MECHANICAL PROJECT 478
MECHATRONIC PROJECT 478
MECHATRONIC PROJECT 488
STUDY GUIDE

2016

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Fakulteit Ingenieurswese
Faculty of Engineering

Departement Meganiese en Megatroniese Ingenieurswese • Department of Mechanical and Mechatronic Engineering
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Tel: +27 (0) 21 808 4376 • Faks/Fax: +27 (0) 21 808 4958
DUE DATES FOR 2016

Every Monday 12:00 during the semester: Departmental research lecture.

Mo 1 Feb  Make sure all students got a topic.
Fri 5 Feb  12:00 Introductory lecture, information regarding module.
8 - 12 Feb  Students see their study leaders to arrange their regular appointments (at least every 2nd week in first semester, every week in 2nd semester).
Fri 12 Feb  12:00 Lecture regarding project proposals.
Fri 26 Feb  Hand in written project proposal to study leader.
Fri 13 May  12:00 Lecture regarding writing guide.
Fri 3 Jun  15:00 Optional early hand-in date for final report (only for students wishing to complete the final year project in the first semester). No late hand-ins.
Fri 17 Jun  Oral examination only for first semester projects (see detail in November).
June recess  Work at least 100 hours on Mechanical/Mechatronic Project.
Fri 22 Jul  12:00 Hand in progress report (at lecture, M306).
Fri 22 Jul  12:00 Lecture regarding presentations.
Fri 29 Jul  12:00 Announcement of postgraduate research topics.
11 - 12 Aug and  Project progress presentations (10 minutes per student).
25 - 26 Aug  
Mon 29 Aug  Study leaders report on their students’ progress to the course coordinator. If the progress is unsatisfactory, the project will be stopped.
Fri 16 Sept  12:00 Lecture regarding write-up of project (Language Centre).
Fri 23 Sept  12:00 Lecture regarding write-up of project (Language Centre).
Fri 23 Sept  Hand in a draft of the final report to the study leader by 15:00.
Fri 30 Sept  Last day on which module may be stopped.
Fri 30 Sept  12:00 Lecture regarding Techno-economic analysis, report and posters.
Fri 7 Oct  Draft final report returned to students.
Fri 14 Oct  12:00 Lecture regarding examination process and techno-economic analysis.
Wed 19 Oct  15:00 All equipment must be returned to the store and laboratories must be clean and neat. No further work on project is allowed.
Fri 21 Oct  15:00 Hand in at M517 (with Beryl Stoffberg):
Project file (see 6.3 for content)
Three copies of the final report (see 6.3 for content), and the following as appendices to the report:

- Outcome self-assessment
- Techno-economic analysis (see M&M web for content)
- Risk analysis and safety procedures

An electronic copy of the report in MS-Word or *.pdf format must also be handed in on WebCT “Turnitin” before 16:00.
NB: Note that 5% per ¼ hour (or part thereof) will be subtracted for late submission. For further information regarding late submission or extension of the submission, please see 6.5.

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mon 24 Oct</td>
<td>Copy of the final report sent to external moderator</td>
</tr>
<tr>
<td>Fri 18 Nov</td>
<td>Study leaders’ nominations for prizes (including Jac van der Merwe competition)</td>
</tr>
<tr>
<td>11, 14, 15, 16 Nov</td>
<td>Each student delivers a 10 minute presentation (see 6.4), followed by an oral examination by the study leader and internal examiner. The external moderator is also present to question the student and to interact with the study leader and internal examiner in order to finalise the student’s mark. During this session, the student must also exhibit his/her poster (see 6.4), and must also hand in a CD/DVD that contains final report, project proposal, both oral presentations, poster, CAD models, data sheets, calculations, computer programmes, etc. to his study leader.</td>
</tr>
<tr>
<td>Thu 17 Nov</td>
<td>10:00 - 12:00 All students exhibit their posters in the Department to showcase their project to the general public and fellow students in M306.</td>
</tr>
<tr>
<td>Thu 17 Nov</td>
<td>14:00 Students nominated by study leaders and internal examiners take part in an oral presentation competition for the SAIMechE award for the best and runner-up presentations.</td>
</tr>
</tbody>
</table>
Stellenbosch University Faculty of Engineering
Module Framework
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This document should be read with the following documents:
- Stellenbosch University Calendar Parts 1 and 11.
- Faculty of Engineering Assessment Rules
- Faculty of Engineering General Stipulations for Undergraduate Modules

MECHANICAL PROJECT 478
MECHATRONIC PROJECT 478
MECHATRONIC PROJECT 488
2016

Lecturer(s):
Semester 1: Dr Corné Coetzee, Room M505,
Tel: 808 4239, epos: ccoetzee@sun.ac.za
Semester 2: Prof Gerhard Venter, Room M526,
Tel: 808 3560, epos: gventer@sun.ac.za

Approved by
Programme Coordinator:
Date: 29/01/2016

1 Assessment Details

- Method of assessment as indicated in the Calendar Part 11
- Note that awarding a pass mark is subject to meeting each of the ECSA Exit Level Outcomes assessed in this module, as stated in Faculty of Engineering’s Assessment Rules

Calculation of final marks:
Refer to section 9 for detail. Continuation can at any stage be refused on the grounds of insufficient progress (see 6.2).

