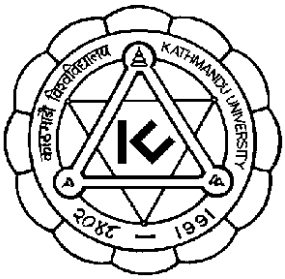
Kathmandu University

School of Education



Curriculum

for

M Phil in Education

(Specialisation in STEAM Education)

Hattiban, Lalitpur, Nepal

December 2018

INTRODUCTION

We envisage that the proposed academic program reflects the historical character of MPhil as a discourse and research-based academic program. By its nature, the purpose of MPhil in Education (Specialisation STEAM Education; henceforth MPhil in STEAM Education) program is to put emphasis on capacity building of potential Nepali and international scholars whose research is likely to become a basis for improving practices in their professions. Given this perspective, the School shall enroll among qualified post-graduate students in STEAM education from diverse fields of study (pure mathematics, applied mathematics, mathematics education, science and technology disciplines, engineering, etc.) in the proposed program insofar as the School has the relevant faculty members and/or it can outsource from among the international partner institutions. More so, international experts in the field can also be invited for short-term visits so as to enhance the research capacity of our research students and faculty members.

We envisage that the program will be interdisciplinary in nature as it aims to utilise perspectives and practices arising from the field of Science, Technology, Engineering, Arts and Mathematics (STEAM) Education. This program is intended for teachers, educators and educational leaders who desire the skills and credentials needed to advance their practice-driven careers. It offers rigorous theoretical and practical orientation for practitioners aspiring to become leaders in fields associated with STEAM Education. We envisage that multiple epistemic frameworks enable research students to be creative and innovative in their research productivity, thereby serving platforms for them to explore newer avenues in STEAM education.

Program Objectives and Attributes

By completing MPhil in STEAM Education program, research students are expected to demonstrate

- an ability to identify research issue(s) and to develop viable research design as per the ethos of paradigm(s), methodologies and methods employed in their research;
- a sound understanding of the major areas, focus and contours of local, regional and international research in their respective research area;
- a capacity for critical assessment of relevant scholarly literature in their field of study;
- an ability to accomplish defined scholarly research within a specific research program
- an ability to develop, implement and evaluate educational programs for the concerned community of practice;
- well-developed flexible problem-solving abilities (skills, knowledge and attitudes) appropriate to the area of study;
- an ability to develop the ethos of life-long learning in their personal and professional contexts.

Structure of the program

The program is of three semesters. There are courses for 33 credit hours comprising core courses (9 credit hours) and specialization courses (12 credit hours), electives courses (3 credit hours), dissertation (including others options) (9 credit hours).

Overall Program Structure

Core Courses (9)	EDUC 600 Educational Dimensions (3) EDUC 620 Research Methods (3) EDUC 621 Advanced Qualitative Research Methods (3) or EDUC 622 Advanced Quantitative Research Methods (3)
Specialization Courses (12)	STEAM ED 600 Lenses of STEAM Education (3) STEAM ED 620 Reflective Practice in STEAM Education (3) STEAM ED 611 Curricula in STEM Education (3) STEAM ED 615 Teaching and Learning in STEM Education (3)
Electives Courses (any one) (3)	EDUC 640 Mixed Methods Research (3) EDUC 650 Transformative Education Research and Practice (3) EDUC 660 Participatory Action Research (3)
Research/Dissertation (9)	EDUC 680 Dissertation (9) Or EDUC 670: Research Papers (9): two papers, one of which should have been published in referred journals during the study period (9 Credit hours) – subject to the approval by the research committee
Total Credits	33 Cr. Hrs.

Duration

Generally, M Phil students are expected to complete their study in 1.5 years. In the case of delayed completion, the Kathmandu University rules will apply.

Evaluation

The evaluation system is guided by the notion of continuous, productive and developmental assessment as learning. The CGPA grading system shall be used as follows:

Grade	A	A-	B+	B	B-	C+	C	F
Grade Point	4.0	3.7	3.3	3.0	2.7	2.3	2.0	Below 2.0
Performance	Outstanding	Excellent	Very Good	Good	Satisfactory	Fair	Poor	Fail

In order to pass, the scholar has to maintain at least C in individual course and a Cumulative Grade Point Average (CGPA) 3.0. The calculation of CGPA and their impression is as follow. CGPA is calculated at the end of the program using the given relation.

$CGPA = (c_1 g_1+c_2g_2+c_3g_3\ldots) / (c_1+c_2+c_3\ldots..)$

Where c_1, $c_2\ldots$ denote credits associated with the courses taken by the student and g_1, g_2 denote grade values of the letter grades earned in the respective courses.

Eligibility

1. For enrolment to MPhil in STEAM Education, those having a Master Degree in STEM related fields (e.g., pure mathematics, applied mathematics, mathematics education, science and technology disciplines, engineering, etc.) with at least 50% score or equivalent to CGPA 3.0 out of 4 are eligible to apply.
2. Desirable: Research publications in the relevant field of study

Application Requirements

1. Completion of the application blank
2. Copies of credentials,
3. A copy of curriculum vitae, and
4. Reference letters

CORE COURSES (9 Cr.)

