

# **Method of Curriculum System Design and Documentation including General Education, MSC, and Engineering Design at Chosun University**

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## **Abstract**

The curriculum system and documentation for advanced general education, MSC (Mathematics, Basic Science, Computer Science), and engineering-design courses have been developed to improve the education of advanced undergraduate students in engineering and technology at Chosun University. In this paper, to obtain improved quality of engineering courses, we systemized the education of engineering and technology, which could be designed as the education satisfying students and provide awards for high-quality performance, through efficient management of education courses and establishment of basic and professional courses. In addition, by applying evaluation to the engineering courses and using the model of continuous quality improvement, we could achieve a high-quality education system for the engineering and technology courses.

## **Introduction**

Engineering education accreditation emphasizes both 'performance-based' and 'demand-oriented' education. The performance-based education needs to set goals at the beginning and reflect on the results for continuous improvement in the quality, or CQI, of education. For this, closed-loop and quality assurance are needed in educational procedures and methods. It indicates that it needs objectives, reasonable, periodical and documented measures, evaluation and reflection on the results to improve quality. That is, educational goals that meet the properties of educational institutes should be developed and documented, and to achieve the goals set, organized curriculum and an administrative system to deal with them should also be established. Such educational systems should have a consistent self-assessment system through which programs can be improved. And programs should provide a series of organized curriculum that help students achieve educational goals and achievements. The documented curriculum should be available to the public so that all the students can use them for development of their academic plans. The standards for the curriculum have the following three points:

- 1) Curriculum should have a completion system in which antecedent, following, and parallel relations among subjects are specified instead of just a simple arrangement
- 2) A system to assure the order of completing subjects should be prepared which was designed to assure students can have organized knowledge as they complete their curriculum.
- 3) It should contribute to academic achievements as all the students are advised from their advisors at the point of course application and complete them in an organized way.

## **II. Examples of Organized Subject Completion Assurance and Documentation**

### **1. Required Completion**

The educational elements required for engineering education accreditation are categorized into three: general education involved in programs, MSC and majors. Students require more than 18 credits of general education, more than 30 of MSC, and more than 60 of major. However, design process requires more than 18 credits. Chosun University documents academic regulations to meet the accreditation standards.

<Table 1> Article No. 12 of Academic Regulation of Chosun University

Divisions (departments) that implement engineering education accreditation in accordance with Section 7, Article 12 (management of curriculum) of Academic Affair Regulations can manage more than 18 credits of general education and more than 30 credits of MSC.

## 2. Curriculum Organization (Directions for 2009 Engineering Education Accreditation Curriculum)

1. The curriculum for major programs should be organized with courses that reflect the suggestions from program members(students and professors) and industries to achieve educational goals and academic performance of major programs. Therefore, the courses shall be organized and have a system of continuous quality improvement (CQI) .
2. For students to develop academic plans for course completion, “Major Program Curriculum Flow Chart” should be open in public and a completion assurance system shall be developed for completion of courses in accordance with accreditation standards of the Accreditation Board of Engineering Education of Korea(ABEEK). The curriculum should be organized in consideration of antecedent, following and parallel relations among courses.
3. Curriculum shall be organized with more than 18 credits of introductory design (creative engineering design), engineering design, and Capstone design as required: introductory design (creative engineering design) for freshman, element design for sophomore and junior students and Capstone Design 1 & 2 for Senior students (Related Regulation –Article No. 7 of Engineering Education Innovation Center Management Regulations)

<Table 2> Directions for general education, MSC, and Capstone Design

- general education shall require more than 18 credits to achieve the educational goals and results of each major program in the pool of courses designated (Table1-1).
- MSC shall require more than 30 credits of MSC required to achieve educational goals and results of each major program in the pools of courses designated(Table 1-2). However, computer science courses shall be less than 6 credits. (except computer engineering).
- Capstone design shall require more than 18 credits of courses required for organized completion of introductory design (creative engineering design), element design, and Capstone Design1 and 2.

## 3. Documentation

### A. Documentation of Course Application

1. We provide a computer system for academic affairs for students who want to submit an application for only the courses provided in each program through which completion assurance system of general education, MSC and major programs are managed
2. We develop a course application system to achieve educational goals of the courses provided in each major program and academic achievements
3. We promote how to apply courses of engineering education accreditation through ‘Course Guide’ for better course application.

<Table 3> Article No. 28 of Academic Regulations of Chosun University (How to apply for courses)

Students who belong to divisions (departments) which implement engineering education accreditation in accordance with Article No. 28 of the Academic Regulations shall apply courses for the online accreditation system based on instructions from advisors according to curriculum completion system required for the accreditation and submit the list of courses applied to the chief professor of divisions (departments) via confirmation from their advisors.