2 Module Objectives

Aim: Independent execution of theoretical and/or practical design and/or investigation in the field of mechanical/mechatronic engineering with formal oral presentations and the submission of a final comprehensive report.

A student who has successfully completed this module can:
1) Solve engineering problems by:
   a) Applying a synthesis of knowledge and technologies from different basic and engineering sciences.
   b) Application of engineering methods, skills and techniques to arrive at practical results and sound assessment of results.
   c) Work creatively by, amongst others, independently assemble and utilise new information.
   d) Apply sound engineering judgement
2) Independently and successfully complete a mechanical/mechatronic project within stipulated due dates
3) Plan a project, taking objective formulation, steps required and time schedules into account
4) Compile technical reports on the planning, progress and the whole of a project
5) Give professional oral presentations on the progress and the results of a project.
6) Demonstrate a grasp and appreciation of professional ethics and practice in the execution of an engineering project

1 Available on SUNLearn for modules offered by Faculty of Engineering, in the block titled “General Programme Information” on the left-hand side
3 Module Content and Schedule

Prescribed textbook(s): No prescribed books

Notes: Guidelines for Project Proposals
Guidelines for Technical Presentations
Guide for Writing Technical Reports
Guidelines for Poster Presentations
Notes on techno-economic analysis
Notes on safety with laboratory setups
Any other sources indicated by module coordinator

Other sources: The study leader may indicate additional sources, as dictated by the project.

<table>
<thead>
<tr>
<th>Period en Duration</th>
<th>Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fourth term of preceding year</td>
<td>Students are given the opportunity to propose projects to study leaders.</td>
</tr>
<tr>
<td></td>
<td>Lecturers compile a list of potential projects.</td>
</tr>
<tr>
<td></td>
<td>Students each choose three projects and indicate their order of preference.</td>
</tr>
<tr>
<td></td>
<td>Projects are then assigned to students.</td>
</tr>
<tr>
<td>First semester of fourth year</td>
<td>Lectures are presented on professional oral presentations and written communication.</td>
</tr>
<tr>
<td>5 hr per week = 70 hr</td>
<td>Students must compile a written project proposal and do an oral presentation on the project proposal.</td>
</tr>
<tr>
<td></td>
<td>Students must start working on their projects.</td>
</tr>
<tr>
<td>June recess</td>
<td>Students work full-time on their projects.</td>
</tr>
<tr>
<td>at least 100 hr</td>
<td></td>
</tr>
<tr>
<td>Second semester of fourth year</td>
<td>Lectures are presented on professional oral presentations and written communication.</td>
</tr>
<tr>
<td>28 hr per week = 392 hr</td>
<td>Complete the work on the project.</td>
</tr>
<tr>
<td></td>
<td>Students complete a final report.</td>
</tr>
<tr>
<td>November-examination period</td>
<td>Students must each deliver an oral and poster presentation.</td>
</tr>
<tr>
<td></td>
<td>All final reports are assessed by the study leaders, internal examiners and external moderators.</td>
</tr>
</tbody>
</table>
### 4 ECSA Knowledge Area Credits

<table>
<thead>
<tr>
<th>Mathematical Sciences</th>
<th>Natural Sciences</th>
<th>Engineering Sciences</th>
<th>Design and Synthesis</th>
<th>Complementary Studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>87%</td>
<td>13%</td>
</tr>
</tbody>
</table>

**Design and Synthesis:** Solving a complex engineering problem. This involves, amongst other things, the design of components, systems, engineering works, products and processes. The solution involves a synthesis of knowledge from senior level modules as well as new knowledge.

**Complementary Studies:** By means of formal lectures, students learn how to write a comprehensive project report, how to report on the project using an oral presentation and also how to convey the essence of the project to the general public by means of a poster.

### 5 ECSA Exit Level Outcomes

**ELO 1. Problem solving:** Demonstrate competence to identify, assess, formulate and solve convergent and divergent engineering problems creatively and innovatively.

**How is the Outcome Assessed?**

The candidate must successfully complete an individual project. The project is assessed using a number of reports, oral presentations and poster as stipulated in the due dates section at the start of this document.

The candidate applies in a number of varied instances, a systematic problem solving method including:

1. Analyses and defines the problem, identifies the criteria for an acceptable solution;
2. Identifies necessary information and applicable engineering and other knowledge and skills;
3. Generates and formulates possible approaches to solution of problem;
4. Models and analyses possible solution(s);
5. Evaluates possible solutions and selects best solution;
6. Formulates and presents the solution in an appropriate form.

