CRITERIA FOR EVALUATING SECOND CYCLE (MASTER) ENGINEERING PROGRAMS

MÜDEK
Association for Evaluation and Accreditation of Engineering Programs
Zincirlidere Caddesi No. 86
Mericoglu Plaza Kat:1 Daire:4
Esentepe, Sisli, 34394 Istanbul, Turkey
Telephone: +90-212-211-0281
Fax: +90-212-211-0289
E-mail: infos@mudek.org.tr
Web site: http://www.mudek.org.tr/
MÜDEK
Criteria for Evaluating Second Cycle (Master) Engineering Programs

CONTENTS

INTRODUCTION AND DEFINITIONS ........................................................................... 1
    Definitions ......................................................................................................... 1

GENERAL CRITERIA ......................................................................................... 2
    Criterion 1. Students ...................................................................................... 2
    Criterion 2. Program Educational Objectives ............................................... 2
    Criterion 3. Program Outcomes .................................................................... 2
    Criterion 4. Continuous Improvement .......................................................... 3
    Criterion 5. Curriculum ............................................................................... 3
    Criterion 6. Faculty Members .................................................................. 4
    Criterion 7. Facilities ................................................................................. 4
    Criterion 8. Institutional Support and Financial Resources ...................... 4
MÜDEK

Criteria for Evaluating Second Cycle (Master) Engineering Programs

INTRODUCTION AND DEFINITIONS

These criteria aim to ensure the quality of engineering programs at the SC (Second Cycle, Master) level Thesis (120 ECTS credits) and Non-Thesis (90 ECTS credits) programs based on a First Cycle (Bachelor, 240 ECTS credits) level education. The criteria intend to support the continuous improvement and quality assurance of such programs in order to meet the international standards in a dynamic and competitive environment.

It is the responsibility of the institution seeking accreditation for an engineering second cycle program to demonstrate clearly that the program meets the criteria specified in this document.

Definitions

Even though the institutions may use their own, different terminology, the evaluations based on MÜDEK’s criteria must consistently use the following basic definitions:

i. Program Educational Objectives: General statements defining the career goals and professional accomplishments that graduates are expected to achieve or attain in the years following graduation.

ii. Program Outcomes: Statements defining the knowledge, skills, and attitudes that students must have acquired by the time they graduate.

iii. Assessment: The process of defining, collecting, and arranging data and evidence through various methods in order to determine the achievement levels of the program educational objectives and program outcomes.

iv. Evaluation: The process of interpreting the data and evidence obtained from assessments through various methods. The evaluation process should yield the achievement levels of the program educational objectives and program outcomes; it should be used for decisions and actions aimed at improving the program.

v. Course Credit: A credit of a SC (Master) course is equivalent to the total hours of a theoretical class and one half of a weekly laboratory or practice hours taught regularly every week during a semester.

vi. ECTS Credit: Credit defined by the European Credit Transfer System.

vii. Complex Problem: A comprehensive problem that requires for its solution some or all of the following: in-depth engineering knowledge, abstract thinking, creative use of basic engineering principles, and the development of a new model or method.

viii. Complex System, Process, Device, or Product: A system, process, device, or product that contains multiple components and various sub-systems and/or may relate to more than one discipline; and whose analysis and design poses a complex problem.
GENERAL CRITERIA

Criterion 1. Students

1.1. Students admitted to the program must have the necessary background to achieve the program outcomes (knowledge, skills, and attitudes) within the planned period. The indicators used in admitting students must be published, monitored, and their influence on program quality over the years must be evaluated.

1.2. A Deficiency Program (Bilimsel Hazırlık Programı), if any, should be articulated, published, and enforced for each student.

1.3. Policies concerning the admission of students through vertical or horizontal transfer, transfer between thesis and non-thesis programs, and joint diploma programs with external institutions and/or programs as well as the evaluation of courses taken at and credits awarded by other institutions and/or programs must be defined in detail and enforced.

1.4. Advisory services that guide students in their course and career planning, monitor their academic progress, and supervise their thesis or project work must be provided.

1.5. Student performances in all courses and other activities within the scope of the program must be assessed and evaluated based on transparent, fair, and consistent methods.

1.6. In order to determine whether students may graduate, reliable methods to determine the fulfillment of all conditions required by the program must be developed and enforced.

Criterion 2. Program Educational Objectives

2.1 For every engineering program to be evaluated, there must exist program educational objectives, consisting of general statements defining the career goals and professional accomplishments that graduates are expected to achieve or attain in the years following graduation.

2.2 These objectives must be
   (a) consistent with the missions of the institution, institute, and department,
   (b) determined based on the needs of the program’s internal and external constituencies,
   (c) published in a way to allow easy access, and
   (d) frequently updated, based on the needs of the program’s internal and external constituencies.

2.3 There must be an ongoing assessment and evaluation process in place in order to periodically determine and document in how far program educational objectives are being achieved. Programs should demonstrate that the program educational objectives are being achieved by this process.

