BRIEF DESCRIPTION OF THE SURVEY

(Industry feedback on the Expected Learning outcomes for the new training programs)

1. Objectives

The objectives of this survey is to take feedback of industry partners who are also prospective employers on the revised Program Learning Outcomes. This survey serves as input for the Curriculum Design team to determine the society needs regarding the students knowledge and skills.

This survey is performed by the SEE.

2. Respondents

Industry partner from various sectors were invited to the workshop, organized on 13 july 2017. 32 companies and organization answered.

3. Methodology

This is a paper based survey. It was later digitalized for analysis.

4. Key findings

- All respondents agree with the new majors in EE that are introduced by SEE, namely "power systems", "renewable energy", and "industrial and commercial power systems"
- Most respondents have high demand on the learner skills. On the Bloom's taxonomy scale, most respondents require that students have ability to synthesize in all aspect (disciplinary knowledge, personal skills, interpersonal skills, conceiving-designing-implementing in the enterprise-social-environmental context).
- Also, during the discussion (see also Evidence EE 10.02.02 in the SAR), most respondents are more used to the Engineer degree of the 4+1 program. SEE and HUST need to communicate more about the new training model which focuses on the Bachelor degree and the Master degree.

QUESTIONAIRE SURVEY ON OUTCOME STANDARDS

To whom it may concerned,

Your survey feedback will contribute to building up the training program of the School of Electrical Engineering, with the aim of meeting your requests when using the human resources trained by our School.

Survey results will be presented in the form of statistical data. We would like to guarantee the information you provide will be completely confidential and used for the right purpose mentioned above.

Thank you for your cooperation.

*Obligatory

A. PERSONAL INFORMATION

5. Full Name
6. Phone number
7. Email
8. Enterprise/Organization
9. Are you an alumnus of Hanoi University of Science and Technology?

Only tick one answer

Yes
No

10. Number of years you are on working?

Only tick one answer

0-5 years 5-
10 years
10-15 years
More than 15 years

11. How many Alumni of School of Electrical Engineering are working in your business?

Only tick one answer

Less than 5 people
From 5-10 people
From 10-20 people
More than 20 people

B. COMMENTS ON THE AREAS OF TRAINING PROGRAM

We intend to open different areas of training program according to the following directions:

11. Your opinion is on which area of training:

Only tick one answer

Electrical Engineering – refer to question 13
Control and Automation - refer to question 15

Orientations of the area of Electrical Engineering

Please read the description of each orientation before you continue the survey.

ELECTRIC POWER SYSTEM

After graduating, the learner has a solid foundation in basic math and science and a competent level of foreign language to participate in international integration, have in-depth knowledge of production and transmission systems, power distribution in order to be able to plan, design, and operate power transmission systems and power plants and substations in the most reliable, safe, quality and economical method.

Intensive blocks of knowledge:
• Power transmission grid
• The electric market
• Power plants and substations
• Protect and control electric systems
• Planning power source and grid
• Operate the power system
• Managing power demand
• Distributed power sources connected to the power transmission system

ELECTRICAL AND ELECTRONICS EQUIPMENT

After graduating, the learner will have

- Firm knowledge base to adapt well to different jobs in the field of electrical engineering, such as: designing, manufacturing, operating, maintaining, consulting and installing industrial and civil electrical equipment, power supply, industrial and civil lighting.
- Skills of knowledge discovery, problem solving, systematic thinking and personal and professional qualities career
- Social communication skills needed to work effectively in a multidisciplinary team and in an international environment
- Capacity to design, build, manufacture systems / products / technical solutions in the field of research, manufacture and use of electrical equipment in the economic, social and political context

Intensive blocks of knowledge
• Implementation of calculating and designing electrical equipment

• Implementation of calculating and designing control devices
• Industrial and civil lighting engineering
• Industrial maintenance

INDUSTRIAL AND CIVIL ELECTRIC SYSTEMS

After graduating, the learner has a solid foundation in basic math and science and a competent level of foreign language to participate in international integration, have in-depth knowledge of medium-voltage and low-voltage equipment and systems in order to be able to design, manage and operate industrial and civil power supply systems in the most reliable, safe, quality and economical method.

Intensive blocks of knowledge
• Power distribution grid
• Electric safety
• Power reliability and quality
• Managing load and power demands
• Distributed power sources
• Industrial power supply systems
• Power supply systems for buildings

NEW AND RENEWABLE ENERGY

After graduating, the learner has a solid foundation in basic math and science and a competent level of foreign language to participate in international integration, have in-depth knowledge of renewable energy sources in order to be able to design, manage and operate renewable energy sources effectively, reliably and economically.

Intensive blocks of knowledge
• Wind power
• Solar power
• Biomass and geothermal power
• Energy storage and modification equipment
• Integrating new and renewable energy sources in transmission and distribution networks
• Energy policies
• Financial analysis of renewable energy projects

13. Practical level of orientations of the area of Electrical Engineering

Only tick one answer for each row

Very practical
Practical
Not practical

Electric Power System
Electrical and Electronics Equipment
Industrial and Civil Electric System

New and Renewable Energy

14. Other comments on orientations of the area of Electrical Engineering

Orientations of the area of Control and Automation

At the bachelor's degree, students in the area of Control and Automation are able to operate or maintain industrial automation systems. Up to engineer and master level, students can choose intensive or multidisciplinary area as follows:

Please read the description of each orientation before you continue the survey.

INDUSTRIAL AUTOMATION

After graduating, learners are able to apply scientific and managing principles in forming and building an Automation system that meets the aggregate requirements of a system in industry such as optimizing operability, combining human resources with investment in modern machinery and equipment. Based on scientific thinking, learners are able to design systems that meet the requirements for control, energy saving, balance between goals of reducing equipment investment costs and system operating costs. Learners are capable of consulting, supervising and owning projects in building an automation system

Intensive blocks of knowledge:
- Integrate automation system
- Electric drive control
- Power electronics
- Robot technology
- Digital control system
- Simulation of production systems

AUTOMATION OF ELETRIC POWER SYSTEM

After graduating from school, learners are able to apply scientific principles, management principles in formulating and building automation systems that meet the general requirements of a system such as optimizing operability, combining human resources with investment in modern machinery, technology and saving energy.

Intensive blocks of knowledge:
- Integrate automation system
- Electric power system (grid, protection)
- Electric drive control

• Power electronics
• Digital control system
• System simulation

INSTRUMENTATION AND INDUSTRIAL INFORMATICS

After graduating, the learner has a solid foundation in basic math and science and a competent level of foreign language to participate in international integration, have in-depth knowledge of sensors, measurement techniques in order to be able to design, install, evaluate, operate and maintain industrial measurement equipment and systems. Learners are capable of participating in activities related to standards and calibration. In addition, students can participate in the simulation process, study the characteristics of new types of sensor.

Intensive blocks of knowledge:
• Measuring and designing measuring equipment
• Signal and algorithm processing
• Sensor
• Micro system
• Measuring device in biomedical engineering
• Environment measuring equipment
• Electronic measuring device
• Standards and national measurement assurance systems

INDUSTRIAL COMPUTING

After graduating, the learners will have a solid foundation in basic math and science and a competent level of foreign language to participate in international integration, have in-depth knowledge of measurement, automatic control, industrial communication network, wireless sensor network, embedded system in order to be able to design, install, operate, maintain monitoring and data-collecting equipment and systems. Leaners are also capable of participating in activities related to designing software for fault diagnosis, industrial systems, and production management.

Intensive blocks of knowledge:
• Computer networks, Internet, industrial networks
• Supervisory Control And Data Acquisition (SCADA)
• Wireless sensor network
• Embedded System
• Neural networks and applications in signal processing

• Digital control system
• Production management system
• Human-Computer Interface
• IoT basic

CONTROL TECHNIQUES AND APPLICATIONS

After graduating, learners will have:

- Professional ethics, health and ability to implement independent research and team working, as well as communicate and present specialized issues.
- Ability to understand, operate, analyze and correct devices, control automation systems in a variety industrial areas, defense-security, construction, transportation, health and civil.
- Ability to design, execute, transfer automatic production lines, automatic control system in industry, including various types of process control systems, hydraulic and compressed air systems, robot as well as industrial monitoring and control systems using computers, PLCs.
- Equipped with knowledge of automatic control theory from basic to modern to be able to implement independent research, as well as being able to join groups of researching and developing high technologies that can be applied into real life.

Intensive blocks of knowledge:

- Advanced control theory
- Optimization and optimal control
- Control system design
- Digital control system
- Design of embedded control system
- Controlling electromechanical systems
- Artificial intelligence and application (AI and Applications)
- Network control system
- Computer Vision
- Motion control
- Process control
- Control renewable energy

13. Practical level of orientations of the area of Control and Automation

Only tick one answer for each row

Very practical
Practical
Not practical

Industrial Automation
Automation of Electric Power System
Instrumentation and Industrial Informatics
Industrial Computing
Control Techniques and Applications

14. Other comments on orientations of the area of Control and Automation

EVALUATE THE OUTCOME STANDARD

The assessment of the output standard is divided into 4 contents: (1) Knowledge and Ability of Making Arguments; (2) Personal Professional Quality; (3) Teamwork Skills; (4) Professional Competence

1. Knowledge and Ability of Making Arguments

17. 1.1 Ability to apply basic maths, physics, informatics knowledge to describe, calculate and simulate technical systems, processes and products related to technical applications of the area of Electrical Engineering

Only tick one answer for each row

Knowledgeable at a limited level
Knowledgeable/able to participate
Able to apply
Able to analyze
Able to summarize
Able to evaluate

Master of science
Master of engineering
Engineer
Bachelor of engineering
Bachelor of industry

18.1.2 Ability to apply knowledge of circuit, electronics, control techniques, measurement and automation to analyze technical problems, products and equipment related to applications of the area of Electrical Engineering

Only tick one answer for each row

Knowledgeable at a limited level
Knowledgeable/able to participate
Able to apply
Able to analyze

Able to summarize
Able to evaluate

Master of science
Master of engineering
Engineer
Bachelor of engineering
Bachelor of industry

19.1.3 Ability to apply knowledge of application-oriented domains, combined with possibilities using modern calculation methods and tools to participate in designing and evaluating solutions, production lines and technical products in the field of application

Only tick one answer for each row

Knowledgeable at a limited level
Knowledgeable/able to participate
Able to apply
Able to analyze
Able to summarize
Able to evaluate

Master of science
Master of engineering
Engineer
Bachelor of engineering
Bachelor of industry

2. Personal Professional Quality

20.2.1 Ability to analyze and solve technical problems

Only tick one answer for each row

Knowledgeable at a limited level
Knowledgeable/able to participate
Able to apply
Able to analyze
Able to summarize
Able to evaluate

Master of science
Master of engineering
Engineer
Bachelor of engineering
Bachelor of industry

21.2.2 Ability to design and implement experiments, research, and ability to analyze results

Only tick one answer for each row

Knowledgeable at a limited level
Knowledgeable/able to participate
Able to apply
Able to analyze
Able to summarize
Able to evaluate

Master of science
Master of engineering
Engineer
Bachelor of engineering
Bachelor of industry

22.2.3 System thinking and critical thinking

Only tick one answer for each row

Knowledgeable at a limited level
Knowledgeable/able to participate
Able to apply
Able to analyze
Able to summarize
Able to evaluate

Master of science
Master of engineering
Engineer
Bachelor of engineering
Bachelor of industry

23.2.4 Personal skills to succeed in technical practices: proactive, flexible, creative, able to explore and manage time

Only tick one answer for each row

Knowledgeable at a limited level
Knowledgeable/able to participate
Able to apply
Able to analyze
Able to summarize
Able to evaluate

Master of science
Master of engineering
Engineer
Bachelor of engineering
Bachelor of industry

24.2.5 Understanding of professional ethics, intellectual property

Only tick one answer for each row

Knowledgeable at a limited level
Knowledgeable/able to participate
Able to apply
Able to analyze
Able to summarize
Able to evaluate

Master of science
Master of engineering
Engineer
Bachelor of engineering
Bachelor of industry

25.2.6 Understanding of management, including trade regulations, society, legal framework in the area of electrical engineering

Only tick one answer for each row

Knowledgeable at a limited level
Knowledgeable/able to participate
Able to apply
Able to analyze
Able to summarize
Able to evaluate

Master of science
Master of engineering

Engineer
Bachelor of engineering
Bachelor of industry

26.2.7 Understanding contemporary issues and lifelong awareness

Only tick one answer for each row

Knowledgeable at a limited level
Knowledgeable/able to participate
Able to apply
Able to analyze
Able to summarize
Able to evaluate

