THE UNIVERSITY OF TRINIDAD AND TOBAGO

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Centre for Education Programmes

COURSE TITLE :- **Science 1: Teaching Methods for Primary**

COURSE CODE :- **SCIE 2001**

LEVEL :- **Undergraduate Year 2** **CREDIT POINTS** :- **3**

PARENT PROGRAMME :- **Bachelor of Education**

SEMESTER :- **1**

TYPE OF COURSE :- **Lecture/discussion; inquiry based activities**

START DATE: **END DATE**

September 5th 2016 **November 25th 2016**

PROGRAMME LEADER:	**PHONE CONTACT:**	**EMAIL:**
Mr. Kishore Lal	**642 8888/ext 29176** **688-9260**	**kishore.lal@utt.edu.tt** **sanshore@gmail.com**
INSTRUCTORS:		
Ms. Deborah Adesiyun		
Mr. Bisram Ramesar		

TOTAL STUDENT WORKLOAD: ***54** hours (30+0+12+12)*

Lecture:	2.5 hrs
Tutorial:	0 hr
Laboratory /fieldwork	1 hr
Self Study:	1 hr

PREREQUISITES:

Integrated Science or Human and Social Biology up to CSEC level.

The majority of teaching sessions incorporate practical inquiry activities and or problem solving exercises so regular attendance is essential. Students should aim to attend 80-100% of classes.

DESCRIPTION: This course promotes the inquiry-based approach to teaching science at the primary school level. It is structured to provide teachers with experiences of practical hands-on inquiry-based activities, as well as relevant theoretical understandings of the philosophy, psychology, and pedagogy of the subject, with particular reference to the needs of children ages 5-12years. The majority of teaching sessions incorporate practical inquiry activities and or problem solving exercises. As such regular attendance is essential.

LEARNING OUTCOMES

Prospective teachers will:

1. Demonstrate knowledge and understanding of the nature of science and the relationship between science, society and technology.
2. Describe the processes of science inquiry and the practices and dispositions of inquiry based science.
3. Demonstrate knowledge of the structure of the Trinidad and Tobago Primary School Science Syllabus.
4. Provide a rationale for scientific literacy and its importance for Trinidad and Tobago.
5. Demonstrate knowledge and understanding of how children think and learn about science
6. Interpret and apply pedagogical content knowledge to authentic classroom situations through lesson plans, unit plans, teaching strategies and resources.
7. Identify a range of students' misconceptions and understand of the role of the process skills in supporting students' construction of more powerful and accurate scientific knowledge.
8. Develop and implement learning experiences and assessment methods appropriate to primary science teaching in a local context.
9. Demonstrate an understanding of safety procedures and management strategies for teaching science safely and effectively.
10. Demonstrate recognition of the social and ethical dimensions of science and science education.

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AREAS OF STUDY

UNIT 1 – The Nature of Science

1. The nature of science: characteristics of scientific knowledge, inquiry skills and attitudes which distinguish Science as a discipline and inform the methodology of the subject.
2. The nature of technology: the relationship between science, technology, and society.
3. Scientific literacy and the goals of science education.

UNIT 2 – Inquiry and the Science Processes

1. The concept and practice of scientific inquiry, and the role of the processes in carrying out scientific inquiry.
2. Identification of the processes of science, as well as recognition of the appropriate pupil behaviours which typify the science processes in action.
3. Safety: strategies for ensuring safety during investigations.

UNIT 3 – The psychology of learning science

1. The relationship between constructivism and learning Science concepts.
2. The cultural and psychological basis of students' misconceptions and the role of the science processes in helping children to correct misconceptions and construct meaningful scientific knowledge.
3. The principles of concept mapping, its use as a pedagogical and evaluative tool,
4. Constructing concept maps

UNIT 4 – Planning and Teaching Science

1. Planning lessons using the 5E learning cycle
2. Writing general and specific objectives.
3. Identifying and implementing formative assessment strategies.
4. Identifying and incorporating the umbrella concepts of Science as outlined in the T&T MOE primary science syllabus.
5. Identifying and developing a range of questions including productive questions which support the development of inquiry and the construction of scientific concepts.
6. Developing units which reflect the structure, rationale and pedagogy of the MOE Primary science curriculum of Trinidad and Tobago.

LEARNING AND TEACHING STRATEGY

Lecture/discussions, inquiry based activities, outdoor observations and inquiry, audio-visual aides, cooperative group work, projects and student presentations linked to independent study and research, student led presentations.

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COURSE CONTENT

COURSE SCHEDULE

This is a flexible schedule; topics can be re-organised to support student engagement, as well as curricula and administrative restrictions.

