

Albukhary International University

Alor Setar, Kedah, Malaysia

Curriculum of Studies for History and Philosophy of Science

Albukhary International University has approximately 80% of its student community coming from around 50 countries. No other university in Malaysia (or the world) has this kind of composition at the moment. Internationalism is built into the very structure of the university.

Present day course work or curriculum for this important subject dealing with the understanding of science and its method of working is extremely one-sided, as can be seen from various curricula available from different universities in other parts of the world. What are predominantly taught are *Western* history and philosophies of science courses. These courses, because of their sheer Eurocentric bias, are wholly inappropriate for a university like AiU and its teaching mandate. AiU aspires to train its students to develop a global consciousness. The university therefore requires a cosmopolitan curriculum suitable to its status, needs and aspirations.

For designing a new curriculum suited to these requirements, AiU called an international workshop of experts from India, Iran and Malaysia. After the workshop, the following curriculum proposal is now recommended for teaching at the university:

The full course will have two major segments: a) the History of Science and b) the Philosophy of Science (including ethics).

First Segment: History of Science

The history of the development of science can affect our view of science and the philosophy of science. Present-day histories of knowledge and science describe the origins of science as exclusively Western. Critiques of such histories are available. Adequate histories of science in China, India, Africa, South American (Maya), Iran, Arabia, Korea, etc., are now readily available. These accounts suggest major original scientific activity in several of these countries and continents.

These scientific contributions will be discussed through specific instances, ideas or techniques originating from different parts of the world:

- a) Gunpowder and Chinese science
- b) The printing press and Korea
- c) Arithmetic from India
- d) The calendar from Mayan civilization
- e) Geometry from Egypt
- f) The House of Wisdom (Baghdad)
- g) The Hospital (Jandishapur/Iran)
- h) The Alkashi Observatory from Samarkhand and its influence

The discussions will examine origins and transmissions of key scientific ideas and inventions across continents including geometry and philosophy from the Africans to the Greeks, gunpowder from China to Europe, the printing press from Korea to Europe, arithmetic from India to Europe via Baghdad, Alkashi to Tycho Brahe.

A syllabus for introducing students to a decolonised history of science that is truly global and which respects the developments in science – past and present – from all societies, not just Western ones, is also included.

Second Segment: The Philosophy of Science

Basic concepts of science-working including testability including experimental methods, with examples from various traditions will be discussed including various strategies and tricks relied upon by scientists to avoid testing or to resist testability. This discussion will enable the students to understand the difference between science and non-science.

Examples for science as testability: the round earth versus flat earth theory and measurement of the earth's size. Students will experiment to measure the circumference of the earth.

Discussion of mathematics as deduction.

The Ethics of Science:

As a general popular discussion in terms of its relevance to their own lives, the ethics of science will enable students to voice their opinions on the remaking of the world according to science and its negative impacts on the environment as well.

The course will conclude with a discussion of the *Elements* encountered by students all over the world as they commence their primary association and journey with science. It will examine the deductive versus the empirical method in science and the problems that characterise science today.

MQA description of the course is annexed.