Master of science
Master of engineering
Engineer
Bachelor of engineering
Bachelor of industry

3. Teamwork Skill

27.3.1 Skills of organization, leadership and teamwork, in a multidisciplinary working environment

Only tick one answer for each row

Knowledgeable at a limited level
Knowledgeable/able to participate
Able to apply
Able to analyze
Able to summarize
Able to evaluate

Master of science
Master of engineering
Engineer
Bachelor of engineering
Bachelor of industry

28.3.2 Effective communication skills in writing, presentations and discussions, using electronics and media means

Only tick one answer for each row

Knowledgeable at a limited level
Knowledgeable/able to participate
Able to apply
Able to analyze
Able to summarize
Able to evaluate

Master of science
Master of engineering
Engineer
Bachelor of engineering
Bachelor of industry

29.3.3 Skills to use English effectively at work

Only tick one answer for each row

Knowledgeable at a limited level
Knowledgeable/able to participate
Able to apply
Able to analyze
Able to summarize
Able to evaluate

Master of science
Master of engineering
Engineer
Bachelor of engineering
Bachelor of industry

4. Professional Competence

30.4.1 Capacity to identify problems and formulate ideas for technical solutions, participate in building projects that are related to economic, social and environmental factors in the globalized world

Only tick one answer for each row

Knowledgeable at a limited level
Knowledgeable/able to participate
Able to apply
Able to analyze

Able to summarize
Able to evaluate

Master of science
Master of engineering
Engineer
Bachelor of engineering
Bachelor of industry

31.4.2 The capacity to participate in designing systems, processes, products and offering technical solutions related to the area of electrical engineering

Only tick one answer for each row

Knowledgeable at a limited level
Knowledgeable/able to participate
Able to apply
Able to analyze
Able to summarize
Able to evaluate

Master of science
Master of engineering
Engineer
Bachelor of engineering
Bachelor of industry

32.4.3 Capacity to participate in implementing, manufacturing and deploying systems, products and technical solutions related to the area of electrical engineering

Only tick one answer for each row

Knowledgeable at a limited level
Knowledgeable/able to participate
Able to apply
Able to analyze
Able to summarize
Able to evaluate

Master of science
Master of engineering
Engineer

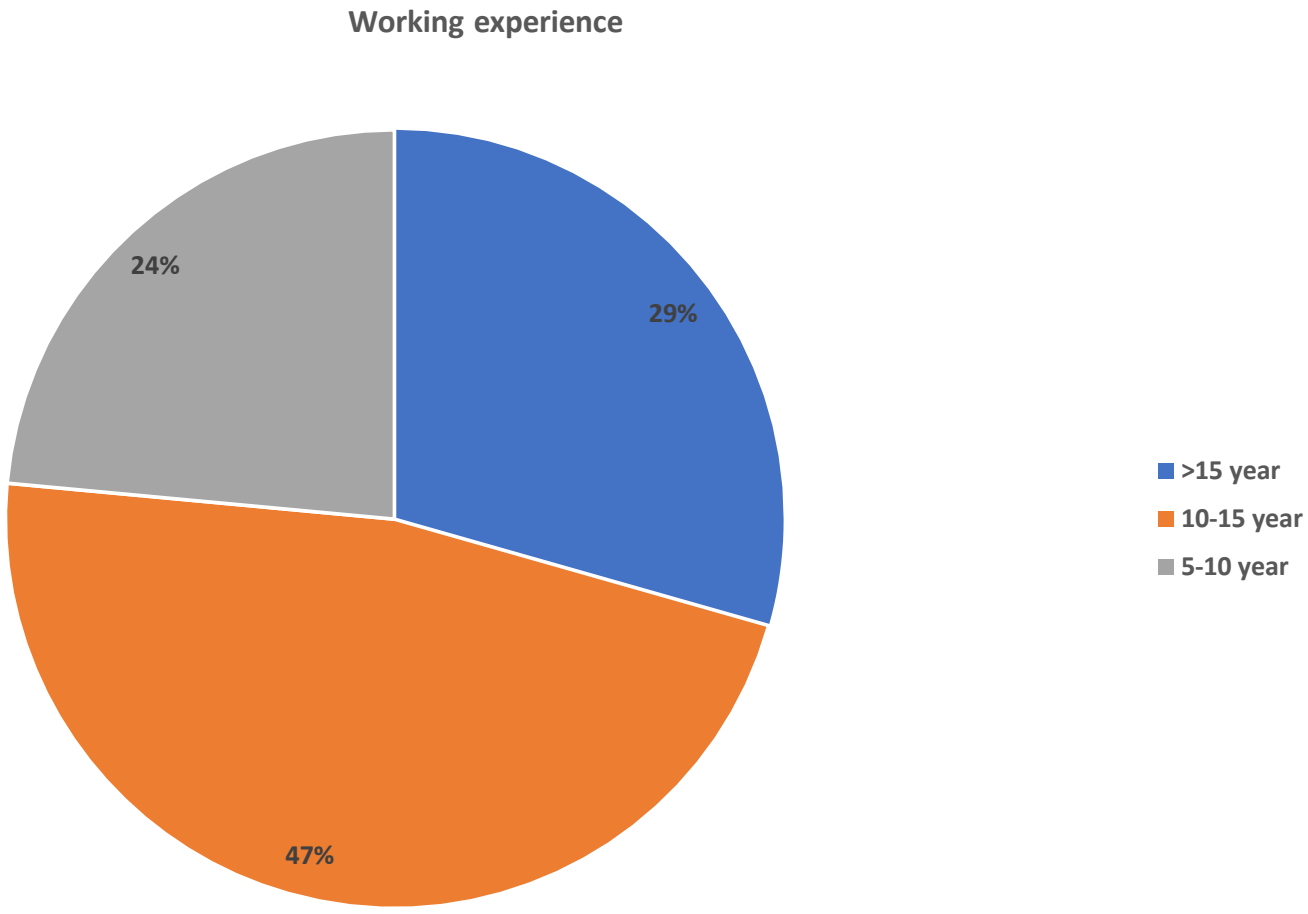
Bachelor of engineering
Bachelor of industry

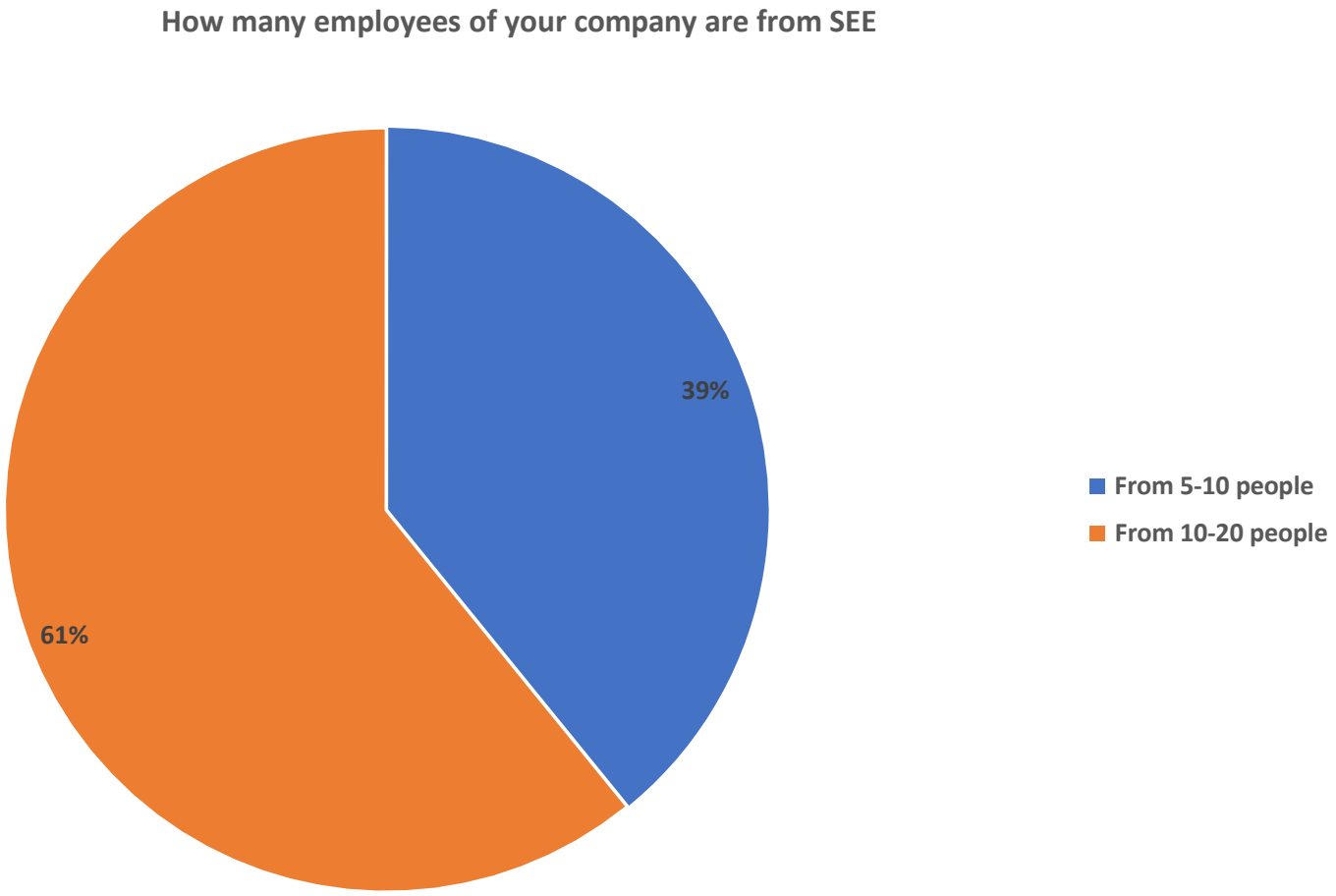
33.4.4 Ability to operate, use and exploit systems, processes and products related to application area

