2015 p. 20*).

STUDENTS WITH DISABILITY

“Babcock University seeks to provide a conducive environment for optimal living and learning experience. While the university is working towards facilities that accommodate persons with disabilities, provisions will be made for students with disabilities under the following conditions. Students with disabilities are to:

Report to Student Support Services for assessment, and obtain a clearance/recommendation at the commencement of the semester or as soon as disabling incidence occurs

Show the clearance/recommendations to relevant university officials at the commencement of the semester or as soon as disabling incidence occurs

Maintain ongoing contact with Student Support Services” (*BU Academic Bulletin 2012-2015 p. 20*).

What is Philosophy?

Philosophy is a combination of two Greek words, *Philo* which means love and *Sophia* which means wisdom. From these derivatives one could define philosophy as love of wisdom. While wisdom connotes knowledge, but being knowledgeable does not necessarily mean someone has wisdom. Knowledge can be said to be *value-neutral*. It is the application of knowledge that determines what value or values that are ascribed to it. For example, two graduates of nuclear Physics decided to define their career paths. The first decided to convert nuclear energy for the development of safe civilian nuclear energy programs. The second decided to go into the manufacturing of small and medium range nuclear weapons sold to some International crime syndicates for various terrorist activities. One could say they both had access to the same type of knowledge but the application differs. Of course, we know who among them is qualified to be called a person who possessed wisdom.

Wisdom can be defined as good judgment, the understanding and application of what is true, right and lasting. Therefore wisdom is tantamount to virtues and a virtuous person is thus wise. Conversely, ignorance is tantamount to vices and a vicious person is thus foolish. Ignorance is not absence of knowledge as some erroneously believed, but rather a misapplication of knowledge. Ignorance oftentimes is a manifestation of faulty or fallacious reasoning. It follows that since God is the creator of everything in the heavens and the earth, then God is the author of wisdom according to Colossians 2:3, "...in whom is hidden the treasure of wisdom and knowledge". God also did personal evaluation of all that was created and He pronounced them *good or perfect*. Therefore the knowledge of God is the beginning of wisdom and whoever does not know God is thus foolish or ignorant.

Branches of Philosophy

This section will be summarized since it is expected that you have done the pre-requisite course, GEDS 101. There are three basic domains in philosophy and all these are expressed in Logic and its rules are applicable to them. The three domains are:

- a. **Metaphysics:** This is the study of the nature of reality. These include the things that are beyond the natural i.e., knowledge of God and the nature around us. There are four major aspects of metaphysics.
 - i. **Cosmology:** It is the study of issues and theories about the origin, the nature and the development of the universe as an orderly system. The key question here is, "how did the universe originate and develop?" This question provoked two major schools of thought, the *Teleological* and the *Mechanistic*. The mechanistic theory on the one hand says that all changes in the universe and all living creatures are caused by physical and chemical forces only. The teleological theory on the other hand says that events and developments are due to the purpose or design that they are serving. It recognizes the power of a supreme being in the creation of man and the universe.
 - ii. **Theology:** It is that part of religious theory that has to do with conception about God. The key question here is "is there God?" If there is God then, "is there one or many?" there are various schools of thought that tried to answer these questions. The *Atheist* claims there is no God. The *Pantheist* claims that God is everything and everything is God. The *Deist* believes that God exists but do not accept such things as religion or revelation. The *Polytheist* claims that there are several gods. The *Monotheist* believes in a personal creator God and insists on the existence of only one God.

- iii. **Anthropology:** It is the study of man as both subject and object of enquiry. Such question pertaining to the relationship between mind and body are raised. Essential here is the Christian belief that man is created in the image of God.
- iv. **Ontology:** It is the study of the nature of existence or what it means for anything to be. It bothers on the issues of basic reality, “is it found in matter or in physical energy?” or “is it found in spirit or spiritual energy?” According to the *Realist*, to exist means to occupy space and time. The *Idealist* claims that absolute reality is in the world of forms and independent of matter, time and space. The *Pragmatist* claims that reality cannot be defined because what appears to be real is constantly changing and cannot be classified. However, Christian worldview accepts the Bible as the basic revelation of God, the nature of God, the trinity and God as the creator, the redemptive role of Jesus Christ, and the restoration by the Holy Ghost.
- b. **Epistemology:** This is the branch of philosophy that deals with the study of the nature, sources and validity of truth and knowledge. It seeks to answer questions on what is true. “How can we know?”
- c. **Ethics:** It is the branch of philosophy that deals with the morality of human conduct. It is also known as moral philosophy. The first great moral philosopher in the West was Socrates. Others were Plato, Aristotle, Epicurus, Emmanuel Kant, St. Augustine and others. Ethics is seen as the study of the fundamental norms of human behaviour. The function is to enable man to live a good life or moral life. The key questions in ethics are, “How does man live a moral life?” or “What is the moral standard?”
- Aristotle and Plato like Socrates mentioned that happiness is a man’s ultimate goal and that the only road that leads to it is virtue. Only virtuous man can be happy. Virtue therefore is identical with knowledge or wisdom, a virtuous man is thus a wise while a wicked and vicious man is foolish and suffers from ignorance. Ignorance therefore is the cause of wrong doings (read Proverb 18:5, 19:1-3). Aristotle came up with the theory of Eudemonism which says “happiness is standard of morality”. He identified two kinds of virtues, namely intellectual virtues and moral virtues.
- Intellectual virtues includes, scientific knowledge, art, practical wisdom, intuitive reason, theoretical wisdom, sound deliberation, understanding and judgment while moral virtues include justice, temperance, generosity, courage, integrity e.t.c.
- Actions are said to be good or bad according to whether or not they promote happiness. According to St. Augustine, man is morally weak. Man’s conscience had been weakened by original sin, and as a result man is unable to do any good action without the help of God. (read Proverb 16:1-9). The love of God and self-love are two motivating principles of action among man.
- Ethics in African traditional philosophy is transcendental. It is an objective moral order that is not an invention of man and man does not have the power to alter it. It transcends the human society. It is established by God and man is obliged to conform to it. Conforming to his moral order requires good character. According to Omoregbe Goodness of character implies the rejection of certain ways of behaviors and vices and adoption of certain ways of behavior as virtues. Virtues and vices are central to the ethics of African traditional philosophy. Vices includes killing, stealing, adultery, general disrespect, incest, oppression of the poor and disables, causing harm to people through the use of mystical forces like witch-

