CAPSTONE DESIGN next.....

ABET

VISITASI OKTOBER 2019 HASIL

HASIL 4 W (WEAKNESS)

ABET
Engineering Accreditation Commission

eac@abet.org

E301 PROGRAM AUDIT FORM FOR BACHELOR'S LEVEL PROGRAMS GENERAL REVIEWS

ution	Hasanuddin University	Program Name	Bachelor of Engineering electrical engineering

The attached Program Audit Form (PAF) summarizes the visit team's initial assessment of each program being considered for accreditation and/or extension of accreditation by ABET.

The PAF has two parts. The first part summarizes the team's identification of shortcomings with respect to criteria and policies. Shortcomings are shown as a Deficiency (D)[1], Weakness (W)[2], or Concern (C)[3]. The second part of the PAF is a detailed description of any identified shortcomings.

The due-process period begins with the departure of the visit team. Due process is a critical part of the accreditation effort and consists of the following steps:

- Seven-day response: Each program has seven days to respond to the Team Chair in case of errors of fact. Only factual errors will be considered in this portion of the review process. Please provide this response in electronic format. Additional material (beyond errors of fact) included with the seven-day response will be considered with the due-process response. If no errors are noted, no seven-day response is required; please notify your Team Chair if you will NOT be submitting a response.
- Draft statement: The Team Chair, working in collaboration with the visit team members, incorporates your seven-day response (if any) into a Draft Statement that is edited and reviewed by two editors, each of whom is a member of commission's executive committee. Following a final editing step by ABET Headquarters, the Draft Statement and a letter of transmittal are sent to your institution.
- Due-process response: You have 30 days after the receipt of the Draft Statement to reply to the Team Chair with your response to the team's findings. The response normally will include documentation of actions taken to correct shortcomings identified in the Draft Statement. Your due-process response should be uploaded to the accreditation management system. You are not required to submit a due-process response. Please inform ABET (eac@abet.org) and your Team Chair if you will NOT be su
- Final statement: The Team Ch incorporates the due-process res reviewed by the editors and sent to
- Final action: At its annual meetin and recommended actions. Follo each program at each institution.
- Notification of final action: In Au informing you of the official accre

[1] A deficiency indicates that a criterion, policy compliance with the criterion, policy, or proce
[2] A weakness indicates that a program lacks th that the quality of the program will not be con compliance with the criterion, policy, or proce
[3] A concern indicates that a program currently for the situation to change such that the criteri

PROGRAM AUDIT SUMMARY
(PROVIDE A COPY TO INSTITUTION)

Key: **Concern (C), Weakness (W), Deficiency (D)**	**Shortcomings from Previous Review**	**Status as of Exit Meeting**
1. STUDENTS		
2. PROGRAM EDUCATIONAL OBJECTIVES	W	
3. STUDENT OUTCOMES		
4. CONTINUOUS IMPROVEMENT	W	
5. CURRICULUM	W	
6. FACULTY		
7. FACILITIES	W	
8. INSTITUTIONAL SUPPORT		
Program Criteria		
Accreditation Policies and Procedures		

HASIL 4 W (WEAKNESS)

DETAILED EXPLANATION OF SHORTCOMINGS
(PROVIDE A COPY TO INSTITUTION AT EXIT MEETING)

The following comments provide detailed information on the shortcomings indicated on the Program Audit Summary.
1. STUDENTS
2. PROGRAM EDUCATIONAL OBJECTIVES This criterion requires the program to have published program educational objectives that are consistent with the mission of the institution, the needs of the program's various constituencies, and the engineering accreditation criteria. It further requires that there be a documented, systematically utilized, and effective process, involving program constituents, for the periodic review of these program educational objectives that ensures they remain consistent with the institutional mission, the program's constituents' needs, and the engineering accreditation criteria. The program lists its students, faculty, industrial advisory board, major employers, and alumni as constituents. There is no evidence that any of these groups, aside from the faculty members, participated in the periodic review of the program educational objectives. It was not clear from the documentation provided that the program educational objectives are consistent with the needs of the constituents of the program. Without appropriate program educational objectives, the graduate attainment may not meet the needs of the program's constituents.
3. STUDENT OUTCOMES
4. CONTINOUS IMPROVEMENT This criterion requires that the program must regularly use appropriate, documented processes for assessing and evaluating the extent to which the student outcomes are being attained. The results of these evaluations must be systematically utilized as input for the continuous improvement of the program. Other available information may also be used to assist in the continuous improvement of the program. No documentation or other evidence was provided that