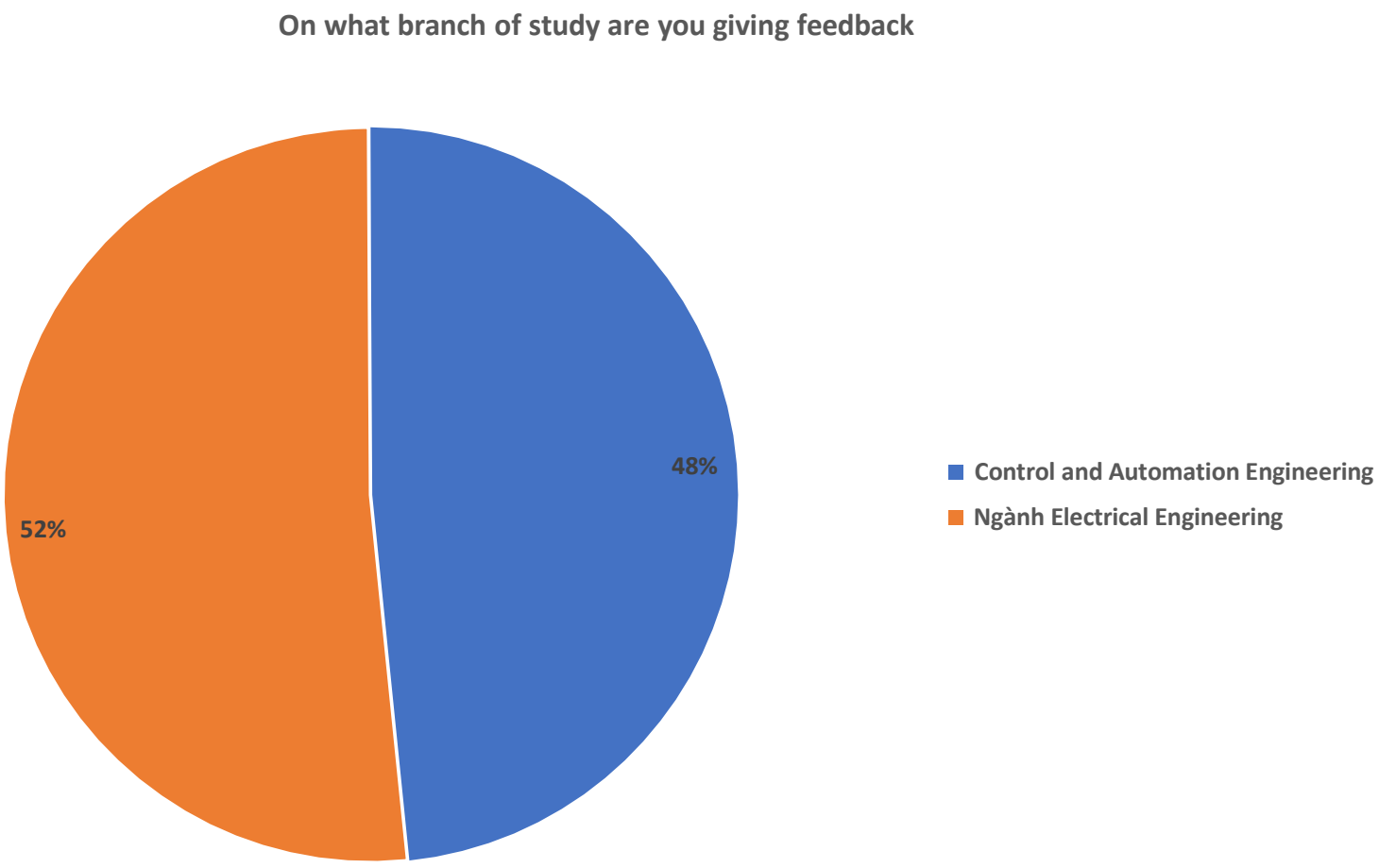
Only tick one answer for each row

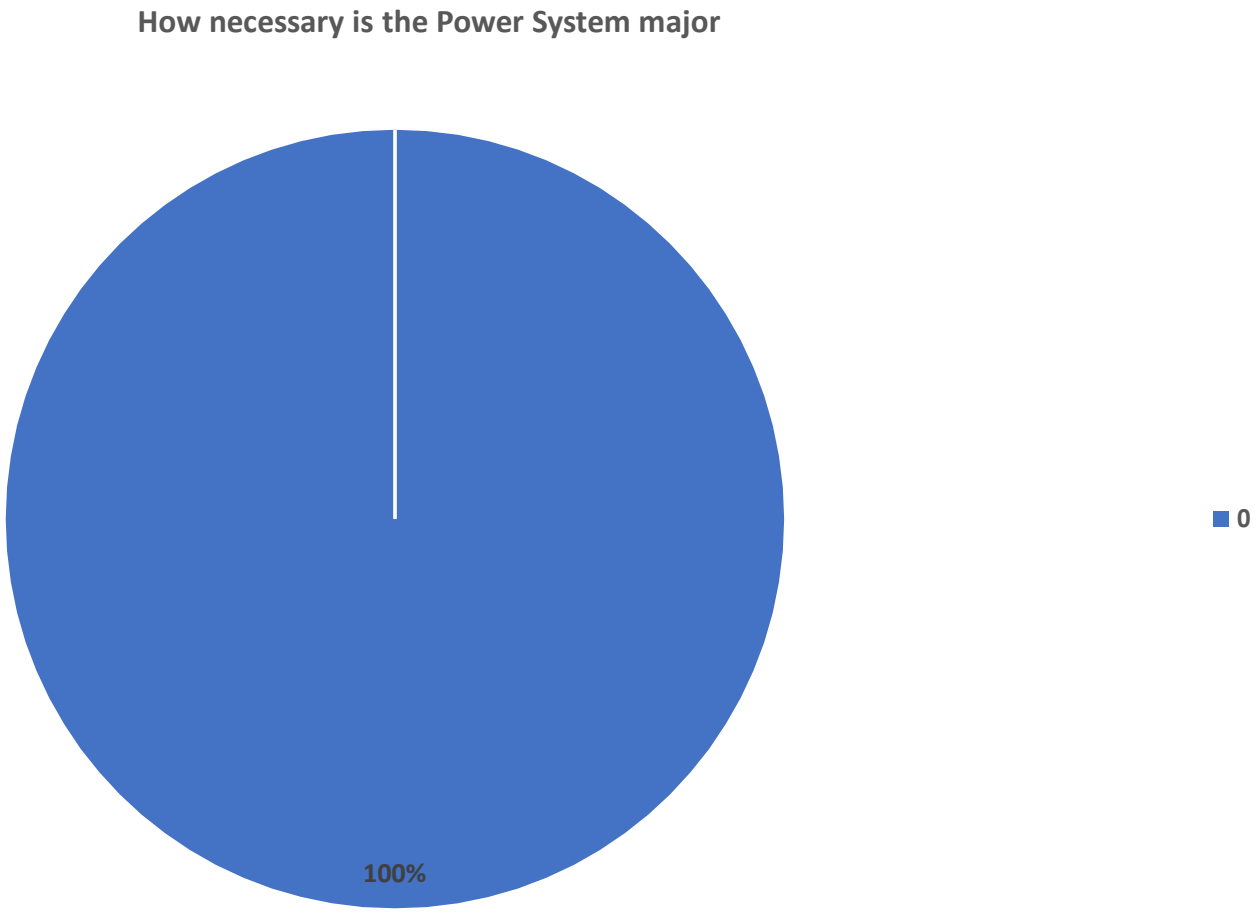
Knowledgeable at a limited level
Knowledgeable/able to participate
Able to apply
Able to analyze
Able to summarize
Able to evaluate

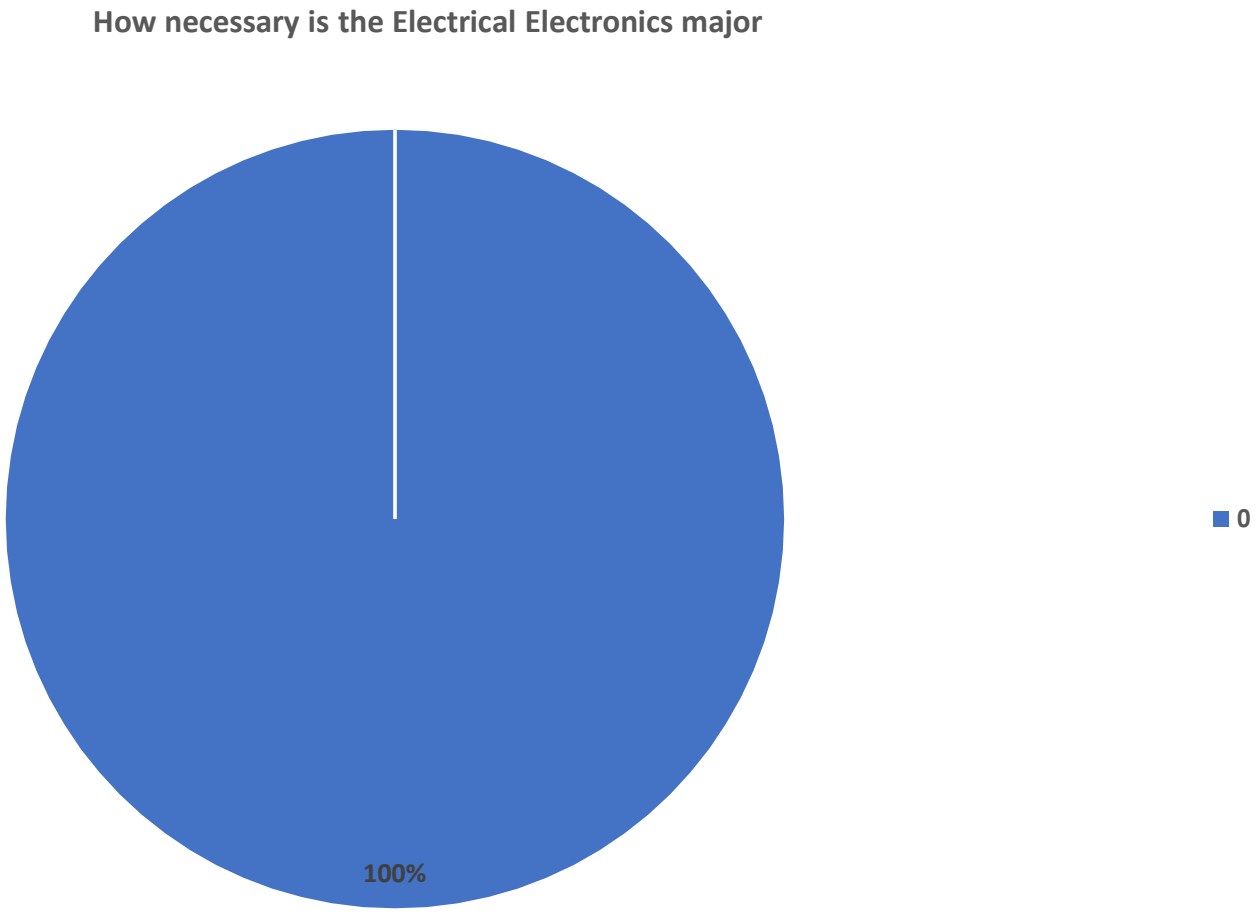
Master of science
Master of engineering
Engineer
Bachelor of engineering
Bachelor of industry