**What is Satisfactory Performance?**

An engineering problem has been identified and solved systematically. Engineering judgement was sufficiently exhibited.

**ELO 2. Application of scientific and engineering knowledge:** Demonstrate competence to apply knowledge of mathematics, basic science and engineering sciences from first principles to solve engineering problems.

**How is the Outcome Assessed?**

The candidate must successfully complete an individual project. The project is assessed using a number of reports, oral presentations and poster as stipulated in due dates section at the start of this document.

The candidate:

1. Brings mathematical and numerical analysis to bear on engineering problems by using an appropriate mix of:
   - a) Formal analysis and modelling of engineering components, systems or processes;
   - b) Communicating concepts, ideas and theories with the aid of mathematics;
   - c) Reasoning about and conceptualising engineering components, systems or processes using mathematical concepts.
2. Uses physical laws and knowledge of the physical world as a foundation for the engineering sciences and the solution of engineering problems by an appropriate mix of:
   - a) Formal analysis and modelling of engineering components, systems or processes using principles and knowledge of the basic sciences;
   - b) Reasoning about and conceptualising engineering problems, components, systems
or processes using principles of the basic sciences.

3. Uses the techniques, principles and laws of engineering science at a fundamental level and in at least one specialist area to:
   a) Identify and solve open-ended engineering problems;
   b) Identify and pursue engineering applications;
   c) Work across engineering disciplinary boundaries through cross disciplinary literacy and shared fundamental knowledge.

| What is Satisfactory Performance? | Technical depth is at the 3rd or 4th year of the BEng programme. Coherent and critical application of the fundamental principles and theory were adequately demonstrated. |

**ELO 3. Engineering Design**: Demonstrate competence to perform creative, *procedural* and *non-procedural* design and synthesis of components, systems, engineering works, products or processes.

**How is the Outcome Assessed?**
The candidate designs components, systems, engineering works, products or processes as part of the project. The design process and its outcome is documented in the report.
The candidate executes an acceptable design process encompassing the following:
1. Plans and manages the design process: focuses on important issues, recognises and deals with constraints;
2. Acquires and evaluates the requisite knowledge, information and resources: applies correct principles, evaluates and uses design tools;
3. Performs design tasks including analysis, quantitative modelling and optimisation;
4. Evaluates alternatives and preferred solution: exercises judgment, tests implementability and performs techno-economic analyses;
5. Communicates the design logic and information.

**What is Satisfactory Performance?**
Alternatives were critically considered. It was demonstrated that the project’s result is functional and utilises knowledge from the applicable areas.

**ELO 5. Engineering methods, skills and tools, including Information Technology**: Demonstrate competence to use appropriate engineering methods, *skills* and tools, including those based on information technology.

**How is the Outcome Assessed?**
Sufficient demonstration of the critical use of applicable engineering methods, skills and tools at the level of 3rd or 4th year BEng is required.
The candidate:
1. Uses method, skill or tool effectively by:
   a) Selecting and assessing the applicability and limitations of the method, skill or tool;
   b) Properly applying the method, skill or tool;
   c) Critically testing and assessing the end-results produced by the method, skill or tool;
2. Creates computer applications as required by the discipline.

**What is Satisfactory Performance?**
Sufficient demonstration of the critical use of applicable engineering methods, skills and tools at the level of 3rd or 4th year BEng. The techno-economic analysis is acceptable.

**ELO 6. Professional and technical communication**: Demonstrate competence to communicate effectively, both orally and in writing, with engineering audiences and the community at large.

**How is the Outcome Assessed?**
The candidate demonstrated: The communication was clear and understandable; Oral presentations, poster and final report are professionally acceptable; Language usage is as required for technical communication.
The candidate executes effective written communication as evidenced by:
1. Uses appropriate structure, style and language for purpose and audience;
2. Uses effective graphical support;
3. Applies methods of providing information for use by others involved in engineering activity;
4. Meets the requirements of the target audience.
The candidate executes effective oral communication as evidenced by:
1. Uses appropriate structure, style and language;
2. Uses appropriate visual materials;
3. Delivers fluently;
4. Meets the requirements of the intended audience.
**What is Satisfactory Performance?**
The communication was clear and understandable. Oral presentations, poster and final report are professionally acceptable. Structure, style, and language is as required for technical communication, and according to Departmental guidelines.

**ELO 8. Individual, Team and Multidisciplinary Working:** Demonstrate competence to work effectively as an individual, in teams and in multi-disciplinary environments.

**How is the Outcome Assessed?**
The candidate demonstrated: The main objectives of the project were achieved; The student’s work was focussed on the objectives and well planned; Moderate supervision was required. The candidate demonstrates effective individual work by performing the following:

1. Identifies and focuses on objectives;
2. Works strategically;
3. Executes tasks effectively;
4. Delivers completed work on time.

