Important notes on the Project EPR400/EPR402 exams

1. YEAR MARK AND FINAL MARK

► **Importantly, see this extract from the study guide.**

> Note that the year mark is used as an exam entry mark, but does not contribute to the final mark.
>
> The exam mark is also the final mark.

In other words: once the year mark has gained the student entry into the examination, the year mark is cancelled and is not considered again. This is different than in all other modules and is specific to Project.

The reason is obvious and is inherently so because of the nature of the final year capstone project. Up to this point, your marks in Project were based mostly on reporting. It is only at the examination that you will present your work to a full examination panel of three independent examiners.

2. WHAT IS EVALUATED?

► **Projects are evaluated against the approved Project Proposal. Neither students nor study leaders were allowed to make any changes to approved project proposals.**

The question and answer below describes why this is so.

Question asked by student

Why can't I change the project requirements? I struggled with getting my signal processing code to work and then rather used code that I found on the internet. I'll be able to get my project working if I used off-the-shelf signal processing code.

Answer

One cannot change requirements to match what you have done. This never works this way in any engineering project. As an extreme example, imagine what would happen if the requirement of developing an autopilot system for a specific aeroplane is dropped in favour of an off-the-shelf solution. Developing the autopilot from scratch requires complete knowledge of the dynamics of the plane. Taking the easy way out and downloading generic code from somewhere is a recipe for disaster.

This is just an example, but demonstrates the point. The approved Project Proposal captures the project requirements. To recap, the objectives are as follows.

- *To ensure that the student is correctly positioned to demonstrate that he/she has met the relevant ECSA GAs. It won't be in the interest of the student to change project requirements and in the process place the student in a position where he/she cannot demonstrate the skills required by the ECSA GAs against which evaluation is done.*
- *To ensure that students learn the nature and the discipline of the real engineering world in which they will work after graduation. It would be poor education practice to teach a student that it is okay to chop and change requirements to suit the engineer. The opportunity for adjustments to requirements is during the contracting process, but after this the contract with a client fixes requirements and deliverables and the task of the engineer is then to deliver a project within the boundaries created by those requirements.*
- *To ensure that evaluation is consistent. Through the process of revisions and eventual approval of the Project Proposal, projects have been adjusted to ensure that each project falls in the correct range of project scope and project complexity. If the requirements for some projects are changed at a late stage, the integrity of the process is lost and evaluation can neither be fair nor consistent.*

3. PASS REQUIREMENTS

- The expectation is that you document in your report, and show in your demonstration, your product working in actual field conditions (please see the requirements for your project in your approved Project Proposal).

  ► **To show that a system could work *in principle*, or could meet requirements *in principle*, is not that same as actually meeting the requirements and does not demonstrate the capabilities that are tested in Project.**

Kindly remember that Project is your capstone module (64 credits, more than 10% of your degree programme) in which you have to *demonstrate* your abilities as engineer. Examiners have to evaluate whether you have reached the level at which an engineer should be able to perform engineering tasks (as reflected in the ECSA Graduate Attributes for the module).

► The *minimum pass requirements* are those documented in the approved Project Proposal. Completing (say) 50% of the work means that the student has not come close to meeting these requirements.

The report should be clear, correct and concise. Don't spend too much time (and space) on long descriptions and *especially* don't focus on aspects not designed by yourself. E.g., a long description of different microprocessors, or a copy of mathematical derivations from a journal article won't gain you any credit.

It is important to note that the student has to pass <u>every</u> ECSA graduate attribute (GA) addressed by Project to pass Project.

The GAs addressed by Project are GA3, GA6 and GA9 as we discussed early in the year. Please refer to the study guide for details.

- The examination evaluation form will appear here on the Clickup site so that you can see exactly what will be evaluated.

- You will see that there are sub-GAs that will be evaluated as well (i.e. subdivisions of GAs).

- Each of the sub-GAs need to be passed in order to pass the specific GA. This is an ECSA requirement that we apply strictly and consistently.

  In other words, should a student should fail any single one of the sub-GAs, the student will fail the module, or will at best be awarded a supplementary exam.

  It is important that you take note of this and that you have clarity on what will be evaluated.

  In this context, it may happen that a student says "how could I possibly have failed – my project worked at the demonstration". PLEASE TAKE NOTE: A design that "works" (that meets its requirements) is only ONE aspect of what is evaluated. The *entire* set of GAs and sub-GAs constitute the set of requirements and each one of these have to be passed, not just a single one. It is very important that you understand this.