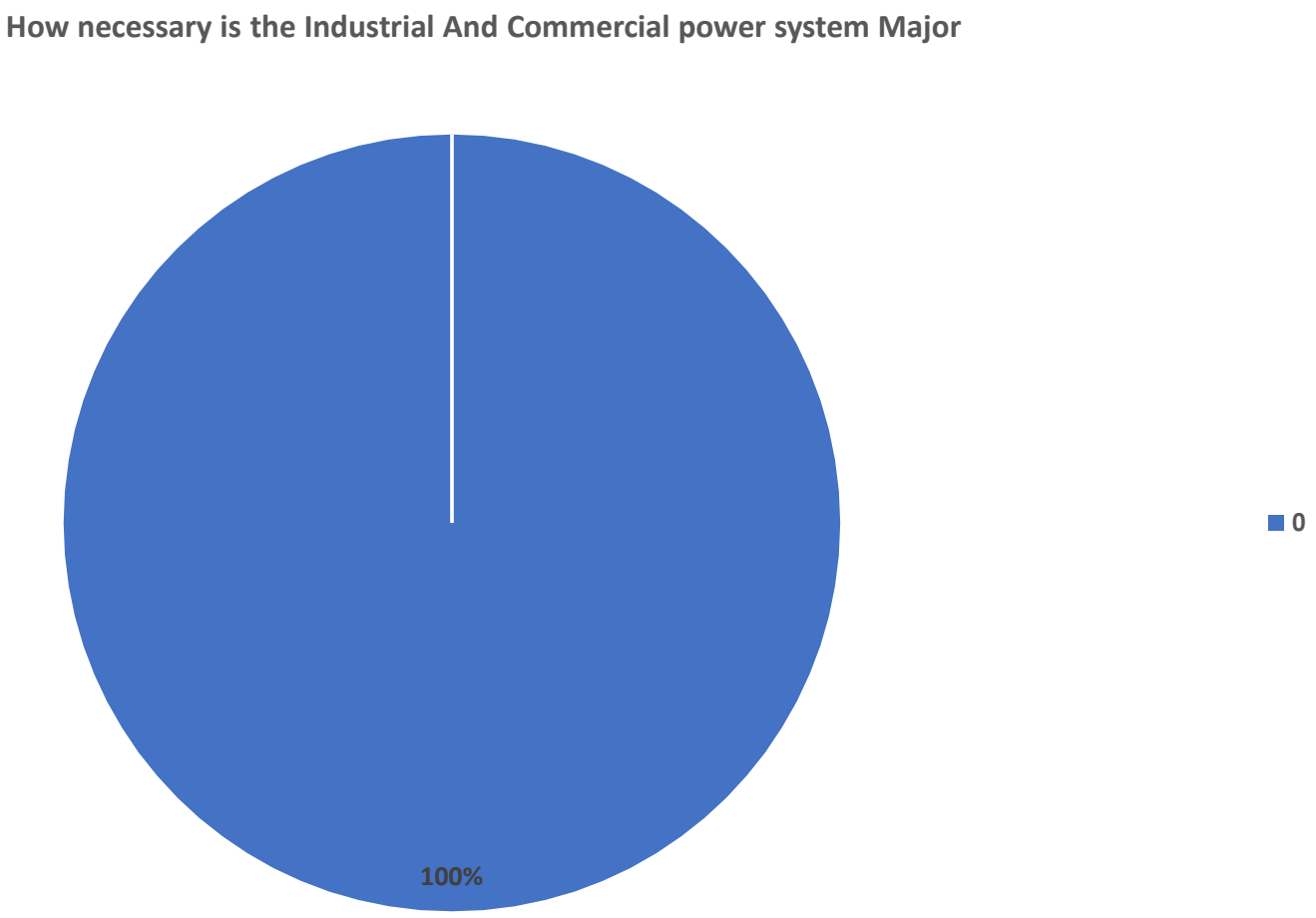

Working experience
24%
29%
47%
>15 year
10-15 year
5-10 year

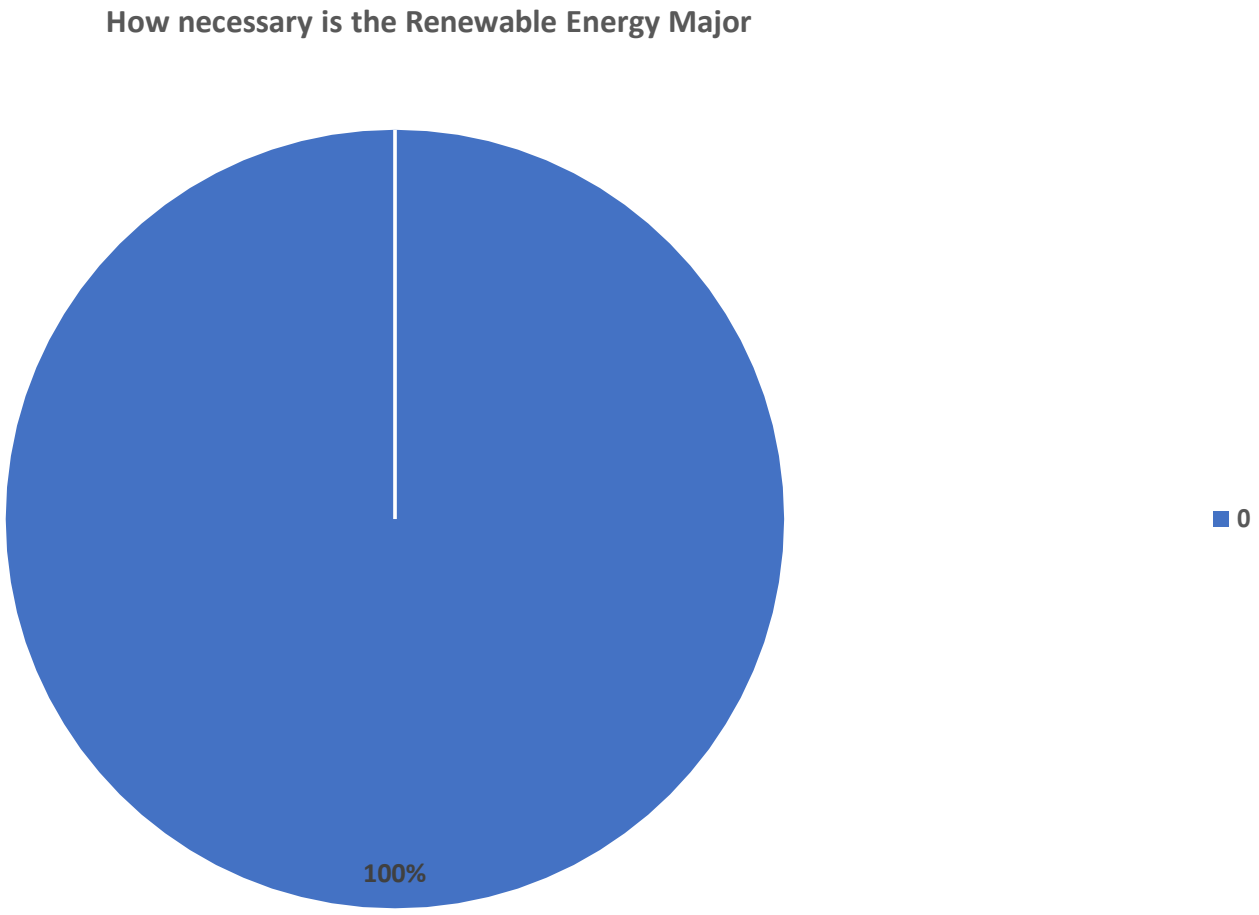

How many employees of your company are from SEE
39%
61%
From 5-10 people
From 10-20 people


On what branch of study are you giving feedback
48%
52%
Control and Automation Engineering
Ngành Electrical Engineering

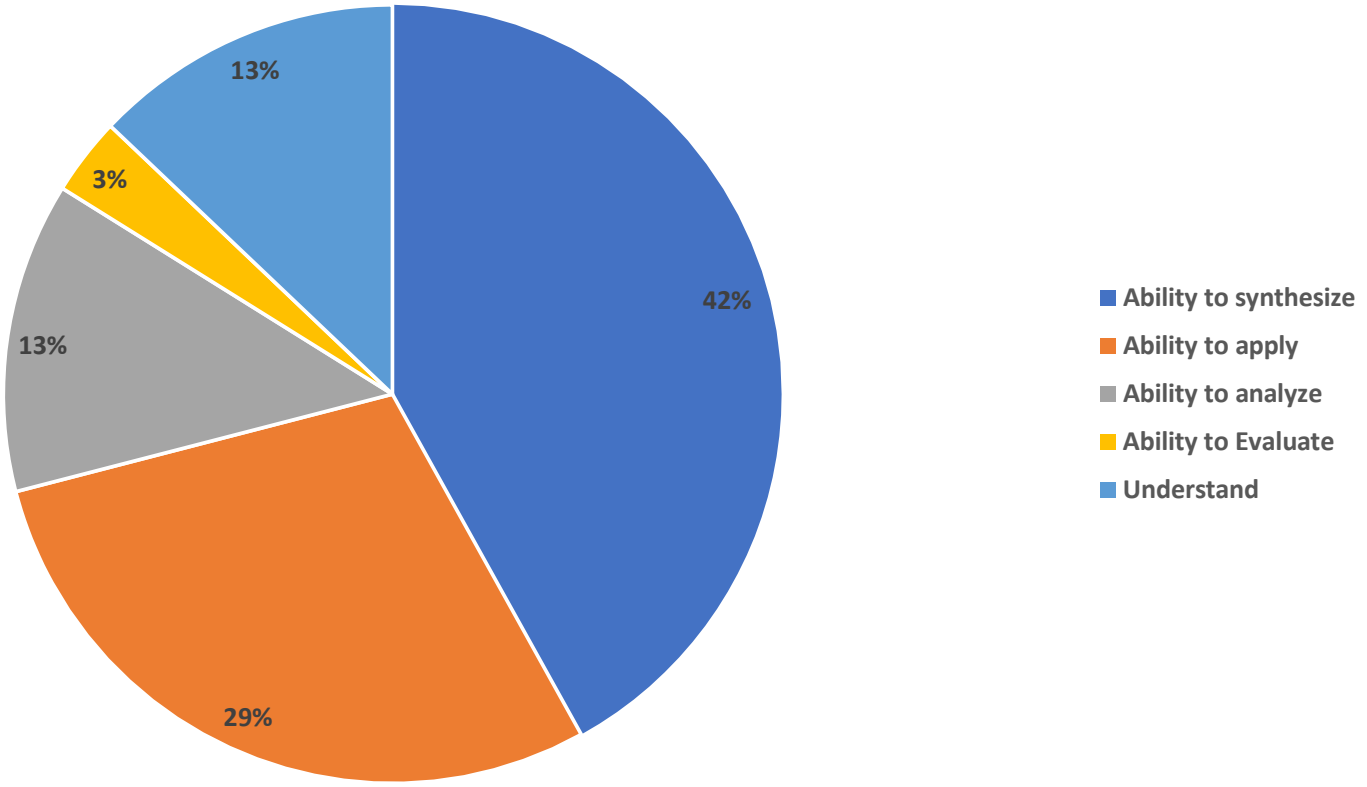

How necessary is the Power System major
100%
0


How necessary is the Electrical Electronics major
100%
0

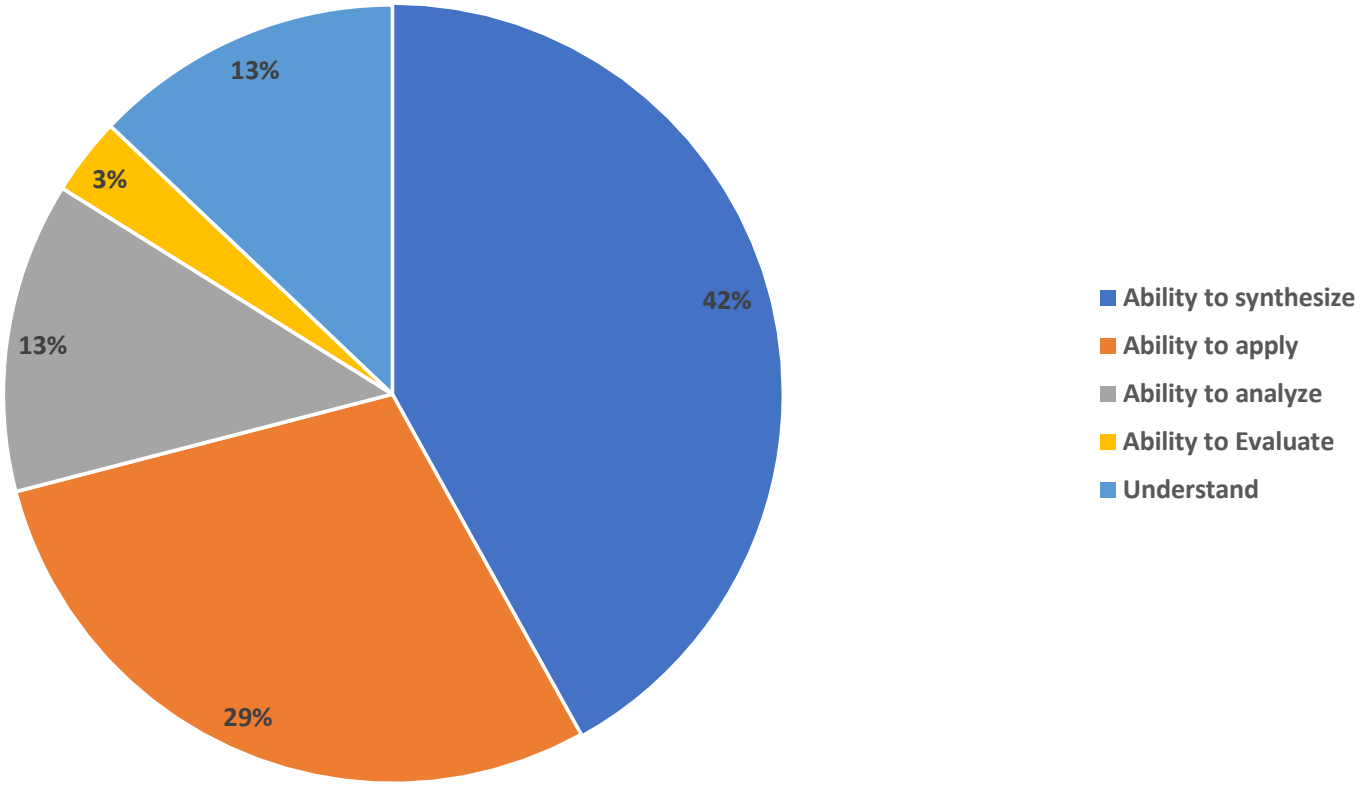

How necessary is the Industrial And Commercial power system Major
100%
0


How necessary is the Renewable Energy Major
100%
0

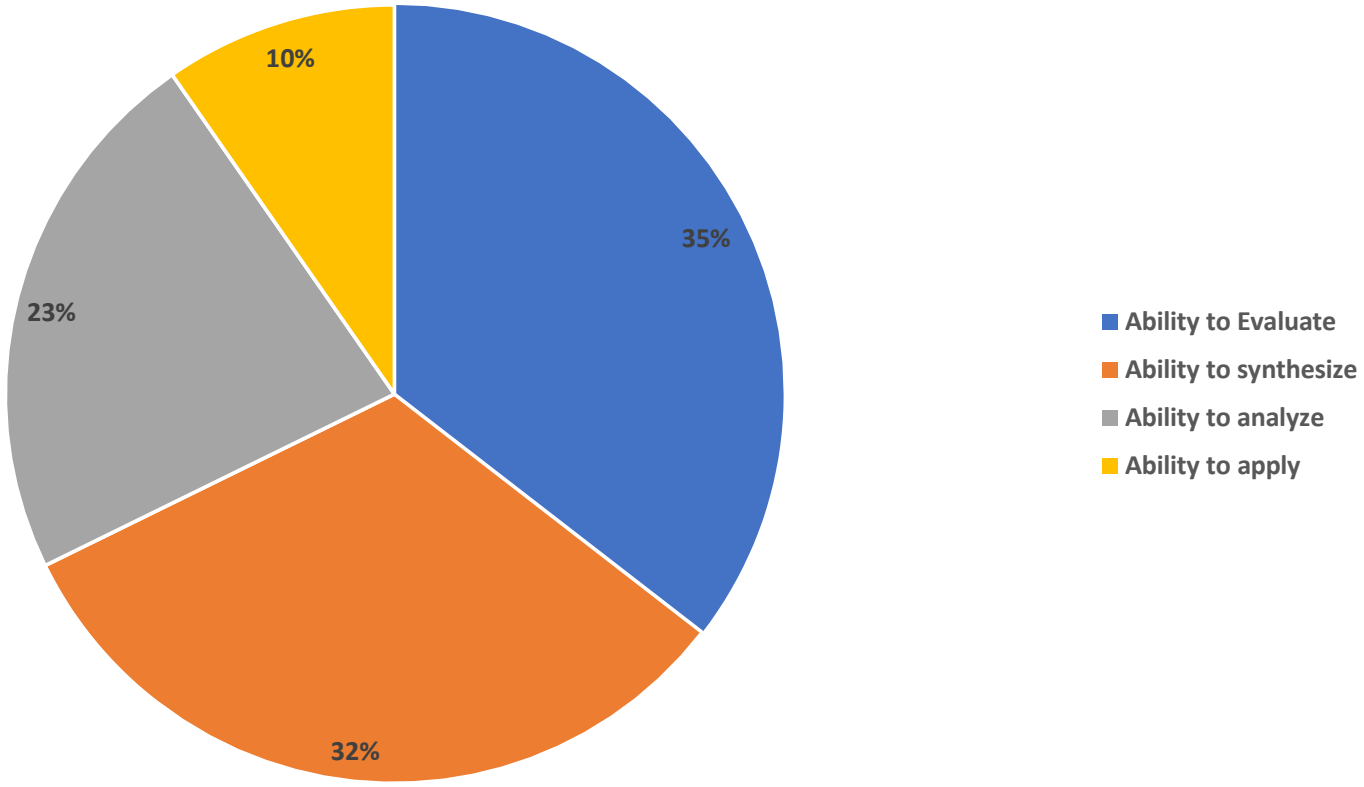
1.1 KNOWLEDGE OF UNDERLYING MATHEMATICS AND SCIENCES