Table 3: Summary of information on each course

1	Name of Course Module: History and Philosophy of Science (BBA)					
2	Course Code:					
3	Name(s) of academic staff: Prof. C K Raju; Dr. Claude Alvares					
4	<p>Rationale for the inclusion of the course/module in the programme:</p> <p>History and philosophy of science are today projected as exclusively Western contributions, which makes students from other regions of the world feel small. This course takes a more inclusive approach better suited to the international background of the community of students at AIU and will make them more self-confident and with a better appreciation of science.</p>					
5	Semester and Year offered: Year 1 [Trimester 2]					
6	Total Student Learning Time (SLT)	L	T	P	O	Total Guided and Independent Learning
	L=Lecture, T=Tutorial, P=Practical O=Others [Projects / Assignments / Consultation / Library Searches / E-learning / Self-study / Independent study / Preparation / Field Work, etc.]	36			84	120
7	Credit Value: 03					
8	Prerequisite (if any): Nil					
9	<p>Learning outcomes (LOs)*:</p> <p>At the end of the course, students will be able to:</p> <p>LO1: recognise that science has a multicultural and multi-racial origin, and that various parts of the world have contributed to its development from historically early times [C1, C2, C4, A1, A2, A3]</p> <p>LO2: comprehend that these discoveries and inventions were transmitted to the West which subsequently claimed them as its own, and illustrate this with case studies [C2, C4, A5]</p> <p>LO3: know what science is today, discriminate it from non-science, and relate it to various cultural contexts [C1, C2, C5, A4]</p> <p>LO4: appraise some ethical problems associated with scientific activity, compare different ways of resolving them, and apply their own cultural values to resolve these problems [C5, C3, A3, A5]</p> <p>LO5: evaluate the veracity of internet sources of information such as Wikipedia [C5, A3]</p> <p>*Cognitive domain: Knowledge [C1], Comprehension [C2], Application [C3], Analysis [C4], Synthesis [C5], Evaluation [C6] Affective domain: Receiving [A1], Responding [A2], Valuing [A3], Organization [A4], Internalizing [A5] Psychomotor domain: Perception [P1], Set [P2], Guided Response [P3], Mechanism [P4], Complete Overt Response [P5], Adaptation [P6], Organization [P7]</p>					
10	<p>Transferable Skills:</p> <p>Students acquire the following:</p> <ul style="list-style-type: none"> • critical thinking • analytical thinking • reasoning skills • experimental skills • innovative skills 					
11	Teaching-learning and assessment strategy*:					
	Learning Outcome	Teaching and Learning Strategy			Assessment Strategy	
	LO1: recognise that science has a multicultural and multi-racial origin, and that various parts of the world have contributed to its development	Lecture Literature Reviews Group discussions Summary Writing [MQA 1,3,4,5,6,7,8;			Assignment Mid-term examination Final Examination	