[Figure1] Course Application Procedure



A. Documentation of Lesson Plan, Curriculum Portfolio and CQI

\_ In cases when the organization of “2009 Curriculum Organization Chart” violates the regulations, it shall not be input to the academic affairs program.

2. When professors, who teach general education and MSC, neglect the organization of their curriculum portfolio, major programs can report neglect of instructors to managing departments and incentives for the portfolio may not be given.
3. To develop the curriculum portfolio and CQI reports that reflect the educational goals and academic achievements required for general education and MSC, duties shall be listed on contracts of part-time instructors and an incentive of 200,000 won a semester shall be given to them.
4. As introduction of liberal arts and MSC is managed by full-time instructors of other colleges or departments in consideration of the conditions of this university, the results of accreditation activities shall be reflected in their performance evaluation to enhance quality of engineering education accreditation.

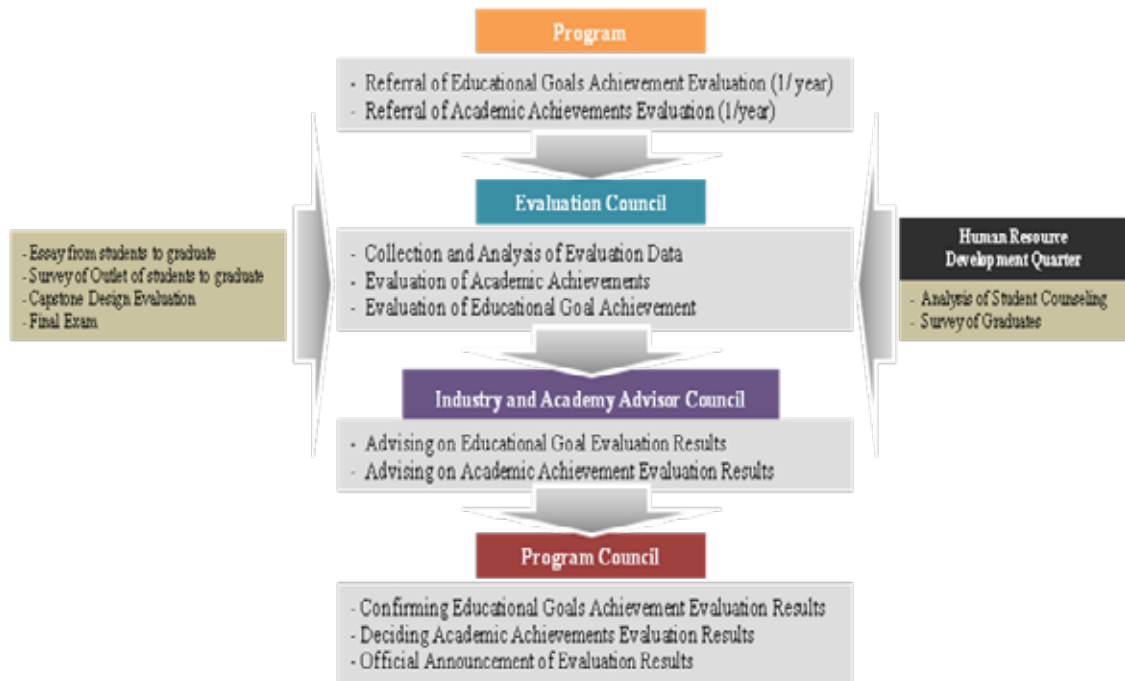
<Table 2> Contract for Part-time Instructors of Chosun University

Part-time instructors who teach engineering students in accordance with Section 4, Article 3 of the contract of part-time teachers shall develop the curriculum portfolio required by each department. For this, an allowance of 200,000 won a semester shall be provided to the instructors.

**3. Reflection for Educational Improvement**

To assess academic achievements in each program, we improved rubrics and methods of assessment and gave academic assessment to students to graduate. Then we analysed the results and collected basic data for improvement. Based on the results of the improvement, we revised management regulations for each program for evaluation tools and rubrics and the revision procedure was displayed on the home-page of Chosun University after a discussion between department heads of the college of engineering and we received approval from the president.