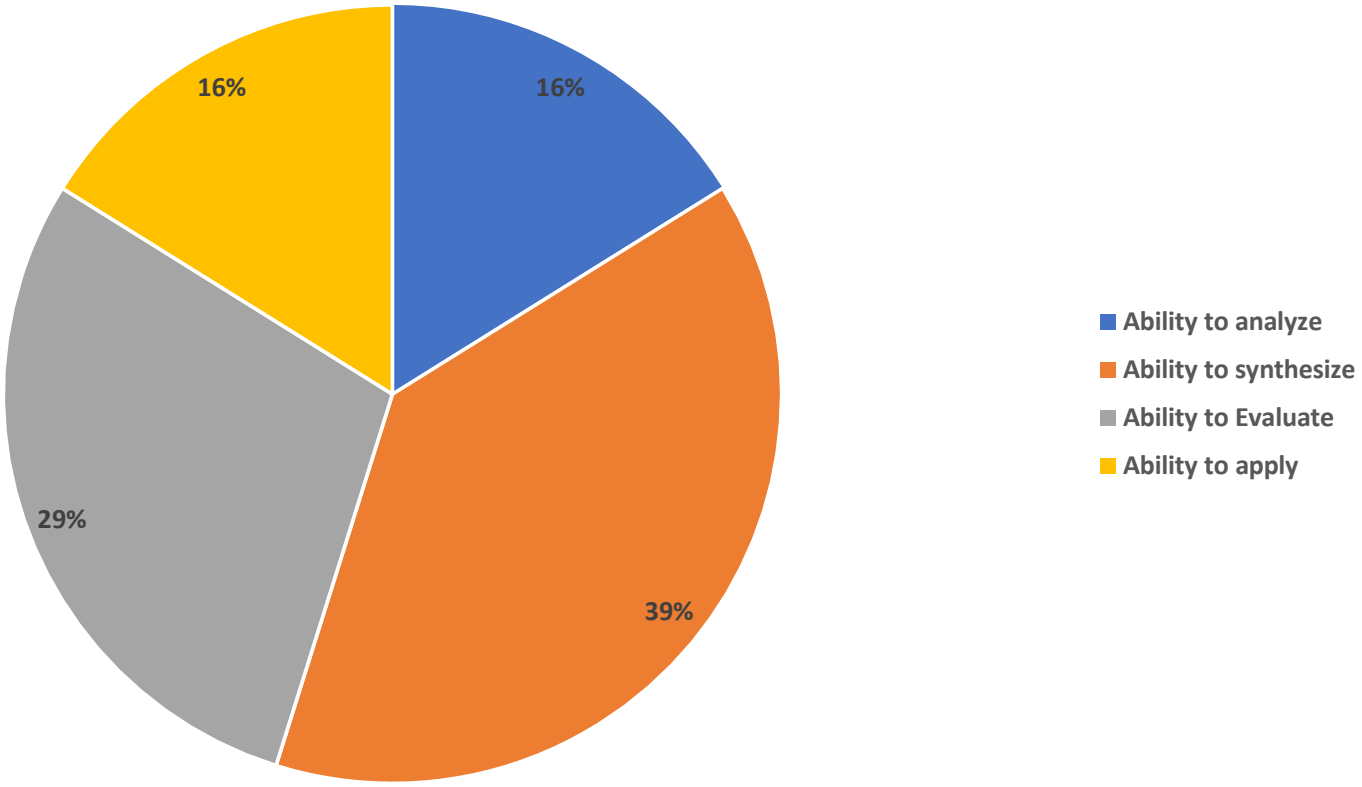
1.2 CORE ENGINEERING FUNDAMENTAL KNOWLEDGE



