

THE EDUCATION UNIVERSITY OF HONG KONG

Course Outline

Part I

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| Programme Title | : Doctor of Education (Mathematics Education – Directed Study) |
| Programme QF Level | : 7 |
| Course Title | : Research and Issues in Mathematics Teacher Education |
| Course Code | : MTH8125 |
| Department | : Mathematics and Information Technology |
| Credit Points | : 3 |
| Contact Hours | : 39 hours |
| Pre-requisite(s) | : MTH7122 or MTH7123 |
| Course Level | : Applied Stage |

Part II

The University's Graduate Attributes and seven Generic Intended Learning Outcomes (GILOs) represent the attributes of ideal EdUHK graduates and their expected qualities respectively. Learning outcomes work coherently at the University (GILOs), programme (Programme Intended Learning Outcomes) and course (Course Intended Learning Outcomes) levels to achieve the goal of nurturing students with important graduate attributes.

In gist, the Graduate Attributes for Undergraduate, Taught Postgraduate and Research Postgraduate students consist of the following three domains (i.e. in short "PEER & I"):

- Professional Excellence;
- Ethical Responsibility; &
- Innovation.

The descriptors under these three domains are different for the three groups of students in order to reflect the respective level of Graduate Attributes.

The seven GILOs are:

1. Problem Solving Skills
2. Critical Thinking Skills
3. Creative Thinking Skills
- 4a. Oral Communication Skills
- 4b. Written Communication Skills
5. Social Interaction Skills
6. Ethical Decision Making
7. Global Perspectives

1. Course Synopsis

This course will expose candidates to different aspects of competence of mathematics teachers. Developing theories on measuring mathematics competence of pre-service and in-service teachers will be introduced and investigated. Candidates will explore on how to enrich pedagogical content knowledge without losing the rigor of mathematics content in classroom practices.

2. Course Intended Learning Outcomes (CILOs)

Upon completion of this course, students will be able to:

- CILO₁ identify issues and select approaches to analyze the issues and related implications;
- CILO₂ execute international comparison methods on teachers' and pre-service teachers' competence between two or among several groups;
- CILO₃ apply research procedures appropriate for investigations in this research area;
- CILO₄ plan, execute and report on a small scale research project in a selected area of the field.

3. Content, CILOs and Teaching & Learning Activities

| Course Content | CILOs | Suggested Teaching & Learning Activities |
|--|-----------------------|---|
| Critical understanding and knowledge with respect to the implementation of assessment methodology to identify the competence of mathematics teachers in mathematics for teaching, pedagogical content knowledge, subject matter knowledge and curriculum knowledge | CILO _{1,2} | <ul style="list-style-type: none">• Lecturer-led Q&A• Guided Research Activities |
| Design research methods and instruments to undertake evaluations of teachers' competence, professionalism and handling of ethical issues in mathematics education | CILO _{1,2,3} | <ul style="list-style-type: none">• Guided Research Activities |
| Critical analysis of research literature on mathematics teachers' competencies | CILO _{3,4} | <ul style="list-style-type: none">• Guided Research Activities |
| Implementation of the research designs and procedures | CILO _{2,3} | <ul style="list-style-type: none">• Guided Research Activities |
| Data analyses including ethnographic and quantitative approaches | CILO _{3,4} | <ul style="list-style-type: none">• Lab Work• Presentation |
| Discussion of the results and rationalization for further applications | CILO ₄ | <ul style="list-style-type: none">• Presentation |

4. Assessment

| Assessment Tasks | Weighting (%) | CILO |
|--|---------------|-------------------------|
| Candidates are required to submit a 5000-6000 words project on a relevant topic of their interest in either primary or secondary mathematics teachers' knowledge competencies. The project will involve literature review on current developments and issues, methodology and design of proper instruments of investigation, qualitative/quantitative analyses, and implications of the findings. An oral presentation of the project is required. | 100% | CILO _{1,2,3,4} |