**What is Satisfactory Performance?**
The main objectives of the project were achieved on time. The student’s work was focussed on the objectives and well planned. Moderate supervision was required.

**ELO 9. Independent Learning Ability:** Demonstrate competence to engage in independent learning through well-developed learning skills.

**How is the Outcome Assessed?**
The candidate demonstrated: Applicable independent research was conducted and sensibly used in the project; The source material used was at the level of a 3rd or 4th year text book. The candidate shows evidence of being an effective independent learner by the following:

1. Reflects on own learning and determines learning requirements and strategies;
2. Sources and evaluates information;
3. Accesses, comprehends and applies knowledge acquired outside formal instruction;
4. Critically challenges assumptions and embraces new thinking.

**What is Satisfactory Performance?**
Applicable independent research was integrated in project plan, conducted critically and sensibly used in the project. The source material used was at the level of a 3rd or 4th year text book.

6 **Guidelines**

6.1 **Technical Focus**

- The student must ensure that, in the course of the execution of the project, he/she demonstrates that he/she can judiciously utilise the technical knowledge gained in the third and fourth year modules to an engineering project, and sufficiently address all the outcomes as required by the module.

- Students must demonstrate in the execution and documentation of the project that the integration of their part of the project in a greater mechanical/mechatronic system was sensibly taken into account.

6.2 **Insufficient Progress**

- Continuation of the module can be refused at any stage due to insufficient progress. The particular student must drop the module in such a case, or a fail will be awarded.

- All students’ progress will continually be assessed by the study leader. The study leader can at any stage request the student to do an oral presentation of the project’s progress to a panel of three lecturers (appointed by the Chairman; the study leader is normally one of the panel members). If this panel finds that the student’s progress has been insufficient, continuation of the project will be refused.
6.3 Project File and Final Report

- Three copies of the final reports must be submitted at the student's cost. Additional copies may be made for bursary companies, employers, etc. if they require it. Project reports may not be copied at the copy room of the Department of Mechanical and Mechatronic Engineering.

- Editorial aspects of the final report must be in accordance with the department's "Guide for Writing Technical Reports", which is available at http://mecheng.sun.ac.za.

- The report may not be more than 50 pages from the introduction to the conclusion. The appendices may not be more than 25 pages. Detail information such as manufacturing drawings, data sheets, etc. must be included in the project file, but not in the report.

- A summary page, in the format given in section 10, must be bound in just after the title page (where the abstract would have come). The report must not have another abstract.

- The page following the summary page must contain the Department's plagiarism declaration, available at http://mecheng.sun.ac.za. The declaration must be dated and signed by the student.

- A summary of all the actual costs incurred in the project as well as a techno-economic analysis must be included as one of the appendices. The costs of the student's own time, purchases, operating costs, the costs associated with use of equipment, etc. must be included.

- A Gantt chart with the project plan as well as the actual execution of the project must be included as one of the appendices.

- A risk assessment of laboratory or experimental setups, including any safety measures/procedures and emergency evacuation procedures relating to experimental work must be included as one of the appendices.

- If the objectives of the project changed during its execution, this must explicitly be discussed and motivated in the introduction.

- Do not refer to the report as a "thesis".

- An outcome assessment must accompany the Final Report and included and bound into the report after the summary page. This assessment is a single page on which the student must indicate which parts of the report presents evidence of achieving each of the ECSA outcomes (as specified in this document). A sentence or two can also be given for each outcome to explain how those parts of the report demonstrate achieving the outcome.

- Even though the Final Report is the most important document in the determination of the final mark, the final assessment and external moderation will include consideration of the whole Project File, the marks given for the project proposal, progress report, oral presentations, poster and attendance of the research and general lectures.

- Each student must submit a complete project file by the due dates as specified in this document, to pass the module. It is the student's responsibility to compile the Project File and to ensure that it is complete. The Project File must contain at least the following documents, in the order given here:
  - The original instruction for the project.
  - Every other report submitted (including Project Proposal, Pre-study, preliminary final, etc.), as they were marked by the study leader.
o Copies of the weekly progress reports that the student submitted to the study leader.

6.4 Oral and Poster Presentations

- Student must on two occasions, as indicated in the due dates section, give oral presentations on his/her project. The time limit is normally 10 minutes per presentation. Students being considered for the SAIMechE prizes for best and runner-up presentations must give a further oral presentation.
- The oral presentations are aimed at an audience of graduate engineers. The first presentation is aimed towards presenting the progress of the project, and the second is aimed at convincing the client that the work has been completed and can be invoiced.
- The poster presentation must adhere to the requirements given in Guidelines for Poster Presentations (see http://mecheng.sun.ac.za) and must be aimed at the general public.
- The poster itself must remain in the department after the presentations.