EDUC 600: Educational Dimensions (3)

The course aims MPhil/PhD students to acquaint educational praxes through the autobiographical, curricular/pedagogical, sociocultural, political, and philosophical dimensions. The autobiographical dimension enables research students to explore their lived experience as educational practitioners through the lenses of adult learning, reflective practice and Freirean

notion of conseintasization. Likewise, the curricular/pedagogical dimension deals with different concepts related to curricular and pedagogical traditions arising from prescriptive, descriptive and critical curricular/pedagogical traditions. The sociocultural dimension deals with ideas pertaining to situated cognition and education as social/cultural process. Whereas the political dimension draws from the reconstructionist and Freirean schools, the philosophical dimensions unpacks pragmatism, perennialism, constructivism and beyond.

EDUC 620 – Research Methods (3)

This course aims at offering an introduction to research methods for MPhil/PhD students. Students will learn about basics of research methods, the philosophical and theoretical underpinnings of qualitative, quantitative and mixed methods research. In particular, this course will help the students to apply their understanding of research, identifying and stating the research problem, formulating research questions, and designing the entire process of research to write a report independently. At the end of the course, the students can write a coherent research proposal establishing a clear relationship between the what (research problem/agenda) and the how (methodology) of research, able to locate their research considering the major paradigms, and develop competency of applying their preferred method in practice.

EDUC 621 – Advanced Qualitative Research Methods (3)

The course aims at enabling research students with skills, knowledge and understanding of qualitative research traditions, methods and techniques, thereby developing research capabilities in problematising research issues, conceptualising theoretical perspectives, developing research design and analysing and interpreting qualitative data. Furthermore, the course also aims research students to develop knowledge and skills necessary for applying appropriate quality and ethical standards for their research projects. Key topics of this course include*: Overview of Qualitative Research Traditions, Key Paradigms and Worldviews, Problematising in Qualitative Research, Research Designs, Interpreting Qualitative Data and Maintaining Ethical and Quality Standards*.

EDUC 622 – Advanced Quantitative Research Methods (3)

This is an advanced level course designed for MPhil/PhD students with a prior background in basic statistics. The course introduces fundamentals of advanced statistical tools and techniques used in research so that students can apply their knowledge in their own research. The aim of the course is to develop proficiency to use computer based advanced statistical techniques and models in educational and social science research and interpret results in an independent manner. As the course is heavily based upon statistical software, prior experience/skill of using the software is essential.

SPECIALIZATION COURSE (12 Cr.)

STEAM ED 600: Lenses of STEAM Education (3)

With an aim of enabling MPhil/PhD students in STEAM Education by acquainting with different lenses of STEAM education, this course enables them to explore autobiographical, pedagogical, socio-political and philosophical lenses of STEAM education. The course begins with the autobiographical lens of STEAM education to unpack students' personal-professional experiences as different life-roles, such as students, teachers, teacher-educators, and researchers. The second lens offers a space for learners to discuss possible pedagogical strategies that they have been and will be applying in their professional contexts. Indeed, this third module enables to discuss how a critical social theory perspective contributes to understand STEAM education as an activity shaped and facilitated by individuals embedded in their professional contexts. Taking the notion of power at the centre stage, the module delineates how STEAM education can be employed as a means for transforming lives of many, if not all. Taking STEAM Education as/for sustainable development (e.g., ecology of perspectives and knowledge systems, ethics as the first philosophy, systems thinking), the philosophical lens is set to enable scholars to identify the role of philosophical perspectives in transforming STEAM as unchanging and fragmentary disciplines to an integrated and dynamic knowledge system.

STEAM ED 620: Reflective Practice in STEAM Education (3)

Drawing upon the extant and historical literature of reflective practice, the main purpose of this course is to enable MPhil/PhD students to develop ethical conduct, mindful actions and resilience in different situations to become an active inquirer. This course is developed with the notion that STEAM education develops students as reflective practitioners through Transformative Learning (TL) approach. Out of many TL approaches, this course focuses the five interconnected ways of knowing: cultural self-knowing, relational knowing, critical knowing, visionary and ethical knowing, knowing in action. In doing do, the critical autobiographical reflection is considered as a point of departure towards envisaging the future professional performances that provides enough spaces to challenge the status quo being aware with the various dis/empowering forces to improve the educational practices. This course aims students to becoming as reflective citizen by engaging in *reflection in action, reflection on action, and reflection for action.*

STEAM ED 610: Curricula in STEAM Education (3)

With an aim of enabling MPhil/PhD students in STEAM Education by familiarizing with various curricular lenses, this course is developed with the notion that curriculum is not an end in itself but rather a means of fostering quality (e.g., curriculum as a process, curriculum as currere, etc.) learning. Here, curriculum is viewed as a political and social (dis)agreement that reflects a

society's common vision while taking into account local, national and global needs and expectations. The elements of the STEAM curriculum are STEAM values and ethics that consist of the integrated approaches of leaning engaging with the real-world tasks activities. The course provides students with powerful conceptual tools for exploring a variety of ways in which curriculum is understood, both in the relevant STEAM literature and in their own professional experience. These tools include various curricular metaphors, imaginative understanding and re-visioning. Students will have opportunities to develop a critical understanding of their own extant images of curriculum and the way they have been shaped historically by social, political and economic influences. By constructing an image of an ideal STEAM curriculum, students will engage in re-visioning their professional practices. And finally, by examining strengths and limitations of outcomes-based education, having an orientation with STEAM Education, in relation to emerging curriculum visions such as curriculum integration, eco-pedagogy/eco-justice and inclusive logics, students will be able to develop a vision of curriculum for their own professional contexts taking leadership in educational institutions thereby developing institution-based curriculum in an integrated approach to cultivate creative and imaginative thinking in education.