craft. While virtues includes kindness, generosity, hospitality, justice, equity, respect for elders, integrity, virginity before marriage, honesty e.t.c.

Flouting of the moral order has serious social consequences and will incur punishment or divine justice on the individual community, while obedience is rewarded. The idea of corporate responsibility is therefore very strong in African traditional ethics.

In Christian ethics, the greatest virtue, the all embracing virtue or the mother of all virtues is **LOVE**.

Social, and Political Philosophy

Man according to Aristotle is “by nature a political animal”. Man therefore is intended by nature to live in a political society. In fact it is only in a society that the gift of speech has any meaning and any use. It is only in a society that man can develop his potentialities as a human being.

The political society therefore, exists to serve man’s need to provide the individual with the means and circumstance that will enable him to develop himself and attain the goals of life which is happiness.

The family unit is equally very essential because it is the bed-rock of the state. A good government must have the interest of the community at large. Education must also be made a national concern. The children of citizens must have access to qualitative education because the well-being of the state depends on this.

Logic as the Science of the Law of Thought

Logic directs the operation of the mind in the attainment of truth. Therefore, the laws of thought are those first principles which underline all human thinking processes and discourse.

There are three laws of thought:

- i. The law of identity
- ii. The law of contradiction
- iii. The law of excluded middle

The Law of Identity can be stated in the following words;

- i. If anything is A, then it is A.
- ii. If any proposition is true, then it is true.

However, its universal truth has been denied since what is true at one time or place may be untrue (false) at another. i.e. the sun is shining or it is raining.

To meet the objection raised against this law, time and place must be indicated in our propositions.

The Law of Contradiction can be stated as the following words;

- i. Nothing can both be A and not A.
- ii. No proposition can be both true and untrue.

An instance of this is the co-existing of negative and positive in statements. For example, Capital-Labour, Slave-Master, Evil-Genius, Open-Secret etc.

It must be noted that contradictions are possibilities which bring progress both in thought and in reality. They help to clarify rather than confuse.

The Law of Excluded Middle states that;

- i. Anything must be either A or not A.
- ii. A proposition must be either true or false.

This law points out that there is another alternative besides truth and falsity of a proposition.

What is Logic?

It is a known fact that everyone thinks reason and argues but some do it better than others while some do not.

Logic according to Karl Marx (1818-1883) is the 'money of the mind'. This assertion was corroborated by MacIntyre who pointed out that 'logic plays the role that money plays in political economy'. Logic can be said to be the fourth branch of philosophy. It is also the nerve centre of philosophical studies.

According to Achilike(1991) it can be described as the science of reasoning. That is, the systematic separation of correct reasoning from the incorrect one through the use of principles or techniques.

Stephen Layman(2002) described logic as the study of methods for evaluating arguments. That is whether the premises of an argument adequately support (or provide good evidence for) its conclusion. Logicians are concern with the correctness of the process of reasoning.

Relevance of Logic

- i. Logic helps us to separate correct reasoning form the incorrect ones.
- ii. The mastery of logic is an effective way of learning how to use language and ideas precisely and thus enhance understanding.
- iii. It helps the language user to develop a way of thinking that encourages both carefulness and precision.
- iv. Logic will enable us to take rational decisions when faced with alternatives.
- v. Logic is useful for analyzing issues concerning phenomena and making predictions with precision using principles of logical inference.
- vi. It is very helpful in our bid for efficient planning.
- vii. It is also useful when we want to ascertain how consistent or otherwise we are.
- viii. Logic helps us to think both systematically and fast.
- ix. The mastery of logic greatly assists us to detect and avoid fallacies which are errors in reasoning.