4. REPORT ADDENDA – NOT ALLOWED

Note that submission of addenda after the report submission deadline is strictly prohibited. **Addenda will not be accepted.**

Any student that attempts to submit an addendum will have his/her report mark (i.e., the mark for the report version submitted by the deadline) adjusted *downward* to ensure that the mark awarded will *at best* result in a supplementary examination, based on non-compliance with GA6.

Note: aspects that do not appear in the report (e.g., a particular design or particular results) won't receive any credit when the report mark is awarded.

5. THE ORAL EXAMINATION: OVERVIEW

The oral exams take place in the date range as announced previously. The programme appears on the Clickup site – see the link from the Announcements page.

5.1 Dress code

A general rule of thumb is - always dress one step more formally than your expected audience. Dress professionally, as you would like to be regarded as being an aspiring professional.

5.2 Who attends the examination?

- **Each student has an examination panel** consisting of his/her study leader, a second lecturer from within the Department, and an external examiner (an experienced engineer from outside UP). *These three people are the only people that award your marks*.

  - You may find additional people in your examination, for example (i) an examiner of another student who is in your session (see below) and has his/her oral after yours; (ii) a

new lecturer in the department that may have observer status, or (iii) myself (prof Hanekom).

- None of these additional people award marks, but they may ask questions in your oral and at your demonstration.

- **Note that you may not invite visitors** to your examination. UP exam regulations are applicable.

- **Examinations are divided into exam sessions**. Each session has one external examiner for the entire session, along with the two internal examiners that will evaluate each student.

- The internal examiners will not necessarily be the same for every student in the session.

5.3 Examination process

- The programme indicates in which session your exam will take place.
  - You will only attend your own examination, not the entire session.

- You need to be at your oral exam venue (which the programme will indicate) 30 minutes before your time slot as indicated on the programme, except the first student of each session, who needs to be there 10 minutes before the session commences.

- Your oral examination (a 5-minute presentation and questioning by your examiners) **will take place at your oral examination venue** that appear on the programme.

- You will then have your demonstration at any of the departmental labs of your choice.

- Marks are finalised by the examiners at a calibration meeting at the end of each session. The objective is to ensure consistency in awarding of marks.
  - Final marks reflect a consensus among the members of the examination panel.
  - There are in total 36 exam sessions, and as many external examiners.

6. THE ORAL EXAMINATION: DETAILS

The Project examination consists of (i) the final report, and (ii) the oral examination.

The oral examination consists of:

- A 5-minute Powerpoint presentation
- Question time of 10 minutes
- A demonstration of 10 minutes

► Your **presentation and questioning** will take place at the oral exam venue that appears on the exam programme.

6.1 Presentation

Note that the presentation is simply an *introduction* to the questioning and that *no marks are awarded for the presentation*.

Examiners are allowed to stop you in the middle of your presentation to ask questions. If the examiners never give you a chance to complete the presentation, this is not an issue. Questioning flows naturally from the introduction (the presentation) in an oral examination. *Expect this to happen*.

Content of the presentation

There is no prescribed format for the presentation. The presentation mainly serves as an introduction to your oral. All the examiners have read a stack of reports, and you need to remind them what your project is about. But, you should also show (in your presentation) any new results that you may have.

However, DO NOT bring any handouts or addenda to the exam. As mentioned before, you WILL be penalised heavily if you do this, and no handouts or addenda will be accepted.

Use your time well. The following should work well, but you may organise the presentation as you feel would be appropriate.

1. What is my project about? (1 minute)
2. How did I do it? (1 minute)
3. Which particular problems did I run into (1 minute)
4. Results and evaluation thereof (2 minutes)

The time limit of 5 minutes is strict. Note that students will be stopped if the presentation continues beyond 5 minutes - this is strictly the maximum amount of time allowed for the presentation.

Powerpoint presentation

- Powerpoint 2016 or newer will be available.
- A data projector or plasma screen, and a PC or laptop computer will be available at the exam venues. (It may still be a good idea to bring your own laptop).
- Also bring your presentation on flashdisk and/or CD (it is suggested that you bring two copies on two memory sticks - it has happened in the past that the presentation is corrupted). An additional backup on CD may be a good idea.
- You will *most certainly* be penalised if you download a virus onto the computer!
- **Note:** <u>You have to bring your lab book along to the oral exams</u>.
- **Note:** <u>you have to bring a copy of your report to the oral exams</u>. The examiners may (for example) ask you a question about figure 23, and then you need to know what they are referring to. You don't need to bring a printed copy if you don't have one - an electronic copy will be adequate.