6.5 Due Dates and Regular Meetings

- All due dates are specified at the start of this document. The due dates for submission of the final reports must be complied with strictly, whether the originally planned work is completed or not. If a student fails due to marks being subtracted due to late submission, he/she will fail Mechanical/Mechatronic Project and have to do a new project in the next year.
- Extensions for submission of the final report will only be considered if unforeseen circumstances beyond the control of the student lead to a significant delay (e.g. for a few weeks) in the execution of the project. If a student is convinced that he/she should be granted an extension, he/she must submit a well motivated written request to the Departmental Chairman, at least two weeks before the due date. Only a written grant for extension from the Chairman of M&M will be acknowledged for late submission of the final report.
- Students must meet their study leaders at least once every second week in the first semester and once per week in the second semester at mutually agreed times. A short report (typically ½ page) on the preceding week’s progress and the coming week’s objectives, must be handed to the study leader at each of these meetings. The reports must be kept in the Project File as record of the student’s progress.
- All students (including repeaters) must attend the weekly research lectures. A student may not miss more than three lectures per year without being excused by the course coordinator. Exemption from research lecture attendance must be completed using a pink form and signed by the course coordinator.
- Besides the research lectures, there will also be additional lectures scheduled by the coordinator. All lectures are compulsory.

6.6 Study Guidance

- The student is responsible for his/her whole task, as for any other subject. He/she must do his/her best, with the outcomes of the module in mind, in the time allocated to the module and report the work in the final report.
- The study leader will guide the student in the formulation of the objectives for the project.
• The study leader will give reasonable, but restricted guidance during the execution and reporting of the project.
• The study leader will review the draft of the final reports in detail and give the student feedback on the quality of the work and the report writing.

6.7 Assessment
• Note section 6.6 gives the point of departure in the assessment.
• The project proposal, progress report, final report, project file and poster represent the examination scripts.
• The study leader and an internal examiner evaluate (independently of one another) the student's work and his/her reporting based on the final report, oral presentations and poster. They may also consider the project file. Marks for the technical content and the complementary content are awarded separately. A student must pass both sections, as well as each outcome, to pass the module.
• External moderators for the module are nominated by the Department’s Executive Committee, and are then approved by the Faculty of Engineering’s Faculty Board. The external moderators are graduate engineers with appropriate industry experience.
• Each student's final report and marks are then considered by at least one external moderator. The reports are sent to the external moderators several weeks before the oral presentations. The moderators then visit the Department during the November examination period, during which the oral and poster presentations will take place. Each student will deliver a 10 minute oral presentation, after which he/she will be questioned by the study leader, internal examiner and the external moderator. The external moderator will award the final mark, based on the student’s defence of his/her work, and the marks awarded by the study leader and internal examiner. The external moderators will also consider the grades given for the project proposal, progress report and progress presentation, and the attendance record of the research lectures will also be taken into account for assessment.
• The marks approved by the external moderators are final. No re-marking will be allowed because the projects had already been subjected to external examination.

7 Procedures

7.1 General
Students must note that specific procedures must be followed for the following:
• To have something made in the workshops.
• For the purchase of equipment or components.
• For the use of the laboratories and instrumentation store.

Projects that are lead by the Department of Mechanical and Mechatronic Engineering are funded by Mechanical and Mechatronic Engineering and are subject to the procedures of that department. Similarly, projects that are lead by the Department of Electrical and Electronic Engineering are funded by Electrical and Electronic Engineering and are subject to the procedures of that department.
Please refer to http://mecheng.sun.ac.za for the procedures applicable in the Department of Mechanical and Mechatronic Engineering, and to http://www.ee.sun.ac.za for the Department of Electrical and Electronic Engineering’s procedures.

7.2 Safety

- Students must study the general safety instructions and complete the attached indemnity form, before he/she may enter the laboratories. All students must attend the safety training lecture.
- Students are warned to work safely and to adhere to the general safety instructions.
- Please contact the technician in charge of the lab, lecturer or departmental chairperson, should you become aware of any dangerous situation in the labs.

8 Plagiarism

Plagiarism is viewed as a very serious offence. “Turnitin” will check all the final reports and will automatically report instances of plagiarism.

Note: In the preliminary reports, study leaders will not bring their suspicions of plagiarism to the attention of students.

If a student commits plagiarism, the matter will be handled as follows:

- The Chairman will check whether it is the student’s first offence within the university, and whether the offence can be classified as a Category 2 (“less serious matters”) or a Category 3 (“due to negligence or inaccuracy”) according to the interim policy regarding plagiarism. If so, the procedure described below will be followed. If not, the matter will be reported to the Central Disciplinary Committee / Sentrale Dissiplinêre Komitee (SDK).
- The Chairman will decide on a suitable sanction against the student. Normally, a student will be given a zero for his/her project if it can be proven that plagiarism was committed.