Branches or Types of Logic

There are several branches or types of logic. These are some of them:

- i. Formal logic.

- ii. Informal logic.
- iii. Inductive logic.
- iv. Deductive logic.
- v. Material logic.
- vi. Truth-functional logic.
- vii. Dialectical logic.
- viii. Symbolic (mathematical) logic.
- ix. Propositional logic.
- x. Positive (negationless) logic.
- xi. Quantificational logic.
- xii. Multi-valued (modal) logic.
- xiii. Traditional (Aristotelian) logic.
- xiv. Categorical logic.

Propositions

Propositions are sentences that make assertions. It is also referred to as statement. However, not all sentences are statements or propositions. There are different forms of sentences. The different types include:

- i. Question: 'who are you?'
- ii. Command: 'shut the door'.
- iii. Exclamation: 'what a wonderful world!'
- iv. Appeal or Petition: 'Holy Spirit fill my life'.

Propositions are either true or false, e.g. 'Ben is a brilliant student'. Propositions are not in themselves arguments. It is only when a conglomeration of propositions are put together in a way that one is inferred to follow from the other that we can talk of having an argument in view.

There are two types of statements or propositions, simple and compound statement.

- i. **Simple statement** usually contains or conveys an idea i.e. 'London is in England' or 'England is in Europe'.
- ii. **Compound statement** is made up of two or more simple statements and thus conveys more than one idea i.e. 'London is in England and England is in Europe'. Parts or components of compound statement are either joined together by connectives such as: and, either...or, if...then etc.

Symbols are normally used for easy analysis of statements i.e. P, Q, R. Statements can be classified either in the affirmative or negated form.

- a. **Affirmative** or Negationless statement is one that features in positive form. Such statement is yet to be denied.

For example: p- 'London is in England'.

Pq- 'London is in England and England is in Europe'.

- b. **Negated** statement is any statement that has been denied. That is, not affirmed.

For example: \bar{p} - 'London is not in England'.

$\bar{P}q$ - 'London is not in England and England is not in Europe'.

Solving Conjunction or Compound Statement

In Logic, a conjunction is true when all its components are true. It is false when at least one of its components is false. Use of symbols helps to reduce the volume of work in statement analysis. For example:

p	q	p	q	pq
London is in England and England is in Europe		T	T	T
London is in England and England is not in Europe		T	F	F
London is not in England and England is not in Europe		F	F	F
London is not in England and England is in Europe		F	T	F

In the foregoing, we can see that it's only the first statement that has all true components. It is thus the only sound and reliable statement among the others.

Arguments

Argument in logic has a technical sense. It is not like the noisy quarrel or the shouting match often experienced among people. Rather, it is any group of propositions or statements of which one is claimed to follow from the others, which are alleged to provide grounds for its truth. e.g.

All mammals are mortal
All humans are mammals
Therefore, all humans are mortals.

From the foregoing, it is evident that every argument in logic has a structure, in the analysis of which the terms, 'premise' and 'conclusion' are employed. The 'conclusion' of an argument is that proposition which is affirmed on the basis of other propositions of the argument. These other propositions which are affirmed as providing grounds or reasons for accepting the conclusion are the 'premises' of that argument.

However, it must be noted that 'premises' and 'conclusion' are relative terms in the sense that the same proposition can be a premise in an argument and a conclusion in another.

e.g. All mammals are mortal
All humans are mammals
Therefore, all humans are mortals.

And, All humans are mortal
Plato is human
Therefore, Plato is mortal.

We can see that in the two examples above the same proposition, 'All humans are mortal' that plays the role of a conclusion in the first argument is now a premise in the second argument.

The three propositions (statements) in each of the example given combine to form an argument.

Identifying or Recognizing Arguments

Sometimes a passage may be given containing an argument or a group of arguments. Here, it is also possible for the conclusion to precede or follow the premises or it may come between the two premises. Some words or phrases help us to identify the premises and conclusion once an argument has been recognized. These are called premises indicators and conclusion locators.

For the premises indicators, we have words or phrases like: if, since, for, follows from, in as much as, because, as, otherwise, as shown by, whereas etc.

For the conclusion locators we have words and phrases like: therefore, then, hence, accordingly, consequently, so, thus, as a result, proves that etc.

For examples: a. All metals conduct electricity
Copper is a metal
Therefore, Copper conducts electricity.

b. Copper conducts electricity
Since copper is a metal
And all metals conduct electricity.

c. since all metals conduct electricity
Then copper conducts electricity
Because copper is a metal.

We can see that in the three examples given above, the conclusion follows the premises in (a) it precedes the premises in (b) and comes between the two premises in (c).

Note however that the presence of a standard conclusion or premises indicator in a passage does not necessarily make it an argument. For example: 'Examination misconduct is a social vice, therefore avoid it'. What follows 'therefore' is a command and not a proposition.