7. FACILITIES This criterion indicates that classrooms, offices, laboratories, and associated equipment must be adequate to support attainment of the student outcomes and to provide an atmosphere conducive to learning. Modern tools, equipment, computing resources, and laboratories appropriate to the program must be available, accessible, and systematically maintained and upgraded to enable students to attain the student outcomes and to support program needs. Students must be provided appropriate guidance regarding the use of the tools, equipment, computing resources, and laboratories available to the program. In review of laboratories and the associate equipment, it was observed that the number of equipment and the necessary software are outdated and inadequate in number to support the attainment of student's outcomes. Without sufficient and appropriate equipment and software, students learning through hands-on laboratory experience may be inadequate. Also, the laboratories require appropriate software licenses; student versions used are inadequate to support the attainment of the student outcomes.

HASIL 4 W (WEAKNESS)

5. CURRICULUM

This criterion requires that the program must include a culminating mayor engineering design experience that 1) incorporates appropriate engineering standards and multiple constraints, and 2) is based on the knowledge and skills acquired in earlier course work.

Review of student work of the major design projects did not provided evidence that students are incorporating knowledge and skills specified for mayor design projects. Moreover, the major design projects did not consistently incorporate appropriate engineering standards and multiple constraints. Without adequate experience in the application of design constraints and engineering standards, students in the program may not be adequately prepared for engineering practice.

What is a capstone design project?

https://www.google.co.id/search?q=Capstone+Design+Undergraduate+Project&oq=Capstone+Design+Undergraduate+Project&aqs=chrome..69i57.18033j0j7&client=ubuntu&sourceid=chrome&ie=UTF-8

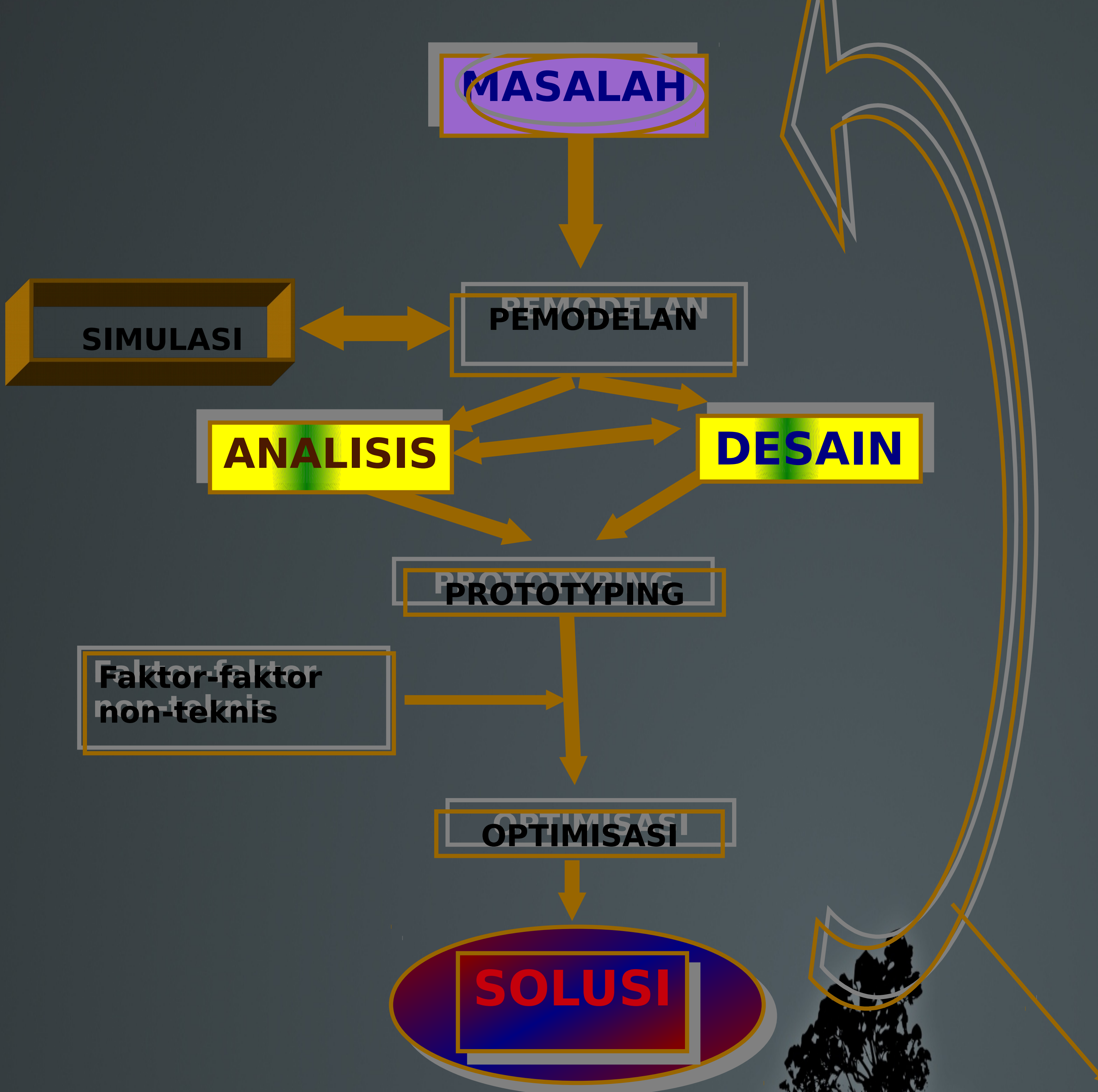
- **Capstone Design is a culminating course offered to undergraduate students in several disciplines at the *Georgia Institute of Technology*. Students work in teams to design, build, and test prototypes with real world applications. At the end of each semester students showcase their efforts at the "*Capstone Design Expo*".**
- **Capstone Design is the culmination of undergraduate students' study in their chosen engineering discipline and is a required course. With private and industry sponsors participating through many of our departments, our students gain hands-on experience with projects that have real-world applications.**