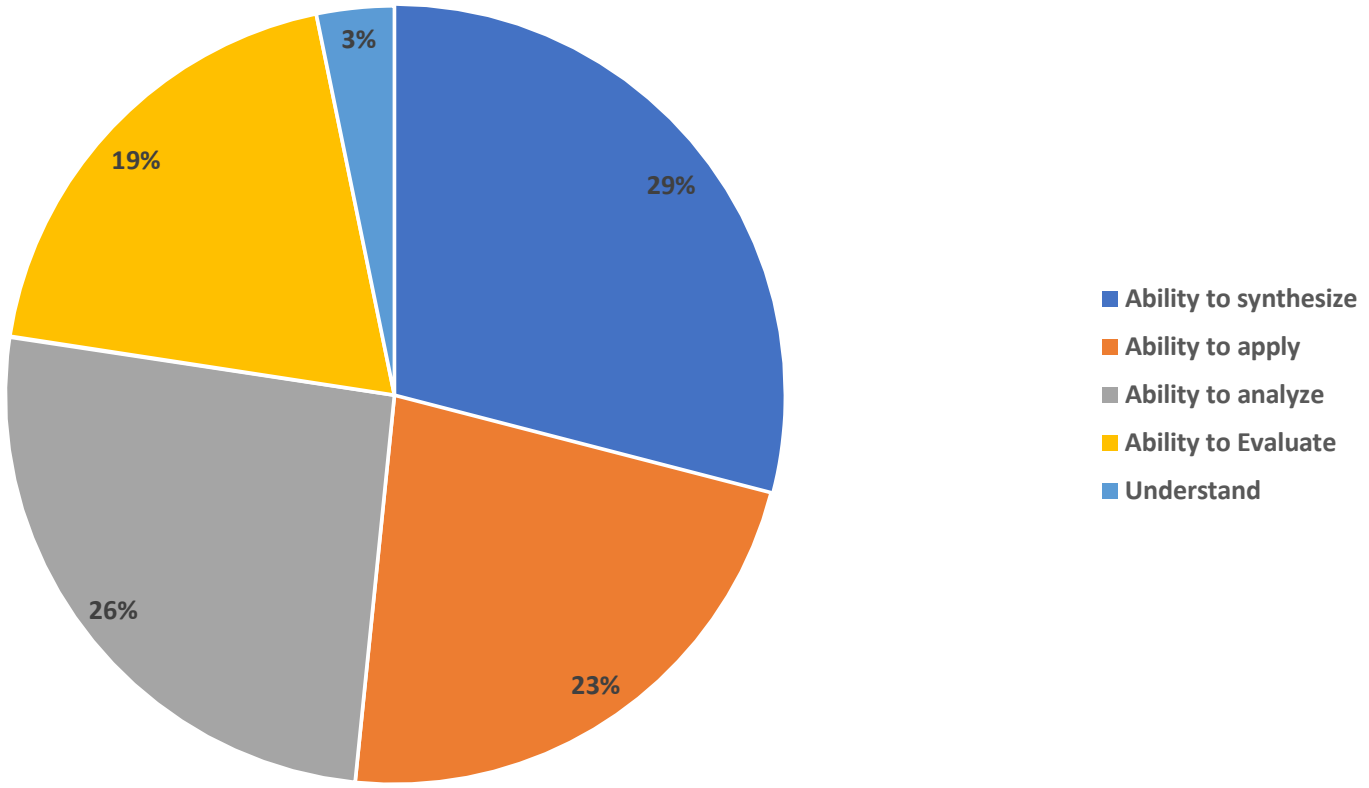
1.3 ADVANCED ENGINEERING FUNDAMENTAL KNOWLEDGE, METHODS AND TOOLS

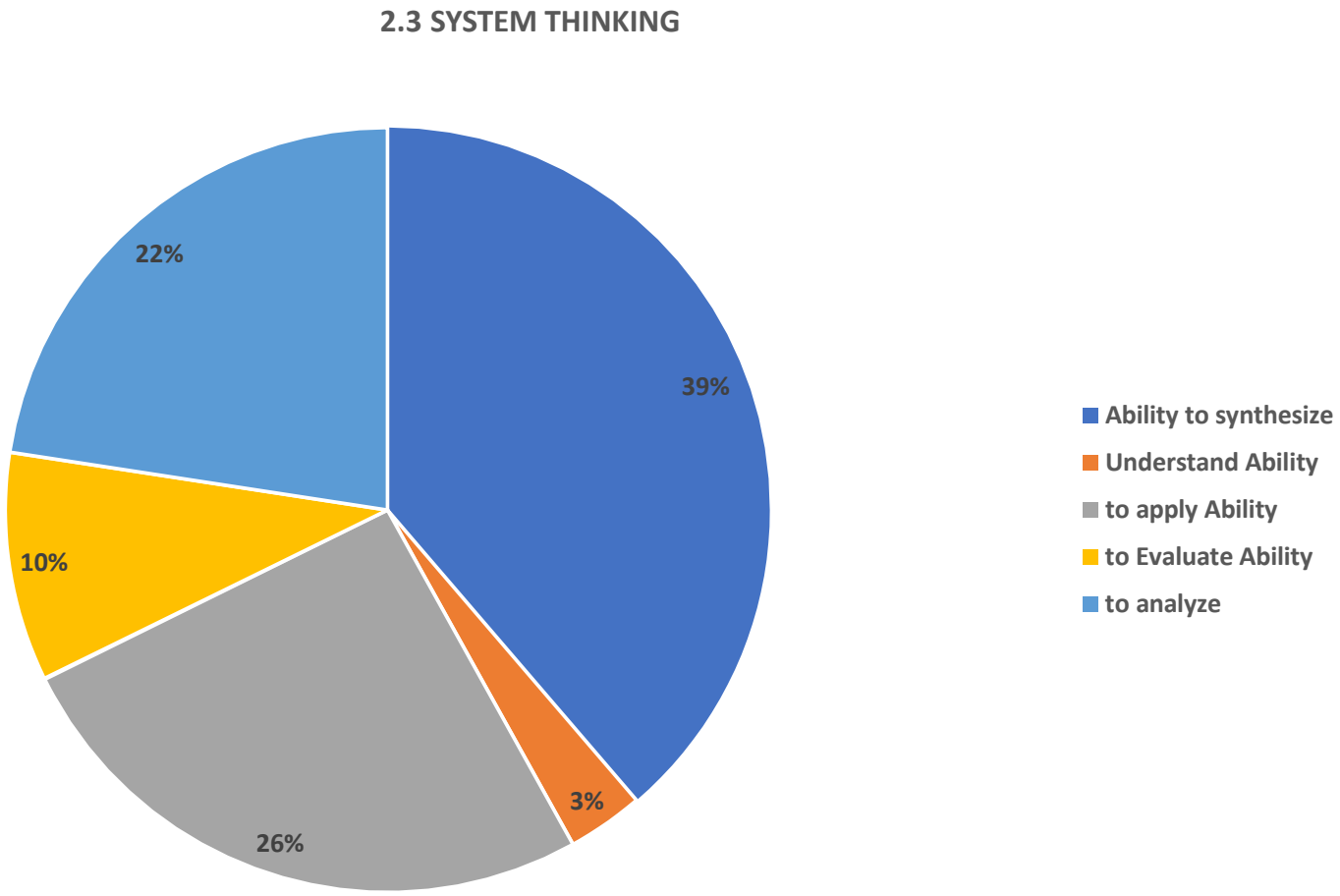


2.1 ANALYTICAL REASONING AND PROBLEM SOLVING

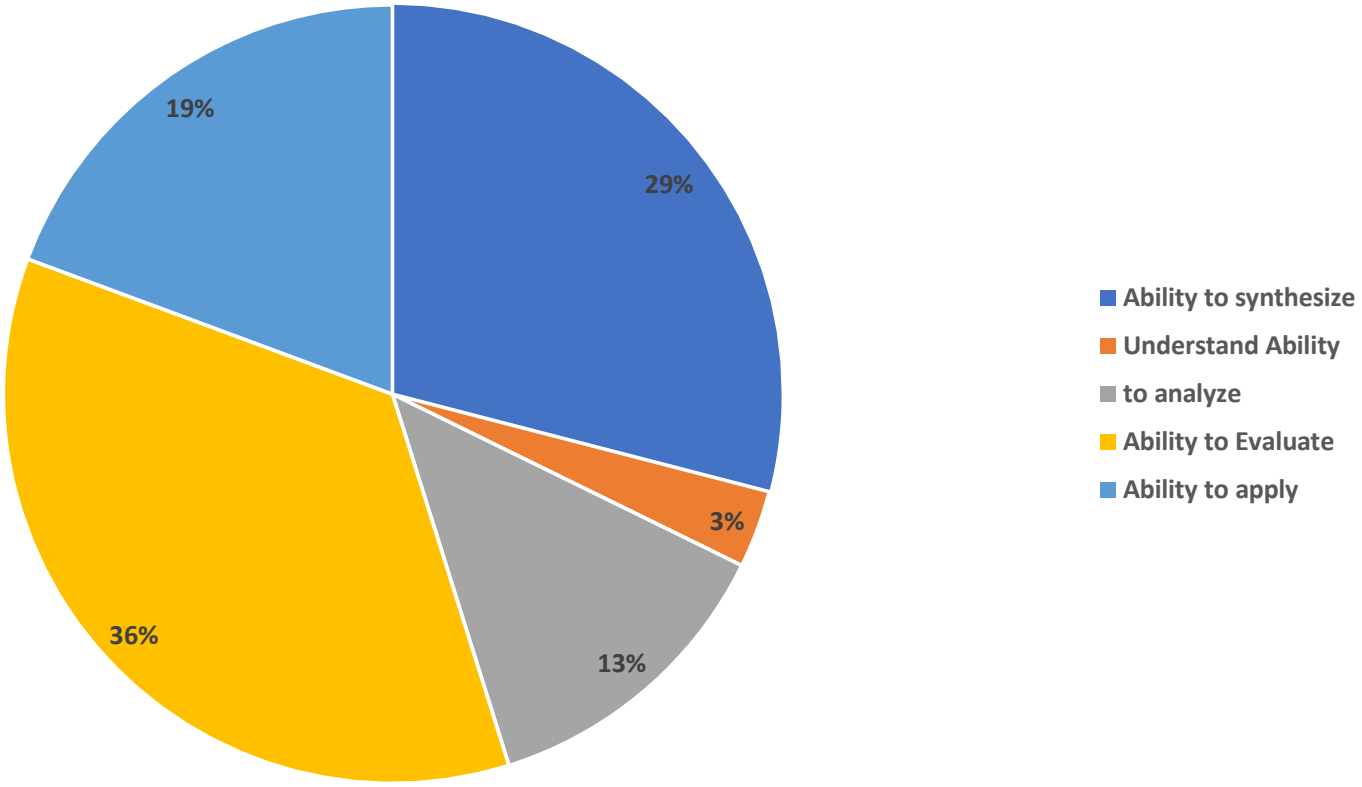


2.2 EXPERIMENTATION, INVESTIGATION AND KNOWLEDGE DISCOVERY

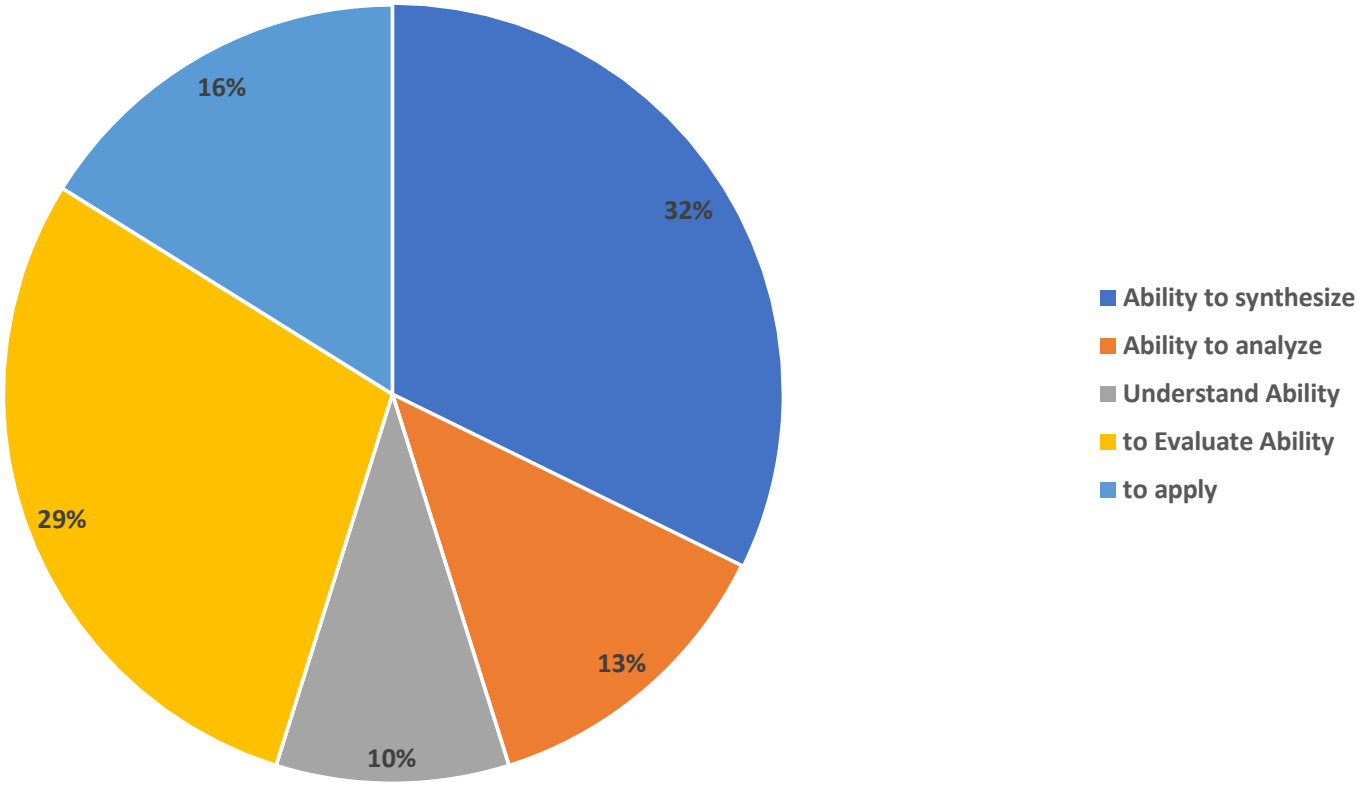


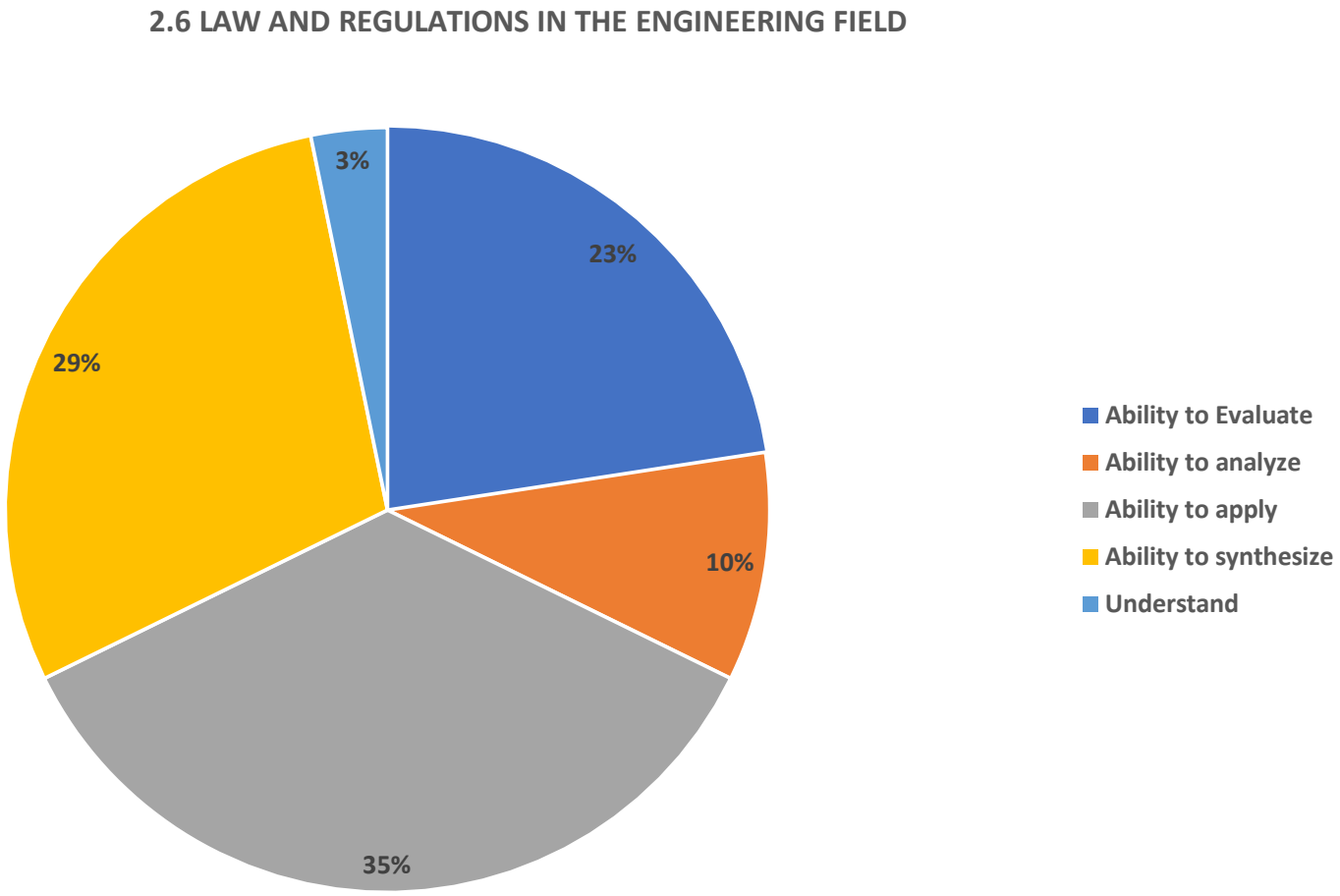

2.3 SYSTEM THINKING
39%
3%
26%
10%
22%
Ability to synthesize
Understand Ability
to apply Ability
to Evaluate Ability
to analyze