Truth and validity

Truth and falsehood characterized propositions. Arguments, however, are not properly characterized as either true or false but as valid or invalid.

Note worthy here that there is a connection between the validity or invalidity of an argument and the truth or falsehood of its premises and conclusion, but this connection is by no means a simple one.

Some valid arguments contain true propositions only. For example:

All bats are mammals
All mammals have lungs
Therefore, all bats have lungs.

An argument may contain false propositions exclusively and still be valid, as, for example:

All cats are mammals

All mammals have wings

Therefore all cats have wings.

This argument is valid because if its premises were true, its conclusion would have to be true also, even though, in fact, they are all false.

These two examples show that although some valid arguments have true conclusions, not all of them do. The validity of an argument does not, therefore, guarantee the truth of its conclusion.

But consider the argument that goes as follows

If I am president, then I am famous

I am not president

Therefore, I am not famous.

We can see that although both premises and conclusion are true, the argument is invalid. Its invalidity becomes obvious when it is compared with an argument of the same form e.g.

If Rockefeller is president, then Rockefeller is famous

Rockefeller is not president

Therefore, Rockefeller is not famous

This argument is clearly invalid because its premises are true but its conclusion is false.

An argument must satisfy two conditions to establish the truth of its conclusion.

- (1) It must be valid
- (2) All of its premises must be true.

Such an argument is termed "sound".

Note that to determine the truth or falsehood of premises is the task of scientific inquiry in general, since the premises may deal with any subject matter.

Deductive Argument

A **deductive** argument is an argument in which the truth of its premises is intended to guarantee the truth of its conclusion. The premises are used as a base from which the conclusion makes a projection. Deductive argument is usually classified as valid or invalid, sound or unsound. It contains major and minor premises from which a conclusion is inferred. The quality of deductive argument is that it offers certainty.

For examples:

1. If Jones is a woman, then Jones is a wife. Jones is not a woman, so Jones is not a wife.

2. Either Bayo has poor memory or he is lying. Bayo does not have poor memory. It follows that Bayo is lying.

Expressions such as “so” or “it follows that” indicate that the premises, if true, provide a guarantee that the conclusion is true. However, there can be reasoning errors which usually result in unsound deductive arguments.

For Examples:

1. All birds are animals
All birds fly
Therefore all animals fly
2. All mothers are women
Ewe is a mother-
Hence, Ewe is a woman.

These arguments are technically faulty and basically unsound. Even though the conclusions in both appear to follow from the premises, they are false. The conclusion in the first argument is faulty because, not all animals fly. Also the conclusion in the second argument is faulty because the term ‘woman’ is descriptive of human beings and not animals.

Inductive Argument

An **inductive** argument is an argument in which the truth of its premises is intended to make likely, but not guarantee the truth of its conclusion. The arguer in inductive argument believes that if the premises of his argument are true, then the conclusion is more likely to be true than false. Inductive arguments are those that involve probabilistic reasoning. It is not concerned with valid inferences but with inferences which are probable, given as evidence the truth of certain propositions upon which they are based. Hurly (2006) gave three criteria that influence the decision about this claim:

- a. The occurrence of special indicator words such as, probable, improbable, plausible, implausible, likely, unlikely etc.
- b. The actual strength of the inferential link between premises and conclusion. If the conclusion does follow probably without strict necessity.
- c. The form or style of argumentation the arguer uses.

For examples:

1. Papers are made from wood
Pencils are made from wood
Writing tables are made from wood
Therefore, probably all writing materials are made from wood.
2. Either the police are adequately equipped, or crime rates will be on the rise.
The police will be adequately equipped.
Therefore, crime rates will likely fall.

3. Humans are mammals and have legs
Birds are mammals and have legs
Animals are mammals and have legs
Therefore, probably all mammals have legs.

Inductive logic is also concerned with tests for the strength and weakness of arguments. An argument may sound valid but still be very weak. In a **weak argument**, it is not probable that if its premises are true, then the conclusion is also true.

For Examples:

- 50% of 40 year old African women live to be 90
Uche is a 40 year old African woman.
So, Uche will live to be 90

It is probable that the premises of this argument were true. However, the conclusion is not necessarily true. The basic truth is that if 50% of 40 year old African women live to be 90, there is another 50% that would not live to be 90. Therefore, Uche who is 40 may fall within either of these. Hence the argument is weak.

A **cogent argument** is one that is strong and all its premises are true. Though, the truth-value of its conclusion cannot be guaranteed.

For example:

Almost all the final year law students passed their examination.

My son is a final year law student.

Most probably my son is among those who pass their examination.

But supposed I learnt my son did not pass the examination. Does that mean the argument is weak? No, it simply means he is among the very few that could have passed the examination but did not.