Kata-kata KUNCI

- *undergraduate students*
- *required course*
- *work in teams*
- *design, build, and test prototypes*
- *real world applications*
- *hands-on experience*
- *Capstone Design Expo*
    - culminating course
    - the culmination of undergraduate students' study

CONTOH-CONTOH

Engineering Education……..



9.5.3 Electrical Engineering Design and Project

Objective of Electrical Engineering Design and Project:

Engineering design is the process of devising a system, component, or process to meet desired needs. It is a decision-making process (often iterative), in which the basic sciences and mathematics and engineering sciences are applied to convert resources optimally to meet a stated objective.[5]

Among the fundamental elements of the design process are the establishment of objectives and criteria, synthesis, analysis, construction, testing, and evaluation. The engineering design component of a curriculum *must include most of the following features*:

- Development of student creativity;
- Use of open-ended problems;
- Development and use of modern design theory and methodology;
- Formulation of design problem statements an
- Consideration of alternative solutions, feasibili processes; concurrent engineering design, an

Further, it is essential to include a variety of realisti factors, safety, reliability, aesthetics, ethics, and social

Each educational program *must include a meani experience* that builds upon the fundamental concept the humanities and social sciences, engineering topics

The scope of the design experience within a program practice within that discipline.

The major design experience should be taught in secti allow interaction between teacher and student. Thi students must do all design work in isolation; team appropriate.

Design cannot be taught in one subject. It is an exp student's development

A meaningful, major design experience means th academic development is nearly complete, ther both focuses the student's attention on profe course work. Inevitably, this means a cours design. "Meaningful" implies that the student's major and that it draws upon Mata Kuliah taken by the student.

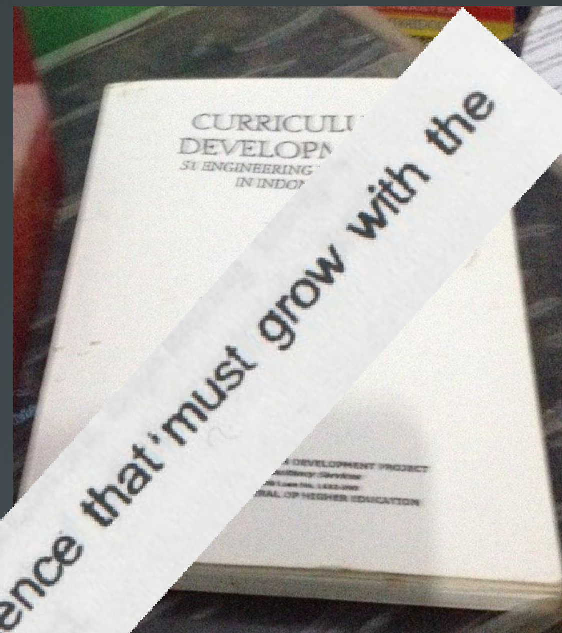
Use of Computers in Electrical E

It is expected that students computers for:

- Hardware and s ... al and
- The use of a ... esign and
- The desic ... plication pa

[5] Adapted from ... Programs in engineering in the U

92



Topics Included in Electric

Topic	Sub-Topic
Electrical Design:	...ents - inductors, transformers and electromagnets; ...agnetic circuit design; ...systems; ...es; Transmission and distribution design; ...e Logic Controller (PLC) system design; Design management.
Power El...	...of Power converter topologies; ...eristics of power semiconductors - diodes, SCRs, IGBJTs, MOSFETS; ...odelling of power circuits using PSPICE; Design management - reliability, testing; Design of gate and base drive circuits; Device protection; Design of magnetic high frequency components; Design of heat sinks; DC-DC switch mode power supplies; PCB design and production;
...esign	Radio-frequency design; Measurement techniques; Transistor models and parameters; Small signal amplifier design; Power amplifiers, mixers, couplers and splitters, transformers, oscillators; Noise in electronic systems - noise generation; Coupling mechanisms – conducted, radiated, common mode, common impedance, differential mode, cross talk; Noise management techniques – sheeting and grouting, zoning, filtering, decoupling, near and far field effects.
Digital System Design	Logic families and characteristics; Timing analysis and design; PCB interconnection for high speed digital systems; Noise in digital systems; Design for testability; Design management.
Embedded Software Design	Development tools - emulators, simulators and analysers; Embedded architecture - the hardware/software co-design; Interrupt service routines and drivers; Object-oriented design for embedded systems; Specialized class libraries; Finite state software design; Fixed-point arithmetic and trigonometric algorithms.
Digital Signal Processing	Digital filter design- Finite impulse and infinite impulse response filters finite word length effects; Kalman filters - spectral estimation and analysis; General purpose hardware for digital signal processing (DSP) and applications.
Control Systems	Use of CAD packages for design of control systems; Integration of PLCs into control systems; Distributed control systems design; Data conditioning design; Design of man-machine interface.
Engineering Project	Investigation, research, critical evaluation, analysis, design and prototype analysis of a selected project in the area of specialisation; The preparation and presentation of a significant thesis/report of the project development and outcomes.

Design cannot be taught in one subject. It is an experience that must grow with the student's development

9.5.3 *Electrical Engineering Design and Project*

Objective of Electrical Engineering Design and Project:

Engineering design is the process of devising a system, component, or process to meet desired needs. It is a decision-making process (often iterative), in which the basic sciences and mathematics and engineering sciences are applied to convert resources optimally to meet a stated objective.[5]

Among the fundamental elements of the design process are the establishment of objectives and criteria, synthesis, analysis, construction, testing, and evaluation. The engineering design component of a curriculum *must include most of the following features*:

- Development of student creativity;
- Use of open-ended problems;
- Development and use of modern design theory and methodology;
- Formulation of design problem statements and specifications;
- Consideration of alternative solutions, feasibility considerations, production processes; concurrent engineering design, and detailed system descriptions.

Further, it is essential to include a variety of realistic constraints, such as economic factors, safety, reliability, aesthetics, ethics, and social impact.

Each educational program *must include a meaningful, major engineering design experience* that builds upon the fundamental concepts of mathematics, basic sciences, the humanities and social sciences, engineering topics, and communication skills.

The scope of the design experience within a program should match the requirements of practice within that discipline.

The major design experience should be taught in section sizes that are small enough to allow interaction between teacher and student. This does not imply that individual students must do all design work in isolation; team efforts are encouraged where appropriate.

Design cannot be taught in one subject. It is an experience that must grow with the student's development

A meaningful, major design experience means that, at some point when the student's academic development is nearly complete, there should be a design experience that both focuses the student's attention on professional practice and is drawn from past course work. Inevitably, this means a course, or a project, or a thesis that focuses upon design. "Meaningful" implies that the design experience is significant within the student's major and that it draws upon previous studies, but not necessarily upon every Mata Kuliah taken by the student.

Use of Computers in Electrical Engineering Design and Project

It is expected that students will be exposed to, and become proficient in the use of computers for:

- Hardware and software design of electrical and electronic systems
- The use of application packages for design and production
- The design and development of application packages in engineering

[5] Adapted from ABET 1998/99 Criteria for Accrediting Programs in engineering in the U.S.