Nature of the presentation

> ▶ **Important note**: The oral exam is *not* a marketing exercise in which a stunning presentation should be used to hide what the student has or has not done.

▶ Marks are awarded for technical content at your oral examination, and showmanship contributes ZERO.

The idea with the student's presentation is mostly to remind examiners which particular project is presented. **No marks are awarded explicitly for the presentation.**

Rather, **marks are awarded for *oral defence of the project***, and these are based on the performance in the oral examination. This is GA 6.3 of the evaluation sheet; this includes specifically (i) how well questions are answered and (ii) how well the demonstration was planned and executed.

By implication, it is NOT a requirement that examiners allow a student to complete the presentation. E.g., if an examiner asks a question one minute into the presentation and this naturally leads into further questioning, it may happen that a student is not awarded the opportunity to complete his/her presentation. This is not a problem - the idea is to evaluate the student thoroughly in the available time.

Practical arrangements

If a student is not available when called into the exam room, that student will be indicated as "absent from examination". **The examiners are not allowed to wait for students that are late.**

Students need to wait outside the exam room and may take a seat on the chairs provided. Students will be called when it is their turn.

As mentioned before, you need to be at your oral exam venue (which the programme indicates) 30 minutes before your time slot as indicated on the programme, except the first student of each session, who needs to be there 10 minutes before the session commences.

6.2 Demonstration

Where does the demo take place?

Your **demonstration** may be in any lab of our Department. You may decide where to set up.

You may also set up elsewhere *on campus* if needed (e.g. in the parkade; on the Aula lawn; in the foyer of Eng 3). You will need to inform the examiners at your presentation where your demonstration is set up.

When does the demonstration take place?

The demonstration may follow directly after your presentation and questioning.

► However, examiners often postpone the demonstration part of the oral to later in the session. For example, examiners may decide to listen to three or four presentations and ask questions to these students at the exam venue before moving to the lab for the demonstrations. **This is allowed and is what examiners usually prefer to do.** ***Expect this to happen.***

Preparing for the demonstration

Please ensure that the demonstration is *very well planned*. You have 10 minutes for the demo, and no more. It happens on occasion students that arrive unprepared and then want to know what the examiners would like to see. Also, some students plan for a demo that is much longer than 10 minutes. Importantly, it is *your* demo, and you need to plan what to show in order to maximise your marks in the 10 minutes that you have available.

No additional time will be allowed to any student. This would not be fair to other students, and the programme does allow for this. Therefore, be ready to use the 10-minute demo slot to your best advantage.

To maximise your marks, be confident. Confident presentation of a well-planned demonstration will maximise your marks. You need to speak! Some students stand around at their demonstrations and wait for the examiners to ask something. **The demo is a presentation**.

►**A student could fail an exam because of a poorly planned demo.** Unprepared demonstrations and/or demonstrations that are stretched out beyond 10 minutes because students are not ready will almost certainly result in very poor marks for the demonstration, which will almost certainly lead to awarding of a failure or a supplementary exam at best.

► Know what you want to show. **YOU need to decide what you wish to show to maximise your marks. The examiners cannot decide for you.**

To help with this, prepare an A4 or A3 sheet that:

- lists the items that you intend to show, and/or that indicates the steps of the demo (this needs to be posted at your demo station);
- shows the functional block diagram of your design.

► **Focus on the system as a whole (i.e., the core requirements in the Project Proposal), not subsystems.** There is no time to show every subsystem in detail. Show the complete project *first*, but if a final integrated system is not available, you may decide to show subsystems. In this case, focus on what you have designed from scratch, rather than showing things that carry no credit (see the study guide). Decide what you would like to show to **prove** that your system works.

Set-up time

No demonstration setup time is allowed in the oral exam venue. Your demonstration needs to be set up and ready in a different room or lab.

Also, students will not be allowed any set-up time during his/her demonstration.

