# Geogebra as a part of undergraduate and postgraduate courses in the Faculty of Mathematics and Informatics of Hanoi National University of Education

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**ABSTRACT:** In this paper, I will describe how Geogebra is taught in undergraduate and postgraduate courses in the Faculty of Mathematics and Informatics of Hanoi National University of Education.
**KEYWORDS:** Geogebra, undergraduate courses, postgraduate courses, the Faculty of Mathematics and Informatics, Hanoi National University of Education

## 1. Introduction

Hanoi National University of Education (HNUE) was founded in 1951 and is one of the oldest teacher training universities in Vietnam. Nowadays, HNUE is one of the major and leading teacher training institutions in Vietnam. Its Faculty of Mathematics and Informatics (FMI) is also one of the oldest high school mathematics teacher training institutions in Vietnam. Dynamic Mathematics Software is taught as a part of undergraduate and postgraduate courses in the FMI of HNUE.

In this paper, I describe how Geogebra is taught in undergraduate and postgraduate courses of the FMI. Firstly, I introduce briefly HNUE and its FMI. Secondly, I discuss undergraduate and postgraduate courses related to Geogebra in the FMI of HNUE. Finally, I make some conclusions about the role of Geogebra in training mathematics teachers in Vietnam.

## 2. A brief introduction to Hanoi National University of Education and its Faculty of Mathematics and Informatics

HNUE (http://english.hnue.edu.vn/About) is regarded as not only one of the National Key Universities but also one of the leading Universities in the teacher education system in Vietnam. The University has 23 training faculties and two departments, two research institutes, more than 20 research centers and centers for technology and two schools, namely The High School for Gifted Students and The Demonstration Secondary School. HNUE offers 42 training programs at the undergraduate level, 49 Master's programs and 41 doctoral programs at the postgraduate level.

The FMI of HNUE is one of the major and leading high school mathematics teacher training institutions in Vietnam. The FMI academic staff includes more than 70 people who belong to 6 research groups including Algebra and Number Theory, Applied Mathematics, Functional Theory, Geometry and Topology, Mathematical Analysis, and Mathematics Education. The Faculty has three training programs at the undergraduate level, 6 Master's program and 5 doctoral program at the postgraduate level. Moreover, it has several part-time programs for in-service middle school mathematics teachers who took degrees from colleges of education and want to receive higher degrees from universities of education. The Faculty has around 800 students, 500 part-time students (in-service middle school mathematics teachers), 200 Master's students and 40 doctoral students currently.

## 3. Geogebra as a part of undergraduate and postgraduate courses in the Faculty of Mathematics and Informatics

As mentioned above, Dynamic Mathematics Software is taught in the undergraduate and postgraduate courses of the FMI. In recent years, Geogebra has been selected to teach at the undergraduate and postgraduate level in the Faculty because of its advantages. In the following section, I briefly describe how Geogebra is taught in the FMI.

### *a. For undergraduate students*

There are around 200 third-year students who are divided into 5 classes and take a two-credit course named "Mathematical Software" with 30 fifty-minute teaching periods. The main aim of the course is to provide the students with knowledge and skills related to some mathematical software so that the students can step by step apply them to their studies and future careers. In this course, the students study Dynamic Computer Software, Algebra Computer Systems, Latex, etc.

In the course, the students often spend around 12 fifty-minute teaching periods in studying and practicing Geogebra. They learn from basic to advanced Geogebra tools and commands so that they can use related knowledge and skills in their studies and future jobs.

### *b. For part-time students*

The FMI has around 500 part-time students currently. In general, these students are in-service middle school mathematics teachers. They graduated from colleges of educations and want to take part in the two-year part-time program to obtain the higher degree from HNUE.

Every academic year, about 250 part-time students take a course entitled "Informatics" with 60 forty-five-minute teaching periods. In this course, the students often learn how to use the Office Software (Microsoft Office Windows, Microsoft Office Word, Microsoft Office Excel), Dynamic Computer Software (Cabri, Geogebra, Geometer' Sketchpad), Internet, etc. so that they can use the software in their teaching of mathematics.

***Figure 1.*** An undergraduate student is presenting a way she find a locus of a point with the aid of Geogebra in the "Mathematical Software" course

### *c. For Master's students and doctoral students*

Every academic year, about 25 Master's students attend a three-credit course called "The Usage of ICT in Teaching and Learning of Mathematics" and about 5 doctoral students take a three-credit course named "The Advanced Usage of ICT in Education and Educational Technology". These students write either Master's theses or PhD. dissertations on mathematics education. Each course includes 45 fifty-minute teaching periods.