Topics Included in Electrical Engineering Design and Project

Topic	Sub-Topic
Electrical Design:	Design of magnetic elements - inductors, transformers and electromagnets; CAD tools for electromagnetic circuit design; Design of earthing systems; Electrical machines; Transmission and distribution design; Programmable Logic Controller (PLC) system design; Design management.
Power Electronics	Overview of Power converter topologies; Characteristics of power semiconductors - diodes, SCRs, IGBJTs, MOSFETS etc.; Modelling of power circuits using PSPICE; Design management - reliability, testing; Design of gate and base drive circuits; Device protection; Design of magnetic high frequency components; Design of heat sinks; DC-DC switch mode power supplies; PCB design and production;
Electronic Design	Radio-frequency design; Measurement techniques; Transistor models and parameters; Small signal amplifier design; Power amplifiers, mixers, couplers and splitters, transformers, oscillators; Noise in electronic systems - noise generation; Coupling mechanisms – conducted, radiated, common mode, common impedance, differential mode, cross talk; Noise management techniques – sheeting and grouting, zoning, filtering, decoupling, near and far field effects.
Digital System Design	Logic families and characteristics; Timing analysis and design; PCB interconnection for high speed digital systems; Noise in digital systems; Design for testability; Design management.
Embedded Software Design	Development tools - emulators, simulators and analysers; Embedded architecture - the hardware/software co-design; Interrupt service routines and drivers; Object-oriented design for embedded systems; Specialized class libraries; Finite state software design; Fixed-point arithmetic and trigonometric algorithms.
Digital Signal Processing	Digital filter design- Finite impulse and infinite impulse response filters finite word length effects; Kalman filters - spectral estimation and analysis; General purpose hardware for digital signal processing (DSP) and applications.
Control Systems	Use of CAD packages for design of control systems; Integration of PLCs into control systems; Distributed control systems design; Data conditioning design; Design of man-machine interface.
Engineering Project	Investigation, research, critical evaluation, analysis, design and prototype analysis of a selected project in the area of specialisation; The preparation and presentation of a significant thesis/report of the project development and outcomes.

Topics Included in Electrical Engineering Design and Project

Topic	Sub-Topic
Electrical Design:	Design of magnetic elements - inductors, transformers and electror [illegible] CAD tools for electromagnetic circuit design; Design of earthing systems; Electrical machines; Transmission and distribution design; Programmable Logic Controller (PLC) system design; D [illegible]
Power Electronics	Overview of Power converter topologies; Characteristics of power semiconductors - diodes [illegible] s etc.; Modelling of power circuits using PSPICE; Design management - reliability, testing; Design of gate and base drive circuits; Device protection; Design of magnetic high frequenc [illegible] eat sinks; DC-DC switch mode power su [illegible] duction;
Electronic Design	Radio-frequency design; Mo [illegible] Transistor models and p [illegible] Small signal amplifier [illegible] ixers, couplers and splitters, transformers, oscilla [illegible] Noise in electroni [illegible] on; Coupling mec [illegible] ked, common mode, common impedance [illegible] k; Noise ma [illegible] eeting and grouting, zoning, filtering, decou [illegible] cts.
Digital System Design	Loc [illegible] cs; Timing analysis and design; [illegible] h speed digital systems; Noise in digital systems; [illegible] sign management.
Embedded Software Design	[illegible] emulators, simulators and analysers; [illegible] cture - the hardware/software co-design; [illegible] e routines and drivers; [illegible] ted design for embedded systems; [illegible] d class libraries; Finite state software design; [illegible] point arithmetic and trigonometric algorithms.
Digi [illegible]	[illegible] tal filter design- Finite impulse and infinite impulse response filters finite [illegible] ord length effects; Kalman filters - spectral estimation and analysis; General purpose hardware for digital signal processing (DSP) and applications.
[illegible]	Use of CAD packages for design of control systems; Integration of PLCs into control systems; Distributed control systems design; Data conditioning design; Design of man-machine interface.
Engineering Project	Investigation, research, critical evaluation, analysis, design and prototype analysis of a selected project in the area of specialisation; The preparation and presentation of a significant thesis/report of the project development and outcomes.

Control Systems
Use of CAD packages for design of control systems;
Integration of PLCs into control systems; Distributed control systems design;
Data conditioning design;
Design of man-machine interface.