



หลักสูตรประกาศนียบัตรการศึกษาชั้นสูงทางสภาพซับซ้อน
(หลักสูตรนานาชาติ)

Certificate of Advanced Studies
in Complexities
(International Program)

ศึกษาเกี่ยวกับการค้นคว้าขั้นก้าวหน้า
ศูนย์ฟิสิกส์ทฤษฎีและปรัชญาธรรมชาตินครสวรรค์

พ.ศ. 2566

**Certificate of Advanced Studies in Complexities
(International Program B.E. 2566)**

NAS, Centre for Theoretical Physics and Natural Philosophy

1. Curriculum Name

English Certificate of Advanced Studies in Complexities (International Program)

Thai ประกาศนียบัตรการศึกษาชั้นสูงทางสภาพซับซ้อน (หลักสูตรนานาชาติ)

2. Names of Qualification and Majors

2.1 Full Title English: **Certificate of Advanced Studies in Complexities**

Abbreviation English: **Cert. Adv. St. (Complexities)**

Full Title Thai: **ประกาศนียบัตรการศึกษาชั้นสูงทางสภาพซับซ้อน**

Abbreviation Thai: **ไม่มี**

3. Major Subjects (if any)

none

4. Required Credits

none

5. Curriculum Characteristics

5.1 **Curriculum type/model:** Certificate of Advanced Studies

5.2 **Language:** English

5.3 **Recruitment:** Both Thai and international students

6. Curriculum Status and Curriculum Approval

6.1 Program new B.E. 2566

6.2 Starting in semester 1, academic year 2023 onwards

6.3 Approval by NAS faculty meeting on **October 4, 2023** (retroactive validation from 1 August 2023)

7. Venue for Instruction

Centre for Theoretical Physics and Natural Philosophy, Mahidol University, Nakhonsawan Campus

8. Fee: There is no fee for the qualification. Students, if they wish, may contribute by donation for supporting NAS operation works.

9. Curriculum and Graduation Requirements

Students are required to take and receive not lower than B grade in each selected subject for at least 13 credits of NWTP 7xx-and 8xx-level taught courses of Mahidol University's "current" Doctor of Philosophy curriculum in Theoretical Physics and Natural Philosophy. These have to be in collective systems and complexity subject groups. Also, these below 5xx-and 6xx-level taught courses are allowed but not more than two of these seven courses can contribute to the requirement:

NWTP 521	Equilibrium Thermodynamics and Phase Transitions	2 (2-0-4)
NWTP 522	Equilibrium Statistical Mechanics and Kinetic Theory	2 (2-0-4)
NWTP 531	Fluid Dynamics	2 (2-0-4)
NWTP 532	Vibrations and Waves	2 (2-0-4)
NWTP 631	Signals and Systems	2 (2-0-4)
NWTP 641	Complex and Adaptive Systems	2 (2-0-4)
NWTP 681	Statistics for Physics	2 (2-0-4)

The certificate is conferred upon a person only once.

The graduation requirement is to be judged by NAS faculty meeting which also has full right to withdraw the qualifications awarded.

Courses (PhD 2566) eligible for the certificate

NWTP 721	Non-equilibrium Thermodynamics	3 (3-0-6)
NWTP 722	Advanced Statistical Mechanics	3 (3-0-6)
NWTP 723	Non-Equilibrium Statistical Mechanics	3 (3-0-6)
NWTP 731	Turbulence	3 (3-0-6)
NWTP 732	Fluctuations in Physical Systems	3 (3-0-6)
NWTP 733	Synchronization	3 (3-0-6)
NWTP 734	Condensed Matter Physics	3 (3-0-6)
NWTP 735	Granular Physics	3 (3-0-6)
NWTP 741	Non-linear Dynamics	2 (2-0-4)
NWTP 742	Complex Network	3 (3-0-6)
NWTP 743	Scaling	3 (3-0-6)
NWTP 744	Self-Organization and Pattern Formation	3 (3-0-6)
NWTP 771	Physics of Economy and Financial System	3 (3-0-6)
NWTP 772	Physics of Social System	3 (3-0-6)
NWTP 773	Physics of Ecological System	4 (4-0-8)
NWTP 774	Physics of Traffics	3 (3-0-6)
NWTP 781	Probability, Entropy, Information and Communication	3 (3-0-6)
NWTP 782	Bayesian Data Analysis	3 (3-0-6)
NWTP 783	Time Series Analysis	3 (3-0-6)
NWTP 784	Random Matrix Theory	3 (3-0-6)
NWTP 785	Stochastic Calculus for Physics	3 (3-0-6)
NWTP 786	Applied Game Theory and Evolutionary Dynamics	3 (3-0-6)
NWTP 821	Theory of Critical Phenomena	3 (3-0-6)
NWTP 822	Phase Transitions in Classical Field Theory	3 (3-0-6)
NWTP 841	Synergetics I	3 (3-0-6)
NWTP 842	Synergetics II	3 (3-0-6)
NWTP 843	Catastrophe Theory	3 (3-0-6)
NWTP 844	Random Walk and Renormalizations	3 (3-0-6)

 (Professor Burin Gumjudpai, Ph.D.)

NAS Acting Director

On behalf of the NAS Faculty Meeting on the 4th October 2023