Rules for Determining Validity and Invalidity of Syllogistic Arguments

a. Valid argument

A valid argument is one in which the premises support the conclusion completely. In other words, it is necessary that if its premises are true, then the conclusion is true. Examples:

- (a) All biologists are scientists. John is not a scientist. So, John is not a biologist.
- (b) If Alice stole the book, then she is a thief. And Alice did steal the book Hence Alice is a thief.
- (c) Either Bayo has a poor memory or he is lying. Bayo does not have a poor memory. Therefore Bayo is lying.

b. An invalid argument

An invalid argument is a deductive argument whose conclusion does not follow from its premises. An invalid argument has this essential feature: It is not necessary that if the premises are true, then the conclusion is true.

- Examples:
- (a) All dogs are animals
All cats are animals
All dogs are cats.
 - (b) If Elizabeth is a wife, then Elizabeth is a woman
Elizabeth is not a wife
So Elizabeth is not a woman.
 - (c) Many Nigerians are actors
RMD is a Nigerian
Therefore RMD is an actor

c. Sound Argument

A sound argument is a deductive argument having these features:

- (i) The argument is valid
- (ii) Its premises are true
- (iii) Its conclusion is true.

Schematically we have: soundness = validity + truth of both premises and the conclusion

- Examples :
- (a) All men are human beings – *true*
All fathers are men - *true*
Therefore all fathers are human beings –*true*

- (b) All fishes live in water – *true*
Tilapia is a fish – *true*
Therefore Tilapia lives in water –*true*

d. Unsound Argument

An argument is unsound if it does not meet at least one of the following criteria.

- (i) Being valid
- (ii) Having true premises
- (iii) Having a true conclusion

Examples:

- (a) All women are human beings – *true*
All ducks are women –*false*

Valid Therefore all ducks are human being – *false*

(b) All rats are cats – *false*

All cats are dogs – *false*

Valid Therefore all rats are dogs – *false*

(c) All metals conduct electricity – *true*

Aluminium is a metal – *true*

Invalid Therefore iroko wood is a metal – *false*

It then suffices to say that all sound arguments are valid, but not all valid arguments are sound.

Also, all invalid arguments are unsound, but not all unsound arguments are invalid.

Examples

All birds fly – true

All dogs are birds – false

Invalid unsound Therefore all dogs are vertebrate- true

All birds fly – true

All dogs are birds – false

Unsound valid Therefore all dogs fly – false

Fallacies

Introduction

In Logic, a fallacy is an error in reasoning. Most of our everyday discourse and reasoning, which appear convincing and sound, contain all kinds of flaws and defects. Since critical thinking is the ability to think clearly and critically, a fallacious argument, therefore, is one which violates all logical canons necessary for a valid argument. It designates not any mistaken inferences or false belief, but typical errors, that is, mistakes that arise commonly in ordinary discourse and that devastate the arguments in which they appear. Each fallacy is a type of incorrect argument.

Fallacies are classified into two broad areas, Formal and Informal fallacies. Formal logic is mainly concerned with formal system of logic. These are specially constructed systems for carrying out

proofs where the languages and rules of reasoning are precisely and carefully defined. However, our focus will be on informal fallacies.

Informal Fallacies

An Informal fallacy is an error in reasoning which an individual may fall into either because of his/her carelessness or by being misled by language problems informal fallacies are either that of relevance or of ambiguity. It refers to the study of reasoning and fallacies in the context of everyday life.

Fallacies of Relevance

- a. **Argumentum ad Baculum (Appeal to force):** This is a fallacy committed when one appeal to force or the threat of force to cause the acceptance of a conclusion it is resorted to when evidence or rational arguments fail. Examples;
 - i. Wilson, it is high time you decided to obey your guardian or continue to disobey him, and cater for yourself.
 - ii. Mr. Speaker sir, let me remind you that I represent so many thousands of voters or better still so many contributors to campaign fund.
 - iii. How I wish you could just apologize to this house and accept this verdict. But it looks like you have made up your mind to lose your seat and damn the consequence.
- b. **Argumentum ad Hominem (Attacking the man):** This is the argument directed not at the issues at stake, but at the personality and values of the arguer. There are three types of ad hominem.
 - i. **Abusive:** It is committed when, instead of trying to disprove the truth of what is asserted one attacks the person who made the assertion. For example:

Mr. A to Mr. B: "I will advice that you lodge in the company's guest house, since you are going on an official trip".

Mr. B to Mr. A: "Shut up your dirty mouth. Who are you to tell me where to lodge? Do you take me for a thief like you, who forges receipts of accommodation?"

In the example above, the personal character of a man is logically Irrelevant to the truth or falsehood of what he says or the correctness or incorrectness of his argument.
 - ii. **Circumstantial:** In this form of fallacy, it is the irrelevance of the connection between the belief held and the circumstances of those holding it that gives rise to the mistake. Let's take for example this argument:

"Mallam Usman Dan-Sokoto, I am not surprised that you will support the bill proposing the allocation of more funds to the Niger-Delta people. After all your second wife is from Bayelsa state."

Such argument is irrelevant to the truth of the proposition in question. It simply urges that some persons' circumstances require its acceptance. Ad Hominem circumstantial is used as the basis for rejecting a conclusion defended by one's adversary or opponent.
 - iii. **"What about You?"(Tu quoque)** In this circumstantial fallacy, rather than answering some questions or defending oneself, the questioner or arguer is being attacked or accused. Example:

Mr. A to Mr. B: "Did you embezzle public funds?"