2.4 ATTITUDES, THOUGHT AND LEARNING

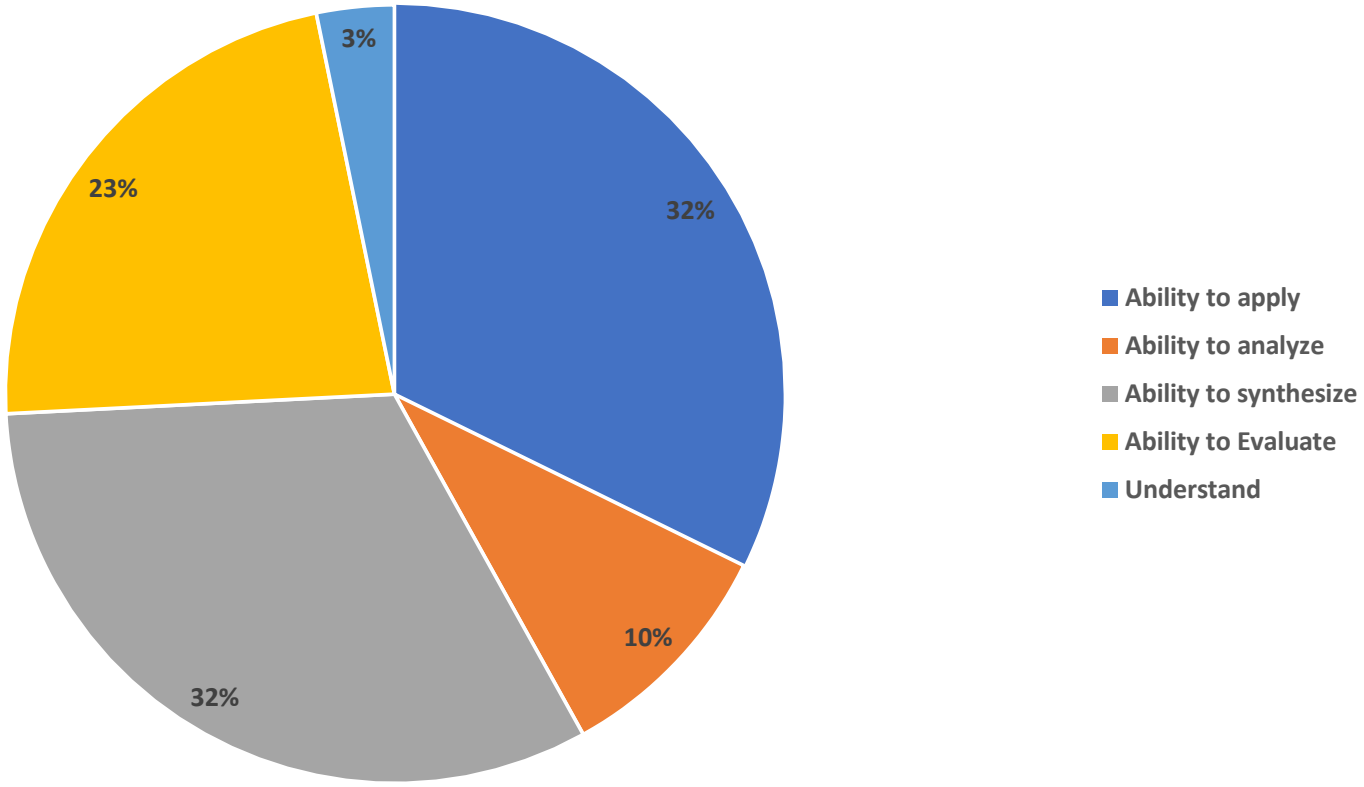


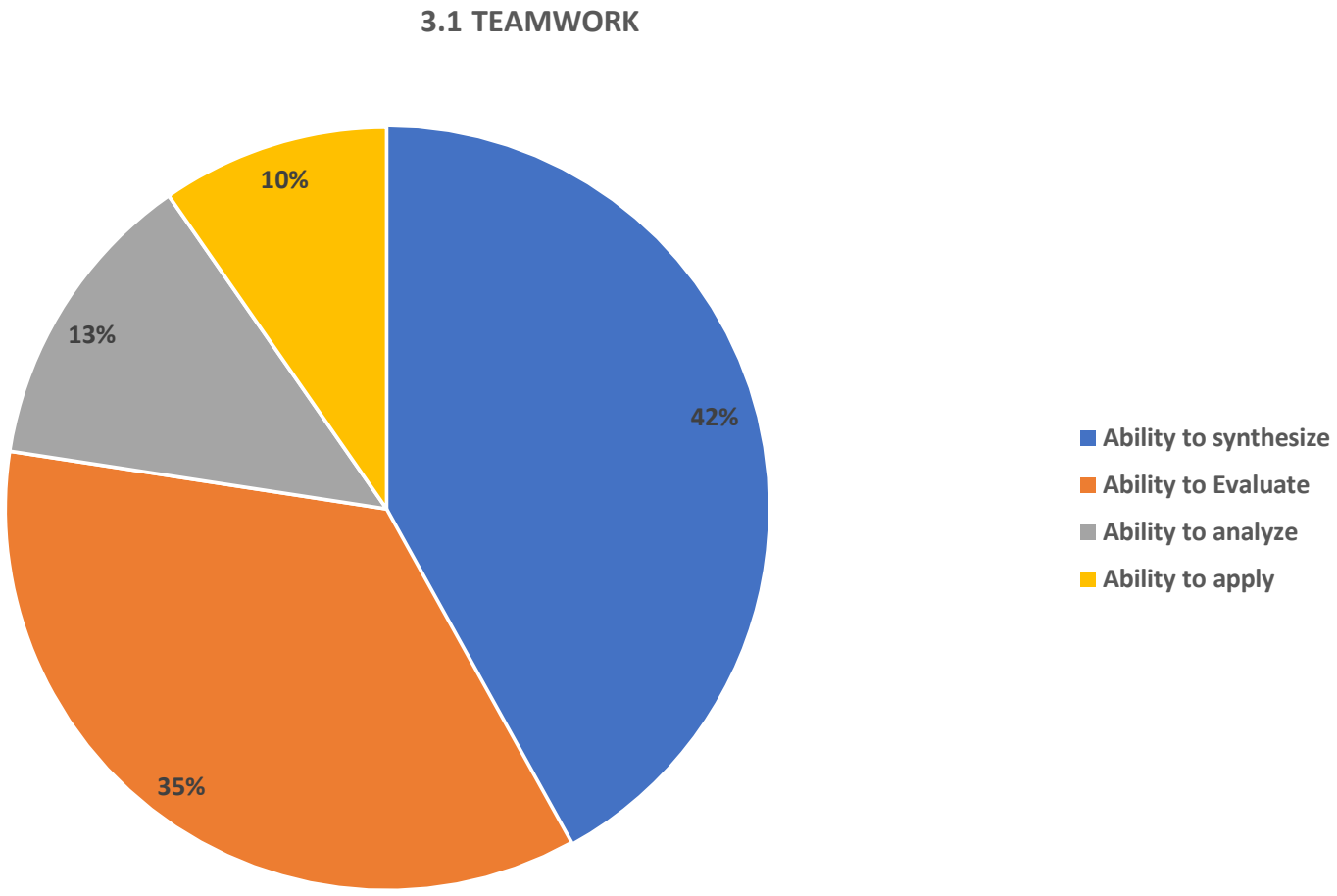
2.5 ETHICS, EQUITY AND OTHER RESPONSIBILITIES

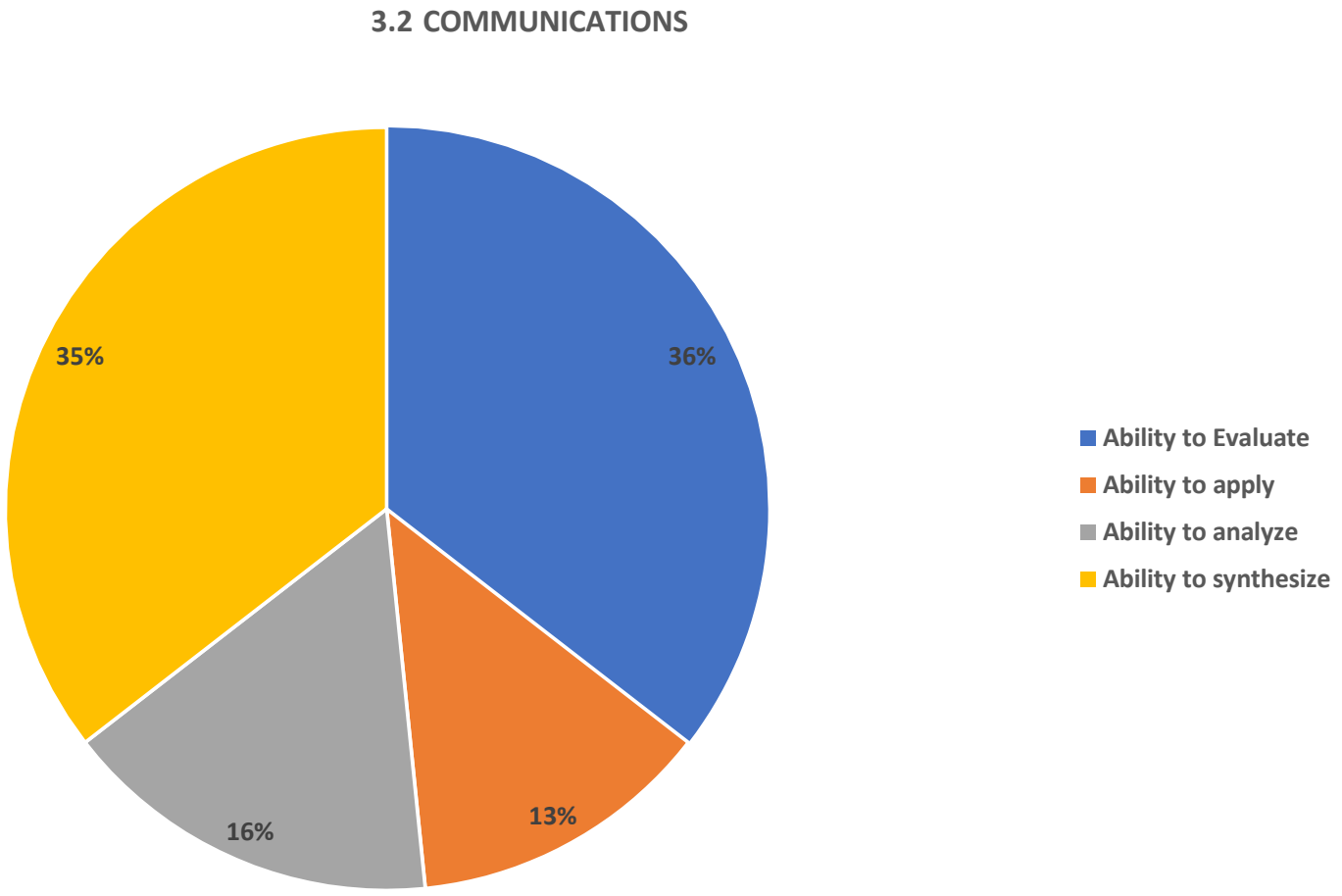



2.6 LAW AND REGULATIONS IN THE ENGINEERING FIELD
3%
23%
29%
10%
35%
Ability to Evaluate
Ability to analyze
Ability to apply
Ability to synthesize
Understand