Week	Unit/Session Topics	Methodology
1 &2	**The Nature of Science** a. Defining science. b. Confronting stereotypes of Scientists through Draw-A-Scientist-Test (DAST). c. Identifying local Scientists and their work. d. Exploring the nature of science through investigative activities such as the Mobius strip. e. Identifying scientific knowledge (facts, concepts, laws, and theories), attitudes, and method. f. Naming and recognizing emotional and intellectual attitudes. g. Illustrating the stages of Scientific inquiry. h. Determining the characteristics of the scientific enterprise (empirical, public, etc.) i. Compare and contrast the skills and dispositions of the MOE revised science syllabus 2013 with the attitudes and inquiry skills of Science.	Lecture-discussion Cooperative hands-on activity (The Mobius Strip, tangram puzzle, etc.) Video analysis
3	**Define Technology** a. Name and describe the characteristics of technology. b. Describe the stages in doing technology. c. Compare and contrast the stages in doing technology with doing Science. d. Describe the relationship between science and technology. e. Identify the rationale for teaching Science and the concept of Science as defined in the MOE syllabus. f. Describe the effect of and role of science and technology on society – group debate	Lecture discussion Practical activity (Straw planes or other activity) Cooperative group work.

Week	Unit/Session Topics	Methodology
4	**Scientific Inquiry and Science Processes** a. Define inquiry in the natural sciences. *compare and contrast with different definitions.* b. Distinguish FAIR Testing from other methods of inquiry such as research, surveys, observation and classification. c. Formulate investigable questions and carry out a scientific inquiry which is a FAIR TEST. d. Develop a hypothesis and investigate the hypothesis. Identify the variables used in a Fair Test. e. Describe the nature of inquiry in the classroom - Pupil and Teacher behaviours.	Lecture discussions. Hands on activities. Carry out a Fair test inquiry. Inquiry Activity Assignment
5 & 6	a. Identify and distinguish between the basic and integrated processes used in carrying out scientific inquiry. Refer to the Martin et al (2008). b. Name and describe the pupil behaviours which typify the basic science processes of observation, space-time relationships, measuring, classifying, inferring, predicting and communicating. c. Name and describe the pupil behaviours which typify the integrated science processes of interpreting data, controlling variables, operational definitions, hypothesizing and experimenting. d. Demonstrate the ability to accurately use rulers, measuring cylinders, thermometers and balances.	Lecture-discussions. Cooperative learning. Investigative activities. • Carry out inquiry activities illustrating the principles of inquiry, and identify the science processes used. • Create a dichotomous key
7	**Learning science** a. Identify students' pre-concepts, alternative concepts and mis-concepts b. Explain the role of the science processes in helping children to construct knowledge. c. Explain the principles of concept mapping. d. Describe the use of concept mapping as a learning and teaching tool.	Lecture - discussions. Cooperative group work. Investigative activities Construct concept maps based on a science topic.

Week	Unit/Session Topics	Methodology
8 & 9	**Teaching Science** a. Explain the constructivist orientation underpinning inquiry based science. b. Describe the learning cycle model used in inquiry based science teaching. c. Describe teacher and student activities for the stages in the 5e learning. d. Identify the components of the 5E Science Lesson plan format and compare to the generic format. ***Assignment: review assignment to develop a lesson based on a topic in the TT primary science syllabus using a 5E lesson plan.***	Lecture discussion. Participating in a 5E lesson. Analysis of a demonstrated lesson using the 5E format Student cooperative work **Inquiry Activities Due.**
10	a. Explain and describe the structure of the MOE revised syllabus: Identify umbrella ideas in Science, outcomes, dispositions, skills, and elaborations, as well as the use of, Thematic approaches b. Review the difference between the 5E science lesson plan and a science unit plan. c. Describe how a Science Unit will be part of chosen theme. d. Illustrate the incorporation of the "umbrella or big ideas in Science" in lessons. e. Writing Instructional Objectives f. Review the components of a measurable instructional objective. g. Distinguish general and specific objectives. h. Critique objectives which have the following errors: non-measurable verb, activity oriented rather than a learning outcome, teacher vs student outcome; lack of clarity of product. i. Re-write objective correcting the errors. j. Classify learning objectives at various levels of the cognitive domain as well as in the affective, psychomotor domains. k. Write objectives for various levels and domains for their chosen science lesson.	Lecture/discussion Student cooperative work.

Week	Unit/Session Topics	Methodology
10 & 11	**Assessment:** a. Demonstrate an understanding of the relationship between assessment and lesson objectives, and teaching strategy (refer to the backward design). b. Identify a variety of assessment strategies suitable for inquiry based science. c. Write objectives and assessment for their given topic d. **Questioning** e. Identify the importance of questioning in the teaching process. f. Identify and analyse various question types in science teaching. Identify and critique the various question types used in science teaching. g. Identify appropriate teacher reactions to pupils' responses.	**Cooperative work,** **Video or case discussion.** **Microteaching/demonstration analysis.** **Draft Lesson plan due**
12	**Presentations of lesson plan / Micro-teaching**	

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ASSESSMENT:

Assessment Element 1 – Practical investigations

weighting:	20%
assessment type:	laboratory work – inquiry activities
special facilities:	basic laboratory facilities and equipment
time/duration:	three sessions (9 hours)

Assessment Element 2 – Lesson planning and micro-teaching

weighting:	30%
assessment. type:	Lesson plan and presentation/micro-teaching
special facilities:	Classroom
time/duration:	2 sessions (6hours)

Assessment Element 3

weighting:	50%
assessment. type:	examination
special facilities:	examination conditions
time/duration:	3 hrs

ASSESSMENT STRATEGY

i. The practical investigations, lesson plan, and microteaching are marked by rubrics which outline the criteria of performance expected. Cooperative group work is marked at both the individual and group level to ensure accountability. The criteria expected of individuals in the group are outlined in the assignment instructions and in the rubrics.

ii. Practical investigations assess students' knowledge and application of the science process skills and their use as methods of inquiry in problem solving. It also assesses students' understandings of the nature of Science. These refer to the outcomes of Units 1 &2.

Micro teaching and lesson planning assess the outcomes of Units 3&4. These activities ask students to apply their knowledge of how pupils learn science to the 5E approach to planning Science as inquiry.

iii. Formative assessment occurs throughout and at the end of each session. Active discussions, quick quizzes and student presentations provide students with feedback on their performance, as well as allow instructors to adjust lessons accordingly.

EVALUATION AND GRADING: Rubrics and marking schemes are included in the course assessment handouts and booklets**.**

AGGREGATION & REASSESSMENT RULES: In order to pass this course, students must gain a total final mark (consisting of the sum of course work and final term exam) of 50% and over, provided a mark of 40% (20 / 50) or over is scored in course work and a mark of 40% (20 / 50) or over is scored in the final term exam.

GRADING SCHEME

UTT Grading System- VERSION 5.O			
Lower Bound	**Upper Bound**	**Grade**	**Grade Points**
95	100	A+	4.0
89	94	A	4.0
84	88	A-	3.7
78	83	B+	3.3
72	77	B	3.0
66	71	B-	2.7
60	65	C+	2.3
50	59	C	2.0
0	49	F	0.0

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COURSE POLICIES

Class Structure

The structure of this class will be a combination of instructor-led discussion, in-class activities, individual/ group laboratory work, quizzes, and projects. Any final project or assignment is due on the last day of class. Assignments will not be accepted after the last day.

Attendance:

The study of science is cumulative (i.e. an understanding of earlier material is necessary to grasp later covered concepts.) Past experience has shown a high relationship between absences and low grades. Furthermore, absences will severely limit interaction with other students. It is very important that you make every effort to attend every class. It is the policy of UTT to debar student with less than 80% class attendance from writing the final examination.

Late Assignment

All assignments are due according to the course calendar. Any late assignment received within one week after the date due will be graded and then assigned a score equivalent to 80% of the earned grade. Assignments will not be accepted (and a grade of 0 points given) more than one week after the assignment is due. The late policy does not apply to a final project or assignment which must be turned in by the last week of class.

Schedule

The schedule for the course is listed on the course calendar. All due dates are section specific and will be supplied to you by your instructor at the first class meeting. The Module tests are not scheduled on this course calendar. The instructor will assign all Module test dates.

Academic Integrity

Academic integrity is submitting one's own work and properly acknowledging the work of others. Any violation of this principle constitutes academic dishonesty and is liable to result in disciplinary action. Forms of academic dishonesty include:

- Plagiarism - submitting all or part of another's work as one's own in an academic exercise, such as an examination, computer program, or written assignment. Please note that allowing someone to submit your work also constitutes plagiarism on your part.

- Cheating - using or attempting to use unauthorized materials on an examination or assignment, such as using unauthorized texts or notes or improperly obtaining, or attempting to obtain, copies of an examination or answers to an examination.

- Facilitating Academic Dishonesty - helping another commit an act of dishonesty, such as substituting for an examination or completing an assignment for someone else.

- Fabrication - altering or transmitting, without authorization, academic information or records.

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SUGGESTED READING:

ESSENTIAL TEXT(S)

Martin, R., et. al (2006*). Teaching Science for ALL Children: Inquiry Methods for Constructing Understanding,* Pearson; 5th edition.

Peacock, Alan (2003). *Teaching Primary science*. Oxford: Macmillan.

USEFUL INTERNET SITES:

http://www.learner.org/workshops/inquiry/videos.html - Annenberg Learner - learning Science through inquiry. Please bookmark this site as we use the videos in class.

http://science.howstuffworks.com/ - another high interest site, that allows you to see science at work in our everyday lives**.**

http://www.enchantedlearning.com/Home.html - just a useful site for primary teachers. It provides information and activities on topics across all subject areas.

http://www.learner.org – a web site specifically established to help schools and communities improve math and science education

http://www.itlrc.com – a website with information relevant to this course.