	from historically early times	MoHE1,2,3,4,5,6,7]																															
	LO2: comprehend that these discoveries and inventions were transmitted to the West which subsequently claimed them as its own, and illustrate this with case studies	Lecture Inquiry Reading Round Table Idea/Mind Mapping Summary Writing [MQA 1,3,4,5,6,7,8; MoHE1,2,3,4,5,6,7]	Assignment Mid-term examination Final Examination																														
	LO3: know what science is today, discriminate it from non-science, and relate it to various cultural contexts	Lecture Internet Search Literature Reviews Group Discussions Summary Writing [MQA 1,3,4,5,6,7,8; MoHE1,2,3,4,5,6,7]	Assignment Mid-term examination Final Examination																														
	LO4: appraise some ethical problems associated with scientific activity, compare different ways of resolving them, and apply their own cultural values to resolve these problems	Lecture Guest Speaker Internet Search Literature Reviews Inquiry Reading Group Discussions Summary Writing [MQA 1,3,4,5,6,7,8; MoHE1,2,3,4,5,6,7]	Portfolio Mid-term examination Final Examination																														
	LO5: evaluate the veracity of internet sources of information such as Wikipedia	Lecture Internet Search Group Discussions Summary Writing [MQA1, 2,3,4,5,8 MoHE [1,2,3,4,]	Assignment Mid-term examination Final Examination																														
	<p>*MQA Domains of Learning Outcomes: Knowledge of Discipline Areas [MQA1], Practical Skills [MQA2], Social Skills & Responsibilities [MQA3], Values, Attitudes & Professionalism [MQA4], Communication, Leadership & Team Skills [MQA5], Problem-solving & Scientific Skills [MQA6], Managerial & Entrepreneurial Skills [MQA7], Information Management & Lifelong Learning Skills [MQA8]</p> <p>*MOHE/ LOKI Soft Skill Learning Outcomes: Communication Skills [MOHE1], Critical Thinking and Problem solving Skills [LOKI2], Information and Lifelong Learning [MOHE3], Team Work Skills [MOHE4], Entrepreneurial Skills [MOHE5], Values, Ethics and Professionalism [MOHE6], Leadership Skills [MOHE7]</p>																																
12	<p>Synopsis</p> <p>This course is about the international history and philosophy of science. It is designed to introduce the idea that several cultures have contributed to the development of science. This understanding of the history of science is essential to an understanding of the philosophy of science. In the process, the student will examine the difference between science and non-science. The student will also become aware of some of the ethical issues generated by science and their potentially different resolutions in different cultural contexts.</p>																																
13	Mode of Delivery: Lecture, Guest Speaker, Internet Search, Literature Reviews, Inquiry Reading, Group Discussion, Discovery Learning, Experiment, Summary Writing																																
14	<p>Assessment methods and types:</p> <p>Formative Assessment/ Summative Assessment Self-Assessment [SA] / Peer-Assessment [PA] / Lecturer Assessment [LA] Individual Assessment [IA] / Group Assessment [GA]</p> <table border="1"> <thead> <tr> <th>Method</th> <th>LO</th> <th colspan="2">Type</th> <th>Weight</th> </tr> </thead> <tbody> <tr> <td>Assignment</td> <td>LO1 – LO3</td> <td>Formative</td> <td>SA/PA/LA</td> <td>15</td> </tr> <tr> <td>Portfolio</td> <td>LO4</td> <td>Formative</td> <td>SA/PA/LA</td> <td>15</td> </tr> <tr> <td>Mid-term Examination</td> <td>LO1 – LO4</td> <td>Summative</td> <td>IA/LA</td> <td>35</td> </tr> <tr> <td>End Term Examination</td> <td>LO1 – LO4</td> <td>Summative</td> <td>IA/LA</td> <td>35</td> </tr> <tr> <td>Total</td> <td></td> <td></td> <td></td> <td>100</td> </tr> </tbody> </table>			Method	LO	Type		Weight	Assignment	LO1 – LO3	Formative	SA/PA/LA	15	Portfolio	LO4	Formative	SA/PA/LA	15	Mid-term Examination	LO1 – LO4	Summative	IA/LA	35	End Term Examination	LO1 – LO4	Summative	IA/LA	35	Total				100
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**15 & 16 Mapping of the course / module Los to the Programme Aims (PA)
Mapping of the course / module Los to the Programme Learning Outcomes (PO)**

COURSE SYNOPSIS		PROGRAMME AIMS [PA]		PROGRAMME LEARNING OUTCOMES (PO) At the end of the Programme the learners will be able to						
<p>This course is about the international history and philosophy of science. It is designed to introduce the idea that several cultures have contributed to the development of science. This understanding of the history of science is essential to an understanding of the philosophy of science. In the process, the student will examine the difference between science and non-science. The student will also become aware of some of the ethical issues generated by science and their potentially different resolutions in different cultural contexts.</p> <p>The values 1-3 represent the emphasis of the CO to the PO: 1 = slight emphasis 2 = moderate emphasis 3 = substantial emphasis</p>		Prepare graduates with the knowledge, skills and attitudes to be efficient administrative and managerial industry related professional	Articulate professionally with sensitivity the appropriate social skills in a local, national and global community	Apply major ideas and specific subject knowledge in the area of business administration	Carry out professional tasks effectively in the workplace	Develop critical, lateral thinking and logical reasoning skills to solve problems in the execution of duties	Develop creative and explorative skills to generate new ideas as well as entrepreneurial skills to be able to make informed judgments and decisions	Select appropriate technological solutions to use in the workplace	Demonstrate sensitive communication skills and professionalism as an individual as well as a team player in specialized networking in a local, national and international environment	Exemplify suitable managerial skills in a professional environment as lifelong learning
NO	COURSE LEARNING OUTCOME [LO]									
1	recognise that science has a multicultural and multi-racial origin, and that various parts of the world have contributed to its development from historically early	2	3	1	1	3	3	3	3	3
2	comprehend that these discoveries and inventions were transmitted to the West which subsequently claimed them as its own, and illustrate this with case studies	3	3	2	1	2	2	2	3	3
3	know what science is today, discriminate it from non-science, and relate it to various cultural contexts	3	3	2	2	2	3	2	2	2
4	appraise some ethical problems associated with scientific activity, compare different ways of resolving them, and apply their own cultural values to resolve these problems	3	3	3	3	3	3	3	3	3
5	evaluate the veracity of internet sources of information such as Wikipedia	3	2	3	3	3	3	3	3	3
Emphasis of CO-PO (Total Value)		14	14	11	10	13	14	13	14	14
Emphasis of CO-PO (Total Value/Max Total Value)%		93.3%	93.3%	73.3%	66.7%	86.7%	93.3%	86.7%	93.3%	93.3%
Average Emphasis of CO-PO (%Emphasis/3)		3	3	2	2	2	3	3	3	3