Mr. B to Mr. A: "Mr Honesty, I ask you too, haven't you been found guilty of stealing before, at least when you were in secondary school?"

- c. Argumentum ad ignorantiam (argument from Ignorance):** This is an error that is committed when someone argues or takes a statement to be true on the grounds that no one has proved or shown it to be false or vice versa. For example:
- i. It is true witches come out at night to dance because nobody has ever proved that they do not.
 - ii. There must be evil spirits lurking around at night since people are afraid of darkness.

This fallacy is common in arguments about psychic phenomena, telepathy etc where there is no clear cut evidence either for or against such arguments. Students of science often affirm the falsehood of spiritualist or telepathic claims simply on the grounds that their truth has not been established.

d. Argumentum ad populum (Appeal to emotion or popular will): This fallacy is committed when the premises attempt to direct an emotional appeal to the people in order to win their assent to a conclusion unsupported by good evidence. It is fallacious because it replaces the laborious task of presenting evidence and rational argument with expressive language and other devices calculated to excite enthusiasm, excitement, anger or hate. This is a favorite device of the propagandist faced with the task of mobilizing public sentiment. Ad populum is saying that a certain belief must be true because everyone knows it. Examples

- i. The super Eagles football team will win, because all Nigerians are behind them.
- ii. Everyone is using Aqua hair cream, so you too should join them.
- iii. All roads lead to South Africa for the All African Games.

e. Argumentum ad Misericordiam (Appeal to pity): This fallacy is committed when the arguer appeals to pity for the sake of getting a conclusion accepted, rather than to facts and reason. It is an attempt to avoid the unpleasant consequences a certain action might have on people. This is common in the law courts, when a defence attorney may disregard the facts of the case and seek to win his client's acquittal by arousing pity in the jury. A celebrated example is that of a youth who was tried for murdering his parents with an axe. When confronted with an overwhelming proof of his guilt, he pleaded for leniency on the grounds that he was an orphan. Also a lawyer pleading on behalf of his client says, "My Lord, considering the present condition of my client, who has been alleged of killing her husband, she is pregnant and still languishing in prison. I therefore plead that you discharge and acquit her so that the man's (husband) baby could be born in a more conducive and sane environment".

f. Argumentum ad verecundiam (Appeal to inappropriate Authority): This error of reasoning occurs when an appeal is made to parties having no legitimate claim to authority in the matter at hand. In other words, it is an appeal to the feelings of respect people have for the famous to gain consent to a conclusion. For example, appealing to the authority of Darwin, a great authority in Biology, in arguments over morality and religion, would be fallacious. Advertising testimonials are guilty of this,

for example, urging people to buy and consume Lucozade boost because these famous footballers, Okocha and Ronaldo affirm its superiority.

g. Ignoratio Elenchi (Irrelevant Conclusion): This fallacy is committed when an argument purporting to establish a particular conclusion is instead directed to proving a different conclusion. For examples:

- i. Nigeria is suffering from energy crises, therefore the oil sector should be deregulated.
- ii. Socialist regimes all over the world have collapsed therefore the teaching of socialist doctrine should be prohibited.

In the above examples, the conclusion is not relevant to the premise.

h. Petitio Principii (begging the question): This fallacy is committed when someone assumes as a premise for his argument the very conclusion he intends to prove. Put in another way, the conclusion is nothing more than a restatement of at least one of the premises.

Examples:

- (i) if you smoke you are likely to get cancer. Therefore you are likely to get lung cancer if you smoke.
- (ii) Segun does not see, Mike could not see, therefore, both of them are blind.

i. Red Herring Fallacy: in this fallacy, the respondent fails to address whichever issues that the arguer has raised, but instead tries to distract the attention of the arguer. For example:

A to B: 'where were you last night?'

B to A: 'Do you care for a cup of tea?'

j. Converse Accident: This is fallacy of hasty generalization. This fallacy is committed, when a conclusion to an issue is basically generalized, or premised on abnormal or exceptional cases. For example: 'Since a Theology student has the overall best result in the university, it shows that all Theology students are first class grade students'.

Fallacies of Ambiguity

Ambiguity is one of the major sources of fallacious reasoning. A term is ambiguous if it has more than one meaning. A term may have one sense in a premise, but quite a different sense in the conclusion. Thus if I say "He has a good grip", It is not clear whether I mean "He has a strong handshake" or "He has a good suitcase".

The word grip is thus ambiguous since it may be interpreted in at least two different ways. Five varieties are distinguished in the following.