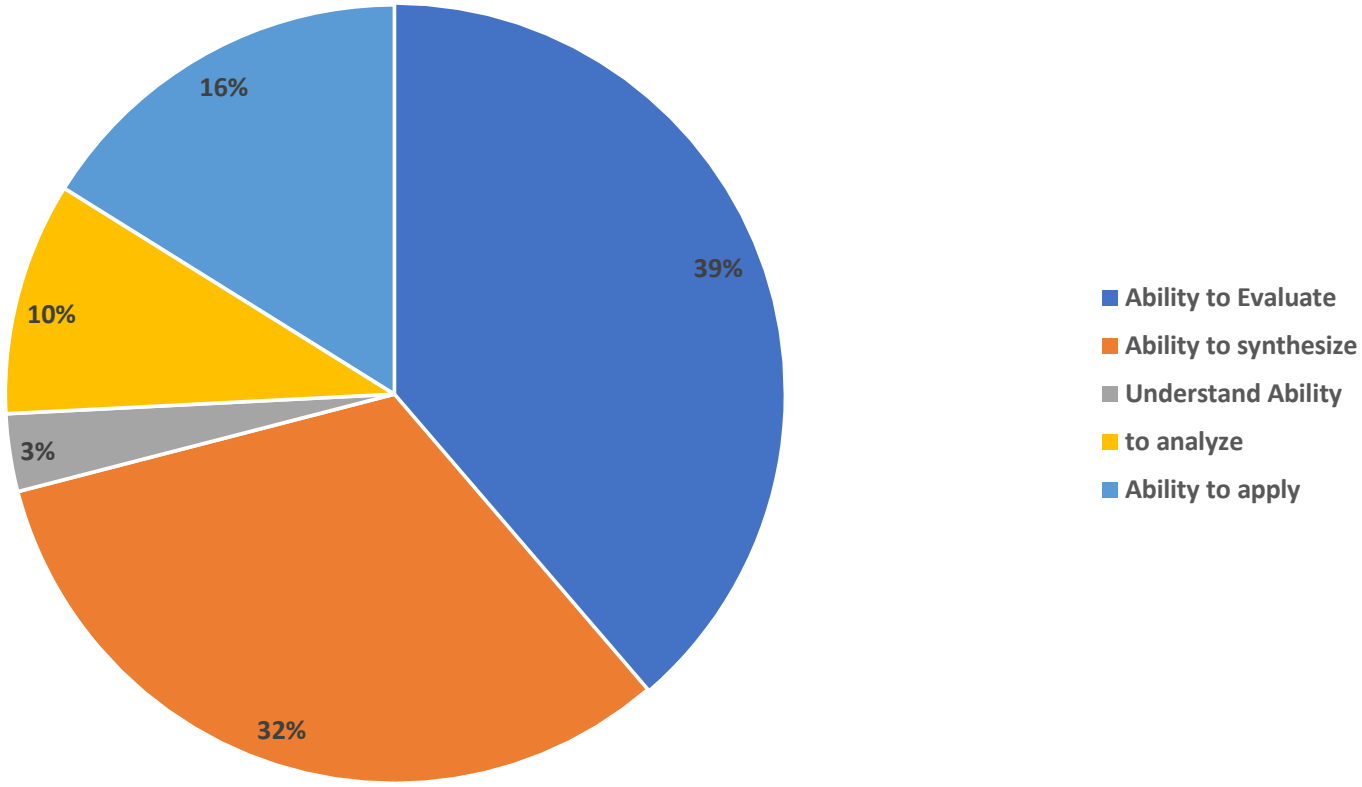
2.7 UNDERSTANDING OF CONTEMPORARY ISSUES AND LIFE LONG LEARNING

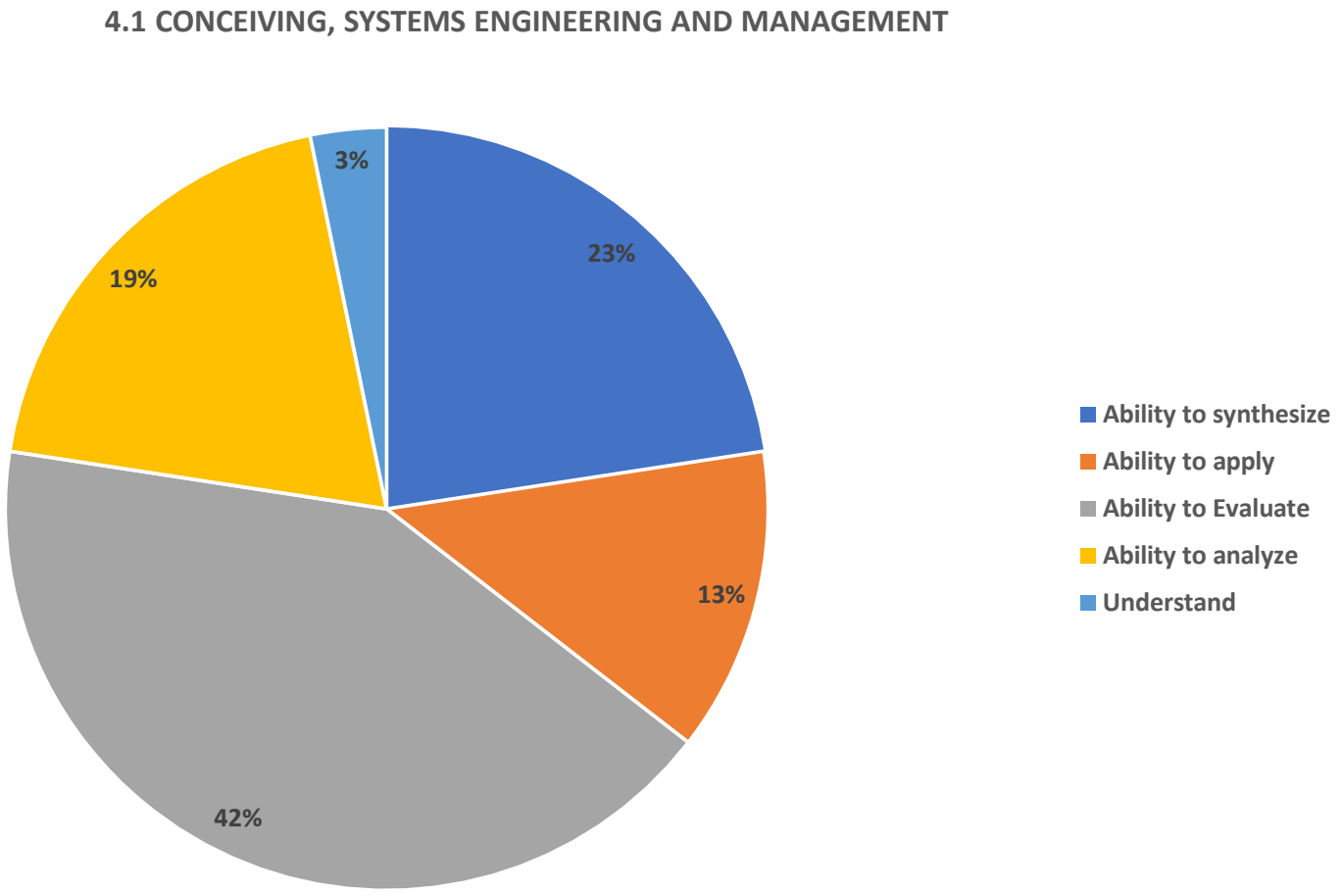



3.1 TEAMWORK
10%
13%
42%
35%
Ability to synthesize
Ability to Evaluate
Ability to analyze
Ability to apply

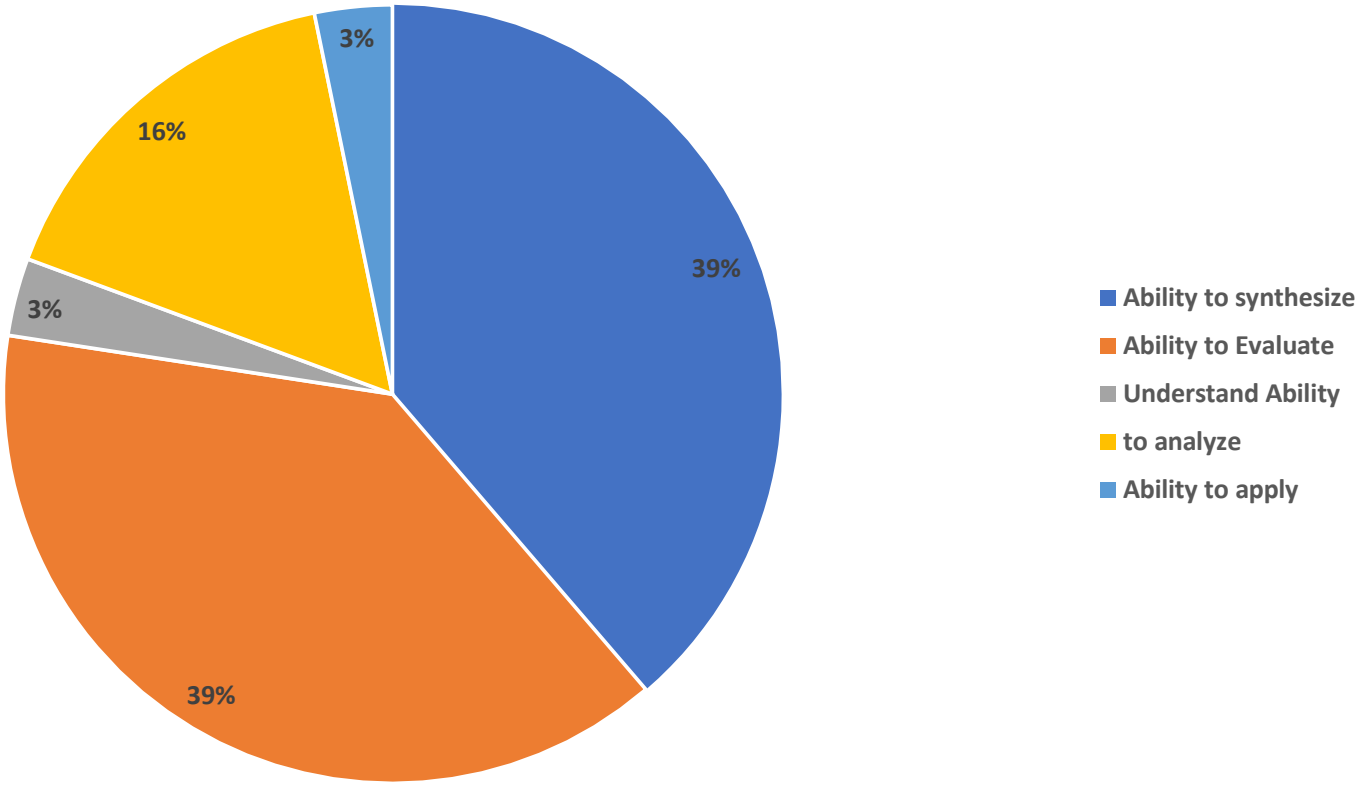

3.2 COMMUNICATIONS
35%
36%
16%
13%
Ability to Evaluate
Ability to apply
Ability to analyze
Ability to synthesize

3.3 COMMUNICATIONS IN FOREIGN LANGUAGES

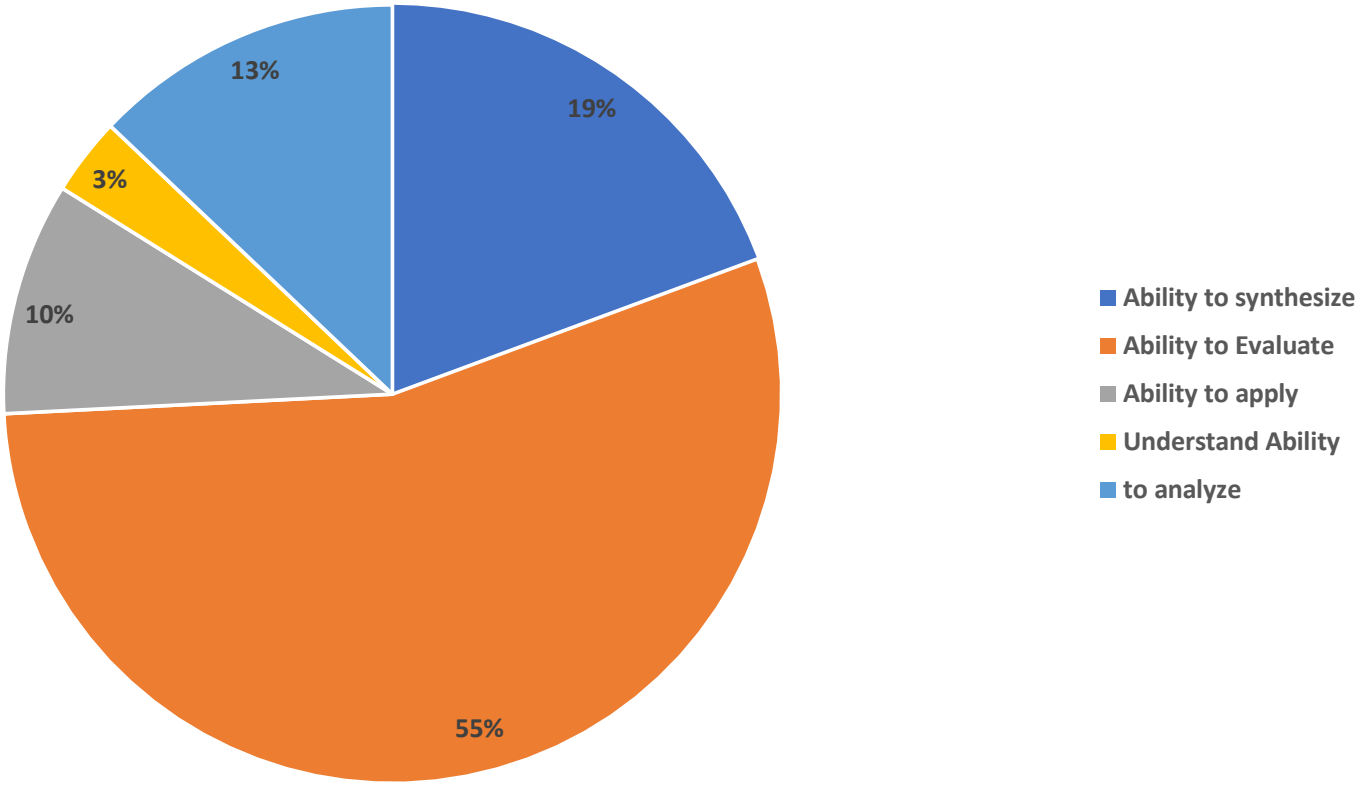



4.1 CONCEIVING, SYSTEMS ENGINEERING AND MANAGEMENT
23%
13%
42%
19%
3%
Ability to synthesize
Ability to apply
Ability to Evaluate
Ability to analyze
Understand

4.2 DESIGNING ENGINEERING SOLUTIONS



4.3 IMPLEMENTING ENGINEERING SOLUTION



4.4 OPERATING ENGINEERING SYSTEMS