**Course description form**

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| **Instructor's name:** | Kyung (Chris) T. Han, GMAC, Washington, USA |
| **Course title:** | **IV.4 Computerized Adaptive Testing (CAT)** |
| **Course type:** | Lectures/Workshop |
| **Number of credit hours per edition:** | 10 x 45 min of lecture and 10 x 45 min of workshop |
| **ECTS** | 4 |
|  | Lecture: 10h  Workshop: 10h  Reading compulsory as well as supplementary literature and assimilating new knowledge: 40h  Preparing for training, preparation tasks: 60h  (The total number of hours 120, corresponding to 4 ECTS points) |
| **Software to be used:** | *- SimulCAT* (Han, 2012): it can be downloaded from <http://hantest.net> (freeware). It will be distributed in the class.  *- SimulMAT* (Han, 2012): it will be distributed in the class.  *- MSTGEN* (Han, 2012): it will be distributed in the class.  *- SPSS*: it should be installed on students’ computers.  *- MS EXCEL*: it should be installed on students’ computers.  - .NET Framework 4.0 or above: it should be installed on students’ computers.  - PARSCALE (or BILOG-MG): the evaluation version can be downloaded from www.ssicentral.com. it will be distributed in the class.  *- AIMMS* (+CLEX): the evaluation version can be downloaded from AIMMS.COM. it will be distributed in the class. |
| **Teaching day schedule preferences:** | *2 x 45 min units + 15 min break + 2 x 45 min per day* (5 days in total) |
| **Course objectives:** | After completion of the course, students should obtain essential knowledge and skills to understand, design, implement, and evaluate CAT programs. |
| **Knowledge** | Know and understand the process of constructing tests (CAT) and mechanisms for the estimation of results  Know and understand item-selection algorithms, including selection criteria item's exposure control and balance content  Know and understand the principles of constructing bank tasks in CAT and selecting items using linear programming and mixed-integer programming  Know and understand the idea of Multistage Testing (MST) and Multidimensional Adaptive Testing (MAT) |
| **Abilities** | Able to plan the process of constructing a test CAT, MDT, MAT, select the appropriate estimation method and the results of the selection-procedure items  Can use simulation techniques to assess the test CAT, MST, MAT |
| **Social competences** | Is aware of the pros and cons of CAT, MDT, MAT  Can argue the use construction techniques for particular tests, such as discussion with the client |
| **Prerequisites:** | Fundamentals of classical test theory and item response theory.  (a brief review on measurement knowledge that is essential to CAT will be covered in the early part of the course) |
| **Pass requirements:** | Course project involving designing and evaluating student’s own CAT program. |
| **Recommended reading:** | *No mandatory articles to be read prior to the course (as long as familiar with IRT).*  *Suggested books & articles:*  Van der Linden, W. & Glas, C. (2010). *Elements of Adaptive Testing*. New York, NJ:Springer.  Thompson, N. A., & Weiss, D. J. (2011). A framework for the development of computerized adaptive tests. *Practical Assessment, Research & Evaluation, 16*. Retrieved from http://pareonline.net.  Georgiadou, E., Triantafillow, E., & Economides, A. (2007). A review of item exposure control strategies for computerized adaptive testing developed from 1983 to 2005. *Journal of Technology, Learning, and Assessment, 5*(8). Retrieved from http://www.jtla.org. |
| **Course plan:** | 1. Introduction to CAT and review of item response thoery.  (i) Test Construction  (ii) Score Estimation  2. Item selection algorithms  (i) Item selection criteria  (ii) Exposure control  (iii) Content balancing  3. CAT Simulations and Evaluation.  (i) Introduction to simulation technique  (ii) Evaluation of CAT using simulations  (iii) Hands on training on SimulCAT  4. Item pool construction and evaluation using mixed integer programming (MIP)  (i) Item pool construction  (ii) Fundamentals of Linear programming and mixed integer programning  (iii) Using Excel and AIMMS for LP/MIP  (iv) Hands on training on AIMMS for multiple item pool construction.  5. Multistage Testing (MST) and multidimesional adaptive testing (MAT).  (i) Multistage Testing  (ii) Multidimensional IRT  (iii) Multidimensional adaptive testing and simulation  6. Recent CAT studies |