Criterion 3. Program Outcomes

3.1 Program outcomes are statements defining the knowledge, skills, and attitudes that students must have acquired by the time of their graduation. These statements must cover all knowledge, skills, and attitude components necessary to accomplish program educational objectives, and they must include the MÜDEK Second Cycle Outcomes listed in Table 3.1. Programs may define additional outcomes specific to their needs, provided that they are consistent with their educational objectives.
Table 3.1  MÜDEK Second Cycle (Master) Outcomes

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Attains knowledge through wide and in-depth investigations his/her field and surveys, evaluates, interprets, and applies the knowledge thus acquired.</td>
</tr>
<tr>
<td>2</td>
<td>Has a critical and comprehensive knowledge of contemporary engineering techniques and methods of application.</td>
</tr>
<tr>
<td>3</td>
<td>By using unfamiliar, ambiguous, or incompletely defined data, completes and utilizes the required knowledge by scientific methods; is able to fuse and make use of knowledge from different disciplines.</td>
</tr>
<tr>
<td>4</td>
<td>Has the awareness of new and emerging technologies in his/her branch of engineering profession, studies and learns these when needed.</td>
</tr>
<tr>
<td>5</td>
<td>Defines and formulates problems in his/her branch of engineering, develops methods of solution, and applies innovative methods of solution.</td>
</tr>
<tr>
<td>6</td>
<td>Devises new and/or original ideas and methods; designs complex systems and processes and proposes innovative/alternative solutions for their design.</td>
</tr>
<tr>
<td>7</td>
<td>Has the ability to design and conduct theoretical, experimental, and model-based investigations; is able to use judgment to solve complex problems that may be faced in this process.</td>
</tr>
<tr>
<td>8</td>
<td>Functions effectively as a member or as a leader in teams that may be interdisciplinary, devises approaches of solving complex situations, can work independently and can assume responsibility.</td>
</tr>
<tr>
<td>9</td>
<td>Has the oral and written communication skills in one foreign language at the B2 general level of European Language Portfolio.</td>
</tr>
<tr>
<td>10</td>
<td>Can present the progress and the results of his investigations clearly and systematically in national or international contexts both orally and in writing.</td>
</tr>
<tr>
<td>11</td>
<td>Knows social, environmental, health, safety, and legal dimensions of engineering applications as well as project management and business practices; and is aware of the limitations and the responsibilities these impose on engineering practices.</td>
</tr>
<tr>
<td>12</td>
<td>Commits to social, scientific, and professional ethics during data acquisition, interpretation, and publication as well as in all professional activities</td>
</tr>
</tbody>
</table>

3.2 There must be an ongoing assessment and evaluation process in place in order to periodically determine and document in how far program outcomes are being achieved.

3.3 Engineering programs should demonstrate that students have achieved the program outcomes by the time they graduate.

**Criterion 4. Continuous Improvement**

Programs should provide evidence that they use the results obtained through their assessment and evaluation system for their continuous improvement. These improvement efforts must rest on solid data gathered systematically in all areas in need of development, primarily as related to Criteria 2 and 3.

**Criterion 5. Curriculum**

5.1 All requirements of a successful completion of the program (attendance, courses, credit requirement, course exams, course notes, criteria of success in a course, course repetition, thesis or project completion requirements) should be defined and enforced.
5.2. Educational methods used in the implementation of the curriculum should guarantee that the students in fact acquire the necessary knowledge, skills, and attitudes.

5.3. A management system that guarantees the implementation of the curriculum as stipulated and that ensures its continuous improvement must be in place.

**Criterion 6. Faculty Members**

6.1 The number of faculty members must be adequate. This number must

(a) ensure an adequate level of student-faculty interaction, student advising and counseling, thesis or project supervision, term projects, service to the university, professional development, research activities, and interaction with industrial and governmental organizations related to the program,

(b) be distributed so as to cover all curricular areas of the program.

6.2 Faculty members must have appropriate qualifications and ensure an efficient execution, evaluation, and improvement of the program. The overall competence of the faculty may be judged based on factors such as their education, publications and expediencies in their research area, diversity of backgrounds, engineering experience, completed engineering projects, teaching skills and experience, ability to communicate, enthusiasm for developing more effective programs.

6.3 The criteria for appointing and promoting faculty members must be determined and applied in a way to satisfy and develop the points listed above.

6.4 Student activities such as research assistantship and support provided to undergraduate educational activities (such as laboratory assistantship, teaching assistantship, system administration, homework preparation and grading, etc.), as liabilities to scholarship/financial aid they receive from the institution, should be at a level so as to not interfere with their education and research.

**Criterion 7. Facilities**

7.1 Classrooms, laboratories, special purpose rooms (such as clean/cool room) and associated equipment must be adequate to accomplish the program objectives and program outcomes and to provide an atmosphere conducive to learning.

7.2 There must be adequate facilities to allow students to participate in extra-curricular activities, to meet students’ social and cultural needs, to foster faculty-student interaction, and to create a climate that encourages professional development and professional activities.

7.3 Programs must provide opportunities for students to learn the use of modern engineering tools. Computing and information facilities must be adequate for the scientific and educational activities of students and faculty members to support the program educational objectives.

7.4 The library services provided to students must be adequate to accomplish the program educational objectives and program outcomes.

7.5 Necessary safety measures must be in place in the teaching environment and in student laboratories. Facilities for disabled persons must be available.

**Criterion 8. Institutional Support and Financial Resources**

8.1 Institutional support, constructive leadership, financial resources, and the strategy for the distribution of resources must be adequate to ensure program quality and its continuity.

8.2 Resources must be sufficient to attract, retain, and provide for the continuous professional development of qualified faculty members.
8.3 Resources must be sufficient to acquire, maintain, and operate the facilities necessary for the program.

8.4 Support personnel and institutional services must be adequate to meet program needs. Technical and administrative staff must be of adequate number and quality to support the achievement of program outcomes.

**Criterion 9. Organization and Decision-Making Processes**

The organization of the university and all decision-making processes of the president’s office, the institute, the faculty, the department and, if any, other sub-units, within themselves and with each other, must be organized in a way so as to support the achievement of program educational objectives and program outcomes.