

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.

A example 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. Summarise the discussion, including Galileo.

Example for discussion of science as inference: Length of the day. Summarise the discussion.

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: Differentiate the basic concepts of discovery, exploration, innovation and invention	Lecture 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	

	LO2: Outline the major early scientific inventions which had an impact on human society	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: Evaluate the role of reason in advancing the present scientific body of knowledge	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: Interpret the implications of scientific discoveries and inventions in the different eras	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	<p>Mode of Delivery: Lecture, Guest Speaker, Internet Search, Literature Reviews, Inquiry Reading, Group Discussion, Discovery Learning, Experiment, Summary Writing</p>																										
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>Type</th> <th>Weight</th> </tr> </thead> <tbody> <tr> <td>Assignment</td> <td>LO1 – LO3</td> <td>Formative</td> <td>SA/PA/LA</td> </tr> <tr> <td>Portfolio</td> <td>LO4</td> <td>Formative</td> <td>SA/PA/LA</td> </tr> <tr> <td>Mid-term Examination</td> <td>LO1 – LO4</td> <td>Summative</td> <td>IA/LA</td> </tr> <tr> <td>End Term Examination</td> <td>LO1 – LO4</td> <td>Summative</td> <td>IA/LA</td> </tr> <tr> <td>Total</td> <td></td> <td></td> <td>100</td> </tr> </tbody> </table>			Method	LO	Type	Weight	Assignment	LO1 – LO3	Formative	SA/PA/LA	Portfolio	LO4	Formative	SA/PA/LA	Mid-term Examination	LO1 – LO4	Summative	IA/LA	End Term Examination	LO1 – LO4	Summative	IA/LA	Total			100
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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 Philosophy of Science	LO3	3			6	9
Week 7: Exam						6
Week 8 Philosophy of Science	LO3	3			6	9
Week 9 Philosophy of Science	LO3	3			6	9
Week 10 Philosophy of Science/	LO3	3			6	9
Experiment Outdoors						8
Week 11 Science and Method	LO4	3			6	9
Week 12 Science and Method	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 Citizen's International.</p> <p>Raju C.K. 2012. <i>Euclid and Jesus</i>, India, Other India Press.</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>Betrayers of the Truth</p> <p>George James, <i>Stolen Legacy: Greek Philosophy, Stolen Egyptian Philosophy</i></p> <p>Salim T.S. Al-Hassani. (2011). ed. <i>1001 Inventions: Muslim Heritage in Our World</i> (2nd ed.). London:Foundation for Science Technology and Civilization.</p>						
19	Other additional information: Nil.						