[Figure2] Mechanical Engineering Program Evaluation Process



### III. Conclusion

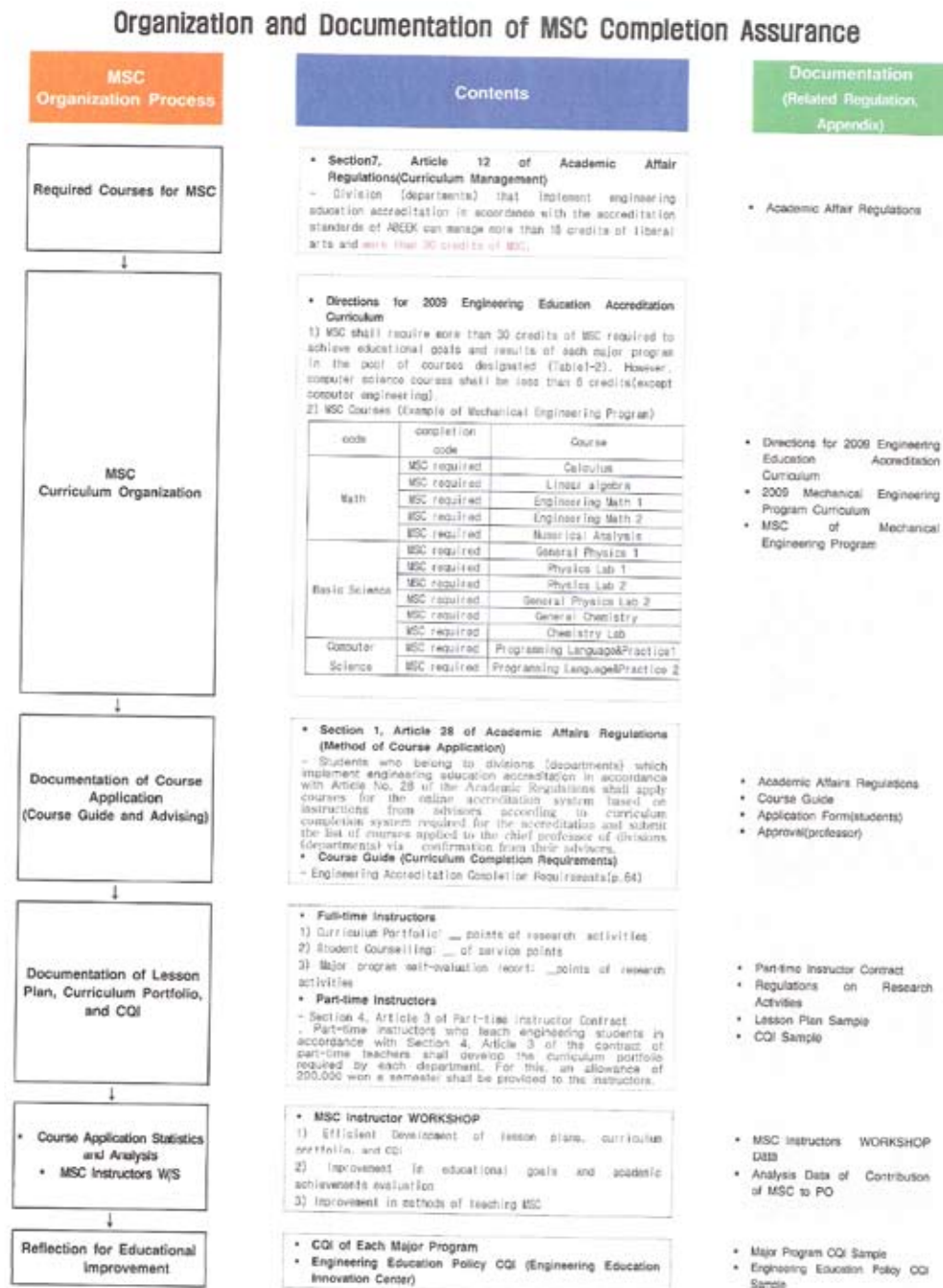
Chosun University has organized and institutionalized general education, MSC, and engineering design and developed a system for quality enhancement of continuing education involved in “performance-based education” and “demand-oriented education” for engineering education accreditation and engineering innovation. That is, we documented educational goals that meet the properties of educational institutes and developed an organized curriculum to achieve the goals. And we have had administrative systems to deal with them and managed a consistent self-assessment system. It is sure that our engineering education has had enhanced the quality of engineering education and created an education system with international equivalence.

Appendix 1 : Organization and Documentation of general education Completion Assurance

**Organization and Documentation of Liberal Arts Completion Assurance**



## Appendix 2 : Organization and Documentation of MSC Completion Assurance



Appendix 3 : Organization and Documentation of Engineering Design Completion Assurance

**Organization and Documentation of Engineering Design Completion Assurance**