STEAM ED 630: Teaching and Learning in STEAM Education (3)

With an aim of enabling MPhil/PhD students in STEAM Education by acquainting with the various teaching and learning approaches (inquiry-based, project-based, problem-based, etc.) Keeping the notion of STEAM-related skills (science process skills, science manipulative skills, computational thinking skills, reasoning skills, engineering design thinking skills and ICT skills) at the centre, the course deals with the inquiry-based approaches, project-based learning and digital learning. Inquiry-based approach promotes STEAM disciplines to enable students to engage in authentic and meaningful activities that help to improve mathematical reasoning. The Project-based learning enables students to develop 21st century competencies including resilience, coping with uncertainty, self-reliance, and creativity by interacting with the real-world activities. The digital learning is modern learning environments that enable students to develop their technological literacy and critical thinking skills throughout their daily learning activities. During the course, the students will able to envisage the better teaching and learning approaches as pedagogical innovations to transform the existing teaching and learning practices.

ELECTIVES – ANY ONE (3 Cr)

EDUC 640: Mixed Methods Research in Education (3)

Taking pragmatic philosophy of educational research, this course aims at enabling MPhil students to develop foundations in developing knowledge and skills for making meaningful mix of positivistic and non-positivistic research methodologies, methods, tools and techniques. Key topics of the course includes: Philosophy of Mixed-Methods Research, Mixed Methods Research Designs, Mixing Information, Quality Standards for Mixed Methods Research, Policy Uptake, and Publications.

EDUC 650 – Transformative Education Research and Practice (3)

The course aims research students to develop sensibilities on different forms of research that focus on transforming structural aspects of education. Creative uses of different research traditions (positivist, interpretive, critical, postmodern and integral) for improving research and practice of educational (formal, informal, non-formal) contexts will be discussed. The course also draws on wisdom traditions of the East, West, North and South so as to offer ways through which to radically envision empowering education system in National and local context of the research students.

EDUC 660 – Participatory Action Research (3)

The course aims for research students to develop an acquaintance with the philosophy and practice of participatory action research. Specifically, the course comprises four major strands that are grounded in the transformative intent of participatory action research, axiology of participatory action research, appreciative inquiry, and participatory research designs. The transformative intent of PAR is guided by the notion of educational change as/for public good in which the axiology of public good comes into play. An important dimension of appreciative inquiry is reflected in collaborating with co-researchers in a productive and appreciative manner. Likewise, the course enables research students to come up with participatory action research designs, thereby trialing them in an appropriate context and community.

DISSERTATION/RESEARCH PAPERS (9 Cr.)

EDUC 680 – Dissertation (9)

The students are required to conduct an independent educational research/inquiry based on a defined original research problem, theoretical perspective(s) and sound research design. The process of completing the design entails – proposal defense, completion of the research under the guidance of an assigned supervisor, evaluation by an external examiner, and successful viva-voce.

Or

EDUC 670 Research Papers (9)

The students can choose the Research Papers options in which they write two publishable research papers in which one of them should have been published in a refereed journal (approved by the Research Committee). The process entails the students proposing the area/topics for the research that develops into a paper, assignment of the supervisor, submission of completed and published papers, and viva-voce.

The following tabular presentation shows the process of completing the dissertation/research Papers

Steps	Dissertation	Research Papers
Conceptualisation	Dissertation Proposal should be done by the end of the First Semester	Proposal for researcher papers shall be submitted during the First Semester
Research Conduction	Upon the successful defence of the proposal, a supervisor shall be assigned	Upon the successful defence of the proposal, a supervisor shall be assigned
Submission	The dissertation shall be submitted to the Dean through the concerned HOD/coordinator with the recommendation by the supervisor	The two papers (one published and another of publishable quality) be submitted to the Dean through the concerned HOD/coordinator with the recommendation by the supervisor. The journal (of referred and blindly reviewed) in which the article is published or approved to be published should be approved by the Research Committee.
External Examination	An external examiner is appointed to assess the quality of dissertation	An external examiner is appointed to assess the quality of research papers

Viva-Voce	A viva-voce is done to assess both the presentational and scholarly quality of the dissertation	A viva-voce is done to assess both the presentational and scholarly quality of the research papers
Grading	The grading shall be done as S (Satisfactory) or US (Unsatisfactory)	The grading shall be done as S (Satisfactory) or US (Unsatisfactory)