In accordance with the instructions in Part 1 of the yearbook, the student will be orally informed:

- That he/she committed an offence.
- That the Department would be willing to handle the matter internally (departmental).
- Which sanctions the Department will apply in the departmental handling of the case.
- That, if the student so wish, the matter can be referred to the CDC (SDK).
- That the CDC (SDK) entails a more formal process and that there exists, amongst other things, a “right to assistance” for students in this process.
- That the penalties that the CDC (SDK) may impose can include the following: expulsion or suspension from the University; forfeiting of the degree/ diploma; forfeiting of a class mark or other methods through which credits were accrued. Die details of the offence and the penalty, with inclusion of the student’s name, may be published on notice boards on the campus.
- That, if the student chooses that the matter be handled internally (departmental), he/she forfeits “right to assistance”.
- That, if the student chooses that the matter be handled internally (departmental), he/she forfeits the right to claim access to the CDC (SDK) process.
After this information was conveyed to the student, he/she must confirm their choice of procedure in writing, otherwise the matter will be handed over to the CDC (SDK). The Division of the Registrar will be notified in writing that the matter is handled internally and will be informed of the sanctions that were handed down.

9 Marking Schedules

9.1 Mechanical/Mechatronic Project 478/488 Marking Schedule

(next page)
<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Fail</th>
<th>Pass</th>
<th>Distinction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problem Solving</td>
<td>The student made an attempt, but problem identification or solution was unsatisfactory.</td>
<td>A complex engineering problem has been identified and solved systematically. Engineering judgement was sufficiently exhibited.</td>
<td>A complex engineering problem has been effectively solved and the results realistically interpreted. The interpretation/solution is innovative or advanced.</td>
</tr>
<tr>
<td>Application of scientific and engineering knowledge</td>
<td>Basic knowledge was used, but not correctly or the technical depth is not sufficient. No coherent and/or critical application.</td>
<td>Technical depth is at the 3rd or 4th year of the BEng programme. Coherent and critical application of the fundamental principles and theory were adequately demonstrated.</td>
<td>Knowledge was applied to the problem in an innovative way. Technical depth is advanced, publishable work.</td>
</tr>
<tr>
<td>Engineering Design (including design of an investigation, experiment or software)</td>
<td>An attempt has been made to design something, but the result was not of significant value.</td>
<td>Alternatives were critically considered. It was demonstrated that the project’s result is functional and utilises knowledge from the applicable areas.</td>
<td>The project’s results can be utilised as is, has been thoroughly completed and/or is of significant practical or research value.</td>
</tr>
<tr>
<td>Engineering methods, skills and tools, including IT</td>
<td>Applicable methods/tools were not used or were used incorrectly. The techno-economic analysis is superficial or missing.</td>
<td>Sufficient demonstration of the critical use of applicable engineering methods, skills and tools at the level of 3rd or 4th year BEng. The techno-economic analysis is acceptable.</td>
<td>In addition to the successful use of the basic tools, new tools were mastered and applied to the task. The techno-economic analysis is of outstanding quality.</td>
</tr>
<tr>
<td>Professional and technical communication</td>
<td>Objectives, problem statement, content or scope of the project not clearly communicated, or the oral presentations, reports or poster were not of a professional standard.</td>
<td>The communication was clear and understandable. Oral presentations, poster and final report are professionally acceptable. Structure, style, and language are as required for technical communication, and according to Departmental guidelines.</td>
<td>The student gave a concise explanation of a large volume of work. Difficult concepts were conveyed so that it was understandable at first reading. The material was compiled systematically so that the arguments flow logically.</td>
</tr>
<tr>
<td>Individual work</td>
<td>A significant part of the project objectives were not achieved due to, e.g. poor planning, time management, or interaction with co-workers. A lot of supervision was required.</td>
<td>The main objectives of the project were achieved on time. The student’s work was focussed on the objectives and well planned. Moderate supervision was required.</td>
<td>The student showed initiative and generated innovative ideas that improved the project’s results beyond the original objectives. Student required little supervision.</td>
</tr>
<tr>
<td>Independent learning ability</td>
<td>New information was gathered, but applied incorrectly or incompletely. Too little evidence of the essential research required for the project.</td>
<td>Applicable independent research was integrated in project plan, conducted critically and sensibly used in the project. The source material used was at the level of a 3rd or 4th year text book.</td>
<td>The research conducted by the student or the level of difficulty of the work is at or near post-graduate level. The student read widely and used the source material critically.</td>
</tr>
</tbody>
</table>

Note: A fail in any outcome leads to a final mark of less than 50.
### 9.2 Assessment Scheme for Oral Presentations for Mechanical and Mechatronic Projects

Name of Student: ………………………………………………………………………..