1. **Equivocation:** This occurs when an inference is invalid because a single word is used in two different senses. For example, in saying "The end of a thing is its perfection. Death is the end of life. So, death is the perfection of life". Here, two different senses of 'end' are confused and so it commits the fallacy of equivocation since the word end may mean either "goal" or "last event"
2. **Amphiboly:** This fallacy occurs when the whole sentence, as contrasted with single words, is ambiguous. Each and every word in the sentence may not be ambiguous, yet the whole

sentence will be because of its grammatical structure. A statement is amphibious when its meaning is indeterminate because of the loose or awkward way in which its words are combined.

Classis example: Croesus the king of Lydia consulted Delphi on whether he would win a propose war with kingdom of Persia. Delphi Oracle replied “if Croesus went to war with Cyprus, he would destroy a mighty kingdom”. He went to war hoping that the mighty kingdom was Persia but lost gallantly. He later wrote the Oracle complaining bitterly, but Delphi priest replied “the oracle had been right. In going to war, Croesus had destroyed a mighty kingdom-his own”. The prediction was amphibious, making it look infallible.

3. **Accent:** This fallacy is committed when the shift of meaning within an argument arises from changes in the emphasis given to its words or parts. The use of italics or bold letters may shift the meaning of a statement. In the latter, it is referred to as sensationalism. For example: “Woman without her man is incomplete”.
4. **Composition:** This fallacy is committed when the attributes of the parts of a whole are ascribed to the attributes of the whole itself. For example, since every part of a certain machine is light in weight, the machine as a whole is light in weight.
Or-the universe is spherical in form because all its constituent parts i.e sun, moon and the planets appear in this form.
5. **Division:** This fallacy is simply the reverse of the fallacy of composition. In it the same confusion is present, but the inference proceeds in the opposite direction. It is fallacious to argue that what is true of a whole must also be true of its parts. To argue that since a certain corporation is very important and Mr. Joe is an official of that corporation, therefore Mr. Joe is very important, is to commit the fallacy of division.

Categorical Proposition

Categorical propositions which are also referred to as traditional Aristotelian syllogism are very important steps in the study of the deductive arguments. These arguments contain only propositions of a special kind called categorical propositions.

Propositions are sentences that make assertions. For example, “All graduates are brilliant persons”. Propositions are either true or false, but they are not in themselves arguments. It is only when a group of propositions interact or put together in a way that one is inferred from another that we can have an argument in view.

Categorical propositions are propositions that make assertions about classes, affirming or denying that a class is included in another class partially or completely.

A **class** is a collection or set of things. Here are examples of categorical statements:

1. All cows are herbivores
2. No democrats are republicans
3. Some grapefruits are sweet fruits
4. Some women are not mothers

Statement (1) indicates that every member of the class of cows is a member of the class of herbivores.

Statement (2) asserts that no member of the class of democrats is a member of (or included in) the class of republicans.

Statement (3) indicates that some (i.e. at least one) members of the class of grapefruits are members of the class of sweet fruits.

Statement (4) says that some (i.e. at least one) members of the class of women are not members of the class of mothers.

Categorical Propositions

There are four types of categorical propositions labelled A, E, I and O.

A represents universal affirmative propositions

E represents universal negative propositions

I represents particular affirmative propositions

O represents particular negative propositions

For a categorical statement to be in standard form, it must have the following elements; quantifier, subject term, copula and the predicate term. The scheme of a standard form categorical proposition is as follows:

	Quantifier	Subject-term	Copula	Predicate-term
A:	All	Cows	are	herbivores
E:	No	democrats	are	republican
I:	Some	grapefruits	are	sweet fruits
O:	Some	women	are not	mothers

The subject term and the predicate term must be nouns or noun-phrases which can be represented with the letters **S** and **P**. **S** stands for the subject term while **P** stands for the predicate term.

For example:

A: All S are P

E: No S are P

I: Some S are P

O: Some S are not P

Quality and Quantity

Each categorical statement has a **quality** which is either affirmative or negative. A statement is affirmative when it affirms that one class is wholly or partially included in another class. **A** and **I** propositions are affirmative in quality.

A statement is negative in quality when it denies that one class is wholly or partially included in another class. **E** and **O** propositions are negative in quality.

The **quantity** of a proposition is universal or particular according to whether the proposition refers to all members or only to some members of the class designated by the subject term.

For example: **A**, and **E** propositions are universal in quantity while **I** and **O** propositions are particular in quantity. The quantifiers, (All, Some, No) help in determining the quantity of categorical propositions.

Putting categorical statements into standard form

There are some techniques for putting categorical statements into standard form.

- (i) When a statement fails to be in standard form because its predicate is an adjective, an appropriate noun can be added. Thus, to put "All cheetahs are swift" into standard form, we can write, "All cheetahs are swift animals".
- (ii) When the elements of standard form statements are all present but not in the right order, such elements will merely be rearranged. Thus, to put "Fathers are men" into standard form, we can write, "All fathers are men".
- (iii) When a statement contains a verb other than "are", the statement can be reorganized by adding "are" and converting such verb into the predicate. Thus to put "All carnivores hunt" into standard form, we can write, "All carnivores are hunters". Also to put "children of God should not steal" into a standard form, we can write, "All children of God are people that should not steal".
- (iv) Each of the basic types of categorical statements has common stylistic variants. A stylistic variant is just another way of saying the same thing.