In these courses, the student often spend from 15 to 20 teaching periods in discussing about a way to use and apply Geogebra effectively in teaching and learning of mathematics at the secondary school level.

There are many topics related to using Geogebra in teaching and learning of mathematics in the discussions. The following are some of them:

- How can teachers (resp. students) apply Geogebra to teaching (resp. learning) of mathematical concepts, theorems, rules and problem solving?
- How Geogebra can help students to generalize mathematical results?
- How can Geogebra help students to find solutions to mathematical problems?
- To what extent should curriculum designers and textbooks authors mention the usage of Geogebra in mathematics curricula and textbooks?
- What are difficulties teachers and students often encounter when they use Geogebra in their teaching and learning of mathematics?
- What are advantages and disadvantages of using Geogebra in teaching and learning of mathematics?
- What are pedagogical issues related to using Geogebra effectively in teaching and learning of mathematics?

***Figure 2***. A Master's student is presenting her way to teach the "Triangle Sum Theory" with the aid of Geogebra in the course "The Usage of ICT in Teaching and Learning of Mathematics"

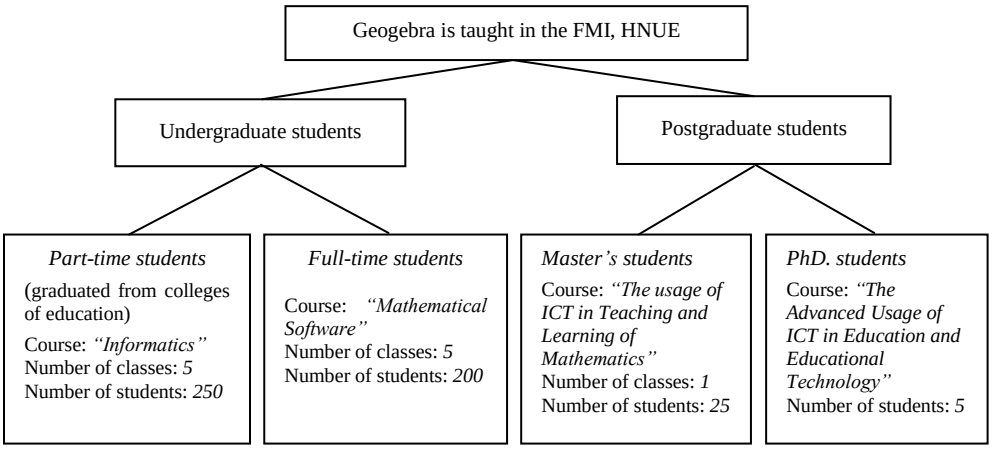


***Figure 3***. Geogebra is a part of undergraduate and postgraduate courses in the FMI

## *d. Several difficulties*

When the mentioned courses are taught for the undergraduate and postgraduate students of the FMI, they and their lecturers often encounter several difficulties.

Typically, the part-time course "Informatics" is usually carried out at several continuing education centers in some provinces. At some centers, computer rooms are

either not always available or not at good quality. Secondly, there is a part of the Master's students and doctoral students who graduated from other universities and did not take a course similar to the course "Mathematical Software". As these students do not have experiences of using mathematical software, they often meet great difficulties in the courses for the Master's students and doctoral students ("The Usage of ICT in Teaching and Learning of Mathematics" and "The Advanced Usage of ICT in Education and Educational Technology").

## 4. Conclusion

Overall, Geogebra is very helpful and useful software for mathematics students, mathematics teachers and mathematics teachers-in-training. Most FMI undergraduate and postgraduate students enjoy learning to use Geogebra in their studies and their work. Moreover, many students gradually apply what they have studied related to Geogebra as well as Dynamic Computer Software to their studies and jobs.

## References


[Anh15] **L. T. Anh** - *Developing Vietnamese pre-service high school mathematics teachers' skills of using Geogebra*, Geogebra International Journal of Romania, vol. 4 (1), 2015.

[HL12] **M. Hähkiöniemi1 and H. Leppäaho** – *Prospective Mathematics Teachers' Ways of Guiding High School Students in GeoGebra-Supported Inquiry Tasks*, International Journal for Technology in Mathematics Education, vol. 19 (2), 2012.

[Ole13] **N. Olefirenko** – *Use GeoGebra in Primary Pupils Training*, Geogebra International Journal of Romania, vol. 2 (2), 2013.