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<tbody>
<tr>
<td>Presentation on project progress</td>
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<td>Presentation on whole project</td>
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**A  VERBAL COMMUNICATION**
(audibility, voice tone and quality, tempo, language usage)

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**B  NON-VERBAL COMMUNICATION**
(enthusiasm, posture, eye contact, gestures, facial expression)

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**C  CONTENT**
(credibility, technical content conclusions, comprehensibility)

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</table>

**D  MEDIA USE**

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**E  OVERALL IMPRESSION**

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<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
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</tbody>
</table>

**TOTAL**

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<tr>
<th></th>
<th>X2</th>
<th>%</th>
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</thead>
</table>

### NOTE:
The time for each presentation is 10 minutes. Student are penalised if they exceed this limit.
### 9.3 Moderation Guideline for Final Mark Allocation

<table>
<thead>
<tr>
<th>Mark</th>
<th>Project Manage-ment</th>
<th>Task Completed</th>
<th>Did more than required</th>
<th>Did better than required</th>
<th>Original work (publishable)</th>
<th>Presentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>90+</td>
<td>Perfect</td>
<td>Perfect</td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
<td>Perfect</td>
</tr>
<tr>
<td>75+</td>
<td>Excellent</td>
<td>Excellent</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Excellent</td>
</tr>
<tr>
<td>70+</td>
<td>Good</td>
<td>Good</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>Good</td>
</tr>
<tr>
<td>60+</td>
<td>Average</td>
<td>Yes</td>
<td>Yes/No</td>
<td>No/Yes</td>
<td>No</td>
<td>Acceptable</td>
</tr>
<tr>
<td>50+</td>
<td>Acceptable</td>
<td>No, but ...</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Acceptable</td>
</tr>
<tr>
<td>40+</td>
<td>Poor</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Acceptable</td>
</tr>
<tr>
<td>39-</td>
<td>Poor</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>No</td>
<td>Unacceptable</td>
</tr>
</tbody>
</table>
**10 Prescribed Summary page**

Note: the wording in the table will differ slightly for the Project Proposal and for the Final Report. Keep the appropriate wording in each report and omit the remainder.

<table>
<thead>
<tr>
<th>Executive Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>Title of Project</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Objectives</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>What (am I going to / did I) do that is new/unique?</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>What are the (expected) findings?</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>What value will/do the results have?</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>If more than one student involved, what part will/did I do?</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Which aspects of the project will carry on after completion of my part?</td>
</tr>
</tbody>
</table>
11 General Safety Instructions

UNIVERSITY OF STELLENBOSCH
DEPARTMENT OF MECHANICAL AND MECHATRONIC ENGINEERING

- Help prevent risks to people and machines by being careful, alert and pro-active. When in doubt, ask the technician or lecturer in charge.

- According to the Public Health and Safety Act (no 85 of 1993), a student is considered an employee of the University of Stellenbosch. Copies of the Public Health and Safety Act, no 85 of 1993 are available from the Departmental Chairman.

- If a student is instructed by either his/her supervisor, another lecturer or technician in with regards to safety, the Act prohibits him/her from disobeying such instructions. The Act does not recognise a statement such as "at their own risk".

- These instructions are applicable to students, personnel and persons entering the laboratories and other rooms of the Department of Mechanical and Mechatronic Engineering.

In case of an emergency: Contact the technician/lecturer/Campus Security

Emergency phone: located in the entrance hall of the laboratory block/SMD entrance

<table>
<thead>
<tr>
<th>DIVISION</th>
<th>TECHNICIAN / LECTURER IN CHARGE</th>
<th>ROOM No.</th>
<th>WORK TEL No.</th>
<th>HOME TEL No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>General</td>
<td>Prof G Venter</td>
<td>M526</td>
<td>3560</td>
<td>4666</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>4666</td>
<td></td>
</tr>
<tr>
<td>Thermo-fluids</td>
<td>Mr Cobus Zietsman</td>
<td>M212</td>
<td>4275</td>
<td>083 767 1835</td>
</tr>
<tr>
<td></td>
<td>Prof HC Reuter</td>
<td>M524</td>
<td>4261</td>
<td>072 724 9819</td>
</tr>
<tr>
<td>Structural Mechanics</td>
<td>Mr Ferdi Zietsman</td>
<td>M213</td>
<td>4954</td>
<td>083 233 1646</td>
</tr>
<tr>
<td></td>
<td>Dr A Bekker</td>
<td>M617</td>
<td>3914</td>
<td>082 878 2698</td>
</tr>
<tr>
<td>Mechatronics</td>
<td>Prof K Schreve</td>
<td>M507</td>
<td>4091</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mr Kevin Neaves</td>
<td>M239</td>
<td>4279</td>
<td>072 109 5926</td>
</tr>
<tr>
<td>NC Machining</td>
<td>Mr Graham Hamerse</td>
<td>Workshop</td>
<td>4285</td>
<td>082 707 6977</td>
</tr>
<tr>
<td>Fire Brigade</td>
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<td>887 1333</td>
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<tr>
<td>Ambulance</td>
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<td>883 3444</td>
</tr>
<tr>
<td>Police</td>
<td></td>
<td></td>
<td></td>
<td>10111 of 883 3222</td>
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<tr>
<td>Student Health Services</td>
<td></td>
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<td>808 3496</td>
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<table>
<thead>
<tr>
<th>PERSONNEL</th>
<th>FIRST-AID TRAINED</th>
<th>TEL No</th>
<th>ROOM No</th>
<th>FIRST-AID KIT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mnr Cobus Zietsman</td>
<td>Yes</td>
<td>4275</td>
<td>M212</td>
<td>No</td>
</tr>
<tr>
<td>Me Maurisha Galant</td>
<td>Yes</td>
<td>4278</td>
<td>MMW/Store/106/214</td>
<td>Yes</td>
</tr>
<tr>
<td>Mnr Pieter Hough</td>
<td>Yes</td>
<td>3479</td>
<td>M610</td>
<td>Yes</td>
</tr>
<tr>
<td>Mnr Juliun Stanfliet</td>
<td>Yes</td>
<td>4285</td>
<td>M142</td>
<td>Yes</td>
</tr>
<tr>
<td>Kevin Neaves</td>
<td>Yes</td>
<td>4279</td>
<td>M238</td>
<td>Yes</td>
</tr>
<tr>
<td>Shiyaam Valentyn</td>
<td>Yes</td>
<td>4278</td>
<td>M611</td>
<td>Yes</td>
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</tbody>
</table>
All Hours