For example, each of the following is a stylistic variant of "All cows are herbivores"

Every cow is herbivore.

No cows are not herbivores.

Things are cows only if they are herbivores.

Each cow is a herbivore.

If anything is a cow, then it is a herbivore.

Cows are herbivores

Only herbivores are cows.

Hence, to put all these statements into standard form, we simply write, "All cows are herbivores".

Definitions

Definitions, for most Logicians, are intended exclusively to explicate the meaning of words. It may therefore be defined as a group of words that assigns a meaning to some words or group of words. Definition consists of two parts, the definiendum and the definiens. The definiendum is the word or group of words that is supposed to be defined, and the definiens is the word or group of words that does the defining. For example in the definition “Nigeria” is the most populous black nation in the world, the word “Nigeria” is the definiendum and every other thing after the word means the definiens.

The various kinds of definitions and the functions that they actually serve will now be highlighted.

Stipulative Definitions

It assigns a meaning to a word for the first time. This may involve either coining a new word or giving a new meaning to an old word. The aim of stipulative definition is usually to replace a more complex expression with a simpler one. For examples, the word “yahoo” or “419er” is coined to describe internet scam/crime. Also the symbol “B²” explains mathematical calculation B x B. The symbol “@” replaces the word “at”. The need for stipulative definition is often occasioned by some new phenomenon or development or new creations. It is a completely arbitrary assignment of a meaning to a “true” or “false” stipulative definition. Also, for the same reason, a stipulative definition cannot provide any new information about the subject matter of the definiendum.

Stipulative definition, however are misused in verbal disputes when an individual covertly uses a word in a peculiar way and then assume that everyone else uses that word in the same way. If this so happens, that person is said to be using the word “Stipulatively”.

Lexical Definitions

It is used to report the meaning that a word already has in a language. Instances of lexical definition are dictionary definitions. It can be identified as either true or false depending on whether it does or does not report the way a word is actually used. Lexical definitions have the further purpose of eliminating the ambiguity that would otherwise arise if one of these meanings were to be confused with another because a lexical definition lists the various meanings that a word can have, a person who consults such a definition is better prepared to avoid ambiguous constructions of his own and to detect those of others.

Précising Definitions

The purpose of a précising definition is to reduce the vagueness of a word. An expression is vague if there are borderline cases in which it is impossible to tell if the word applies or does not apply. For instance, words such as “rich” and “poor” are vague. The vagueness of such word is reduced by a précising definition such that a decision can be reached as to the applicability of a word to a specific situation. For example, if there is a legislation to assist the poor financially, a précising definition would have to be supplied specifying exactly who is poor and who is not. Also whenever words are taken from ordinary usage and used in a highly systematic context such as science, mathematics, medicine or law, they must always be clarified by means of a précising definition.

A précising definition differs from a stipulative definition in that the latter involves a purely arbitrary assignment of meaning, whereas the assignment of meaning in a précising definition is not at all

arbitrary. Adequate care must be taken to ensure that the assignment of meaning in a precision definition is appropriate and legitimate for the context within which the term is to be employed.

Theoretical Definitions

A theoretical definition assigns a meaning to a word by suggesting a theory that gives a certain characterization to the entities that the term denotes. Such a definition provides a way of viewing or conceiving these entities that suggests deductive consequences, further investigation, and whatever else would be entailed by the acceptance of a theory governing these entities. An example is the definition of "light" as a form of electromagnetic radiation.

It is noteworthy that many terms in philosophy, such as "substance", "cause", "form", "Mind", and "God", have been given theoretical definitions by major philosophers in history, in their own peculiar theoretical definition, which, thus, accounts in part for the unique character of their respective philosophies. For example, John Stuart Mill's definition of "good" as the greatest happiness of the greatest number provided the basis for his utilitarian theory of ethics.

Stipulative definitions like theoretical definitions are neither true nor false. The reason being that, theoretical definitions function as proposals to see or interpret some phenomenon in a certain way. Since proposals have no truth value, neither do theoretical definitions.

Persuasive Definitions

Its purpose is to engender a favorable or unfavorable attitude toward what is denoted by the definiendum. This purpose is accomplished by assigning an emotionally charged meaning to a word while making it appear that the word really has that meaning in the language in which it is used. Thus, persuasive definitions are the synthesis of stipulative, lexical, and, possibly, theoretical definitions backed by the rhetorical motive to engender a certain attitude. Examples of opposing pairs of persuasive definitions.

"Abortion" means the ruthless murdering of innocent human beings.

"Abortion" means a safe and established surgical procedure whereby a woman is relieved of an unwanted burden.

"Taxation" means the procedure by means of which our common – wealth is preserved and sustained.

"Taxation" means the procedure used by bureaucrats to rip off the people who elected them.

The objective of a persuasive definition is to influence the attitudes of the reader or listener. For instance, it may be considerably used effectively in political speeches and editorial columns.