17	Content outline of the course/module content and the SLT per topic.					
Course module topics	LO	L=Lecture, T=Tutorial, P=Practical O=Others [Projects / Assignments / Consultation / Library Searches / E-learning / Self-study / Independent study / Preparation / Field Work, etc.]				
		L	T	P	O	SLT
Week 1 Overview of the Course Introduction to the history of science in various parts of the world	LO1	3			6	9
Week 2 History of Science	LO1	3			6	9
Week 3 History of Science	LO1	3			6	9
Week 4 History of Science	LO2	3			6	9
Week 5 History of Science	LO2	3			6	9
Week 6 History Science	LO3	3			6	9
Week 7: Exam						6
Week 8 History of Science	LO3	3			6	9
Week 9 History of Science (summary)	LO3	3			6	9
Week 10 Philosophy of Science	LO3	3			6	9
Experiment Outdoors						8
Week 11 Philosophy of Science	LO4	3			6	9
Week 12 Science and Ethics	LO4	3			6	9
Week 13 Science and Ethics	LO4	3			6	9
Week 14: Exam						6

	Total Hours	36		84	128
18	<p>Readings selected from the following texts:</p> <p>Kuhn, T. S. 1957/2003. <i>The Copernican Revolution: Planetary Astronomy in the Development of Western Thought</i>. Cambridge: Harvard University Press.</p> <p>Nasr, Seyyed Hossein. 1968. <i>Science and Civilization in Islam</i>. Cambridge: Harvard University Press.</p> <p>Needham, J.1981. <i>The Shorter Science and Civilization in China. Vol. 2</i> (Abridgement by C.A. Ronan). Cambridge University Press.</p> <p>Raju, C. K. 2009. <i>Is Science Western in Origin?</i> Penang: Multiversity and Citizens International.</p> <p>Raju C.K. 2012. <i>Euclid and Jesus: How and why the church changed Christianity and mathematics across two religious wars</i>, Penang: Multiversity and Citizens International.</p> <p>Alvares, Claude. 1991. <i>Decolonising History: Technology and Culture in India, China and the West, 1492 to the Present Day</i>. Goa: The Other India Press, India.</p> <p>Selin, Helaine (Ed.). 1997. <i>Encyclopaedia of the History of Science, Technology, and Medicine in Non-Western Cultures</i>. Dordrecht: Kluwer Academic Publishers.</p> <p>Dharampal, <i>Indian Science and Technology in the 18th Century</i>, OIP, India</p> <p>William Broad and Nicholas Wade 1983 <i>Betrayers of the Truth: Fraud and Deceit in the Halls of Science</i>, Simon and Schuster.</p> <p>George James, with foreword by Molefi Asante, 2001, <i>Stolen Legacy: Greek Philosophy is Stolen Egyptian Philosophy</i>, African American Images.</p> <p>Salim T.S. Al-Hassani (ed) 2011. <i>1001 Inventions: Muslim Heritage in Our World</i> (2nd ed.). London:Foundation for Science Technology and Civilization.</p>				
19	Other additional information: Nil.				