• **No person is permitted to work alone in a laboratory.** When a student has permission to work after hours, another person should always be present, regardless of the nature of the work.

• **Do not enter the Internal Combustion Engine Laboratory while the fire alarm is switched on.** The automatic fire-fighting system releasing gases which can lead to suffocation.

• **After hours emergencies:** Use the emergency phone in the entrance hall of the laboratory block/SMD to contact Campus Security (Tel. 4666).

Reporting of safety risks and incidents

• Report all safety risks, for example unsafe/defective electrical wiring and cables, air-pressure pipes, etc. either to the technician/lecturer in charge or to the Departmental Chairman.

• Report all incidents of injury to persons either to the technician/lecturer in charge or to the Departmental Chairman.

Dress & Safety Equipment

• Closed shoes should always be worn in the laboratories. Bare feet or open toed shoes are not allowed.

• Safety shoes must be worn when heavy equipment is being moved.

• Eye protection safety equipment must be used where eye injuries could possibly occur.

• Ear protectors should be used in case of moderate to high noise levels.

• All persons should be aware of the location of fire extinguishers or fire hoses.

• Loose clothing or long hair is not allowed near moving machines.

Permission required

• **No person is allowed to handle dangerous equipment on his/her own.** Dangerous equipment refers to any equipment with rotating or moving parts or equipment that can cause any other danger such as explosions, fire or electrocution. At least one other person must be present in the laboratory when such dangerous equipment is used. When a student has permission to work after hours, another person should always be present, regardless of the nature of the work.

• **Only authorised personnel are allowed to operate electrical equipment.** The Act is very strict in this instance and a student is not even allowed to connect a 15 A plug.

• **Students should first acquire permission before they work in any laboratory or with any equipment.** Permission should be obtained from the person in charge of the particular equipment or laboratory. The names of the relevant personnel are clearly stated on the doors of the laboratories.

General safety regulations applicable to laboratories

• Smoking is not allowed in either the laboratories or the workshops.

• No one is permitted to work in a laboratory after consuming alcohol.

• The laboratories should be cleaned every day after the completion of any work.

• Persons working in laboratories where gases and fumes can build up must personally ensure that the ventilation is adequate.

• Fuels, paints and other flammable materials or materials that give off fumes, should be stored in the correct manner.
Misuse of Equipment and Negligence

- Any student that fails to return equipment to the store according to the store’s rules, will be fined R100.

- If equipment must be replaced or repaired as a result of negligence by a student, the student must contribute towards the costs. The student’s contribution will be calculated as follows:
  
  - If the replacement / repair cost of the equipment is R300 or less, the student will be held responsible for the entire amount.
  
  - If the replacement / repair cost of the equipment in excess of R300 the student must pay one third of the insurance excess fare, or a third of the equipment’s replacement / repair value if the insurance does not accept the claim.

- The student must pay the fine at Admin into cost centre 368F en must then show the receipt to the laboratory manager before he/she will be allowed to use departmental equipment again. The decision of whether a fine is applicable to the student, will be with the laboratory manager, but the student may appeal the decision with the Departmental Chariman.

Every student doing Mechanical/Mechatronic Project 478 must sign the form below and hand it in at M517. If a student does not comply with this, he/she may not use the laboratories.

I .................................................. (name)..................................(student number) acknowledge receipt of a copy of the document titled "General Safety Instructions" of the Department of Mechanical and Mechatronic Engineering. I hereby declare that I have studied the document and understand it.

Signed:  .........................

Date:  ..........................