5. Required Text(s)

Nil

6. Recommended Readings

- Adler, J., Ball, D. L., Krainer, K., Lin, F.-L., & Novotna, J. (2005). Reflections on an emerging field: Researching mathematics teacher education. *Educational Studies in Mathematics*, 60, 359–381.
- Ball, D. L., Hill, H., & Bass, H. (2005). Knowing mathematics for teaching. *American Educator*, 29(3), 14-46.
- Ball, D. L. (1998). The Subject Matter Preparation of perspective teachers: Challenging the Myths. *National Center for Research in Teacher Education*. East Lansing.
- *Bromme, R. (1994). Beyond subject matter: A psychological topology of teachers' professional knowledge. In Rolf Biehler et al. (Eds.), *Didactics of Mathematics as a Scientific Discipline* (pp. 73-88). Dordrecht: Kluwer Academic Publishers.
- Hill, H. C., Blunk, M. L., Charalambous, Y. C., Lewis, J. F., Phelps, G. C., Sleep, L. & Ball, D. L. (2008). Mathematics knowledge for teaching and the mathematics quality of instruction: An exploratory study. *Cognition and Instruction*, 26, 430-511.
- Leung, Issic K.C. & Lew, Hee-chan (2012). The ability of students and teachers to use counter examples to justify mathematical propositions: A pilot study in South Korea and Hong Kong. *ZDM - The International Journal on Mathematics Education*. 45(1), 91-105.
- Leung, Issic K.C. & Carbone, E. R. (2013). Pre-service teachers' knowledge about fraction divisions reflected through problem posing. *The Mathematics Educator*. 14(1&2), 1-20.
- Leung, Issic. K. C., Wong, N. Y., Schwarz, B., Cheung, K. L., Chan, W. S. and Kaiser, G. (2013). Competency of prospective Chinese mathematics teachers on mathematical argumentation and proof. *The Mathematics Educator*, 15(1), 81-97.
- *Ma, Liping (1999). Knowing and teaching elementary mathematics: *Teachers' understanding of fundamental mathematics in China and the United States* (Studies in Mathematical Thinking and Learning). Lawrence Erlbaum Associates, Inc.
- Mason, J. (2011). Phenomenology of example construction. *ZDM-International Journal on Mathematics Education*, 43(2), 195-204.
- Mayer, R. E. (1998). Cognitive, metacognitive, and motivational aspects of problem solving. *Instructional Science*, 26, 49-63.
- *Mayer, R. E. (2003). *Learning and instruction*. Upper Saddle River, New Jersey: Pearson Education, Inc.
- *Pressley, M. (1990). *Cognitive strategy instruction*. Cambridge, MA: Brookline Books.
- Rowland, T., Martyn, S., Barber, P., & Heal, C. (2000). Primary teacher trainees' mathematics subject knowledge and classroom performance. In T. Rowland & C. Morgan (Eds.), *Research in Mathematics Education* (Vol. 2, pp. 3–18). London: British Society for Research into Learning Mathematics.
- Rowland, T., Turner, F., Thwaites, A. and Huckstep, P. (2009). *Developing primary mathematics teaching: reflecting on practice with the Knowledge Quartet*. London: Sage Publications.
- *Schmidt, W., Tatto, M.T., Bankov, K., Blömeke, S., Cedillo, T., Cogan, L. et al. (2007). *The preparation gap: teacher education for middle school mathematics in six countries (MT21 report)*. East Lansing: Michigan State University.
- Shulman, L. S. (1986). Those who understand. Knowledge growth in teaching. In *Educational Researcher* 15, 4-14.

- Shulman, L. S. (1987). Knowledge and teaching: Foundations of the new reform. *Harvard Educational Review*. 57, 1-22.
- Silkula, L.S. (1996). *Handbook of research on teacher education*. (2nd edition). New York, NY: Macmillan.
- Townsend, T. & Hates, R. (Eds.)(2007). *Handbook of teacher education: Globalization, Standards and professionalism in times of changes*. New York, NY: Springer
- Wong, N. Y. (2004). The CHC learner's phenomenon: Its implications on mathematics education. In L. Fan, N. Y. Wong, J. Cai, & S. Li (Eds.), *How Chinese learn mathematics: Perspectives from insiders* (pp. 503–534). Singapore: World Scientific.
- Wong, N. Y. (2006). From “entering the Way” to “exiting the Way”: In search of a bridge to span “basic skills” and “process abilities.” In F. K. S. Leung, G.-D. Graf, & F. J. Lopez-Real (Eds.), *Mathematics education in different cultural traditions: The 13th ICMI study* (pp. 111–128). New York, U.S.A.: Springer Verlag.
- Wong, N. Y., Han, J. W., & Lee, P. Y. (2004). The mathematics curriculum: Towards globalisation or Westernisation? In L. Fan, N. Y. Wong, J. Cai, & S. Li (Eds.), *How Chinese learn mathematics: Perspectives from insiders* (pp. 27–70). Singapore: World Scientific.

Those marked with () are highly recommended.*

7. Related Web Resources

http://usteds.msu.edu/related_research.asp

<http://qualitative-research.net/fqs/fqs-d/2-00inhalt-d.htm>

8. Related Journals

Journal of Teacher Education

Educational Studies in Mathematics

Learning and Instruction

Teaching and Teacher Education

ZDM-The International Journal on Mathematics Education

Journal for Research in Mathematics Education

The Mathematics Educator

9. Academic Honesty

The University adopts a zero tolerance policy to plagiarism. For the University's policy on plagiarism, please refer to the *Policy on Academic Honesty, Responsibility and Integrity with Specific Reference to the Avoidance of Plagiarism by Students* (<https://www.eduhk.hk/re/modules/downloads/visit.php?cid=9&lid=89>). Students should familiarize themselves with the Policy.

10. Others

Nil

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TPg Courses with other Study Modes

Programme Title : Doctor of Education (Mathematics Education – Directed Study)
Course Title : Research and Issues in Mathematics Teacher Education
Course Code : MTH8125
Offering Unit : Mathematics and Information Technology
Credit Points : 3

Delivery mode:

Online learning as the primary delivery mode

| Range of classroom-based contact hours (0-15) | Range of hours for online learning (24-39) | Total No. of-Contact Hours |
|--|---|----------------------------|
| | | 39 |

Directed study mode

| Range of classroom-based contact hours (4-15) | Range of guided independent learning hours (24-35) | Total No. of-Contact Hours |
|--|---|----------------------------|
| 6 | 33 | 39 |