Involvement of helpers

You may involve people in the demo to assist *only if really necessary* (e.g., a subject on which an EEG signal is measured may be required). You won't be able to bring non-UP guests onto campus, so please refrain from involving non-student friends, employers or family members. Preferably, ask a friend in class to act as your assistant or subject (where this is appropriate for the project).

▶ Note that the exam is not a public event. You may not invite guests (e.g. parents or employer).

6.3 The oral examination – step by step

- In summary, the step by step procedure at the oral examination is as follows.
    - Set up your demonstration well in advance (in the lab or venue where you will demo) and ask a friend to look after it during your presentation and questioning. (No setup time is allowed at the oral - your demonstration needs to be ready).
    - Be at the oral venue 30 minutes early (or 10 minutes if you are the first student in the session).
    - Take a seat outside on the chairs provided and wait to be called in.
    - In the exam room, get your presentation ready (a Powerpoint presentation of 5 minutes *maximum*).
    - The examiners will then let you start with the presentation, and will stop you after at most 5 minutes, but perhaps earlier as explained previously.
    - This is followed by around 10 minutes of questioning.
    - The examiners will then either walk with you to your demonstration setup, or will ask you to get your demonstration ready and to wait for them in the lab while they speak to the next two or three students.
    - Your examination is complete after the demonstration.

- ▶ **Finally, after your oral:** <u>you need to return any items that you checked out</u> (e.g. instruments, DSP boards, borrowed components, etc). Do this on the day of your oral, or on the next weekday. All instruments and other borrowed items need to be returned NO LATER THAN Tuesday 29 November. **If your borrowed items are not returned in time, your marks will be delayed by several days.**

6.4 How to approach the presentation of your project in the report and at the examination, and what <u>*not*</u> to do

Engineering vs googleneering

Of course, you knew that you could not Google for the solution to your project. Now, in your report and oral, ensure that you focus on the things that YOU contributed, not the Googleneer stuff. Focus on YOUR first principles designs, and NOT those aspects that won't gain you any credit (see the study guide for a list of things that won't earn you any credit). *If you could find the solution to your project by hunting for solutions on the internet, this invalidated the project as a final year project*. Off-the-shelf solutions are not acceptable and are not permitted to constitute any major part of the design.

- The focus in Project is that students need to *demonstrate* their ability to function independently as engineer througout the design cycle. **A product that works according to specification, but which does not contain a strong design contribution from the student is not what is required in Project and won't earn a pass mark.** Please make sure you don't miss this point when presenting your work. Ensure your focus is on your own contribution.

- **To expand on this, note again that the following are not seen as final year project design challenges (as also expanded on in the study guide)**, so don't make them the focus of your presentation or demo at the exam, or of your report. These are aspects that appear in some projects, but for which students will gain zero, or very, very little credit in Project. These include GUI design, design and creation of databases, encryption and decryption of digital communication signals, design of power supplies (unless the student has a power electronics project where this is the core focus), and Android programming (Android programming per se is not seen as a challenge, but developing signal processing algorithms on an Android platform is an appropriate challenge in some projects). All of these things are mostly simple imitation aspects that anyone can do by following internet instructions. This is not engineering, does not provide any technical challenge, and will not gain you any credit – so don't waste your valuable examination time and report space on these.

- You have seen that a lot of emphasis was placed on developing **a product that works in actual field conditions**. *To make your system work and to demonstrate in real field conditions (as specified in your Project Proposal) is a minimum requirement.*

- This is because it is often easy to get something working in the lab, especially with the help of internet resources, but real world systems are far more challenging to get working reliably, simply because you cannot control the sources of noise.

- Noise may mean different things in different projects. Examples are interference from unwanted signals in a digital design, vibration in a measurement system, dust and vibration in a gate motor, bright sunlight in an optical detector system, low light levels in an image processing system, multipath or fading in a communication system, unreliable feedback in a control loop, unpredictable internet traffic in a computer network project, background noise or interfering voice in a speech recognition system, unpredictable slopes or unexpected obstacles that a robotic vehicle has to navigate and component tolerances in analogue design. There are many more examples.

- The point is that the real world contains noise, and that you as an engineer will have to *demonstrate* the ability to design systems that can cope with these sources of noise and still work reliably.

- This also means that a student would *not* have been able to "thumbsuck" solutions – the assumption is that the student has read appropriate material to help him/her identify appropriate solutions. Make sure this is clear from your report and that you cite this material correctly. You will need to cite high quality textbooks and journal articles in high quality technical journals (like IEEE journals) rather than hackers' resources on the internet.

A note on video material at the exams

Video material may be use at best as *partial* evidence for a system that works in field conditions. Video evidence is not accepted as complete evidence. For example, if the project involves tracking cattle on a farm, you need to provide evidence that your system has been tested on real animals in farm conditions, and that it works under these conditions. You would still need to prepare a demonstration on campus, which may involve tracking students across campus with your product.

A note on simulations

It is important in many projects to show that you developed a simulation first (perhaps in Matlab, Octave or Python), before you attempted an implementation. Here are the two parts of the golden rule mentioned in class in February:

- if a design works in simulation, it doesn't work in the real world yet, and there is no guarantee that it will work in the real world.
- However, if you can't get the system to work in simulation, it will never work in real life.

6.5 Traps to avoid

- **The quickest way to exit Project** is to fall into the trap of committing any act of plagiarism, academic dishonesty or collusion. If there is any evidence whatsoever that a student did not do every aspect of his/her project himself/herself, he/she will be charged with academic dishonesty and will face expulsion from the University. Of course, there is no problem if you discussed aspects of your design with your study leader and/or other lecturers in the department, or asked advice on a particular aspect from a friend in class.

- **Be extremely careful of collusion**, i.e. unauthorised cooperation. Examples of collusion are where student A uses sections of code that student B developed for his project; where student B writes code for student A; where student A designs part of student B's hardware, or where students A and B work together on a hardware aspect that is the same in their two projects. All your work work has to be your own.

- **Be absolutely truthful in your report and oral examination.** Students were instructed to be absolutely truthful in the report.

  If a student, for example, indicated in the discussion that "results show that the system works according to specification", but no results are given to back this up, the student would probably fail.

  If results were fabricated, the student will definitely fail and a case of academic dishonesty will be opened.

7. CONTINGENCY PLANS AND BACKUPS

Please make very regular backups of your report and your code, and ensure you have video evidence of working hardware.

Accidents do happen – accidental overwriting of your report or your code, hard disk failures and so on are things that have been known to happen, especially when working under pressure. Do not be stranded without a backup! Create multiple backups (external hard disk, flash disk, Google drive etc) and ensure that these are updated regularly.

Just like turning up for your exam on the incorrect date or time, or forgetting to prepare a particular section for an exam, there is unfortunately no recourse if your report is lost before submission, or if your hard disk failed and your code is lost. Please take responsibility and ensure that you have backups. Off-site backups (e.g. Google drive) provide good insurance against losses. Make multiple backups.

Do NOT tweak your hardware or software the day before your oral exam. If you have a working copy or system, don't take chances with it.

Blown up hardware that *used to* work won't be of any value at your demonstration – examiners can and will only evaluate what they see working.

Video evidence: It is a good idea to have video material of a working project ready at the examination. This may only be used as a backup, though – this cannot be used as your primary demonstration. **Video material may be used at best as *partial* evidence** for a system that works in field conditions. For example, if the project involves tracking cattle on a farm, you need to provide evidence that your system has been tested on real animals in real farm conditions, and that it works under these conditions. You would still need to prepare a demonstration on campus, which may involve tracking students across campus with your product in this example.

8. WHAT HAPPENS IF YOU ARE ILL AT THE PROJECT EXAMS?

► All exams, including those in Project, are handled within the relevant UP exam regulations.

Report

Make sure you have a contingency plan. The deadline for the report is known well in advance and is a strict deadline. Students need to prepare the final report early so that he/she can submit on time. It is assumed that the report is mostly complete and that students will perhaps be completing some final touches on the day of submission. A student that falls ill on the day of submission should have completed the report by then and should submit the report by the deadline. Note that reports are distributed to examiners immediately after the submission deadline; i.e. the examination commences at the submission deadline. If a student falls ill earlier and submits a valid medical certificate within the timeframe required by regulation, he/she should contact Prof Hanekom.

Oral examination and demonstration

Students that are ill on the day of the oral examination: if a student is ill on the day of the oral examination, he/she will need to comply with normal UP requirements relating to submission of documentary evidence within the given timeframe required by regulation. He/she may then apply for a sick exam at Faculty Administration and should also contact Prof Hanekom within the allowed timeframe. If a sick exam is granted, this exam will take place at the earliest